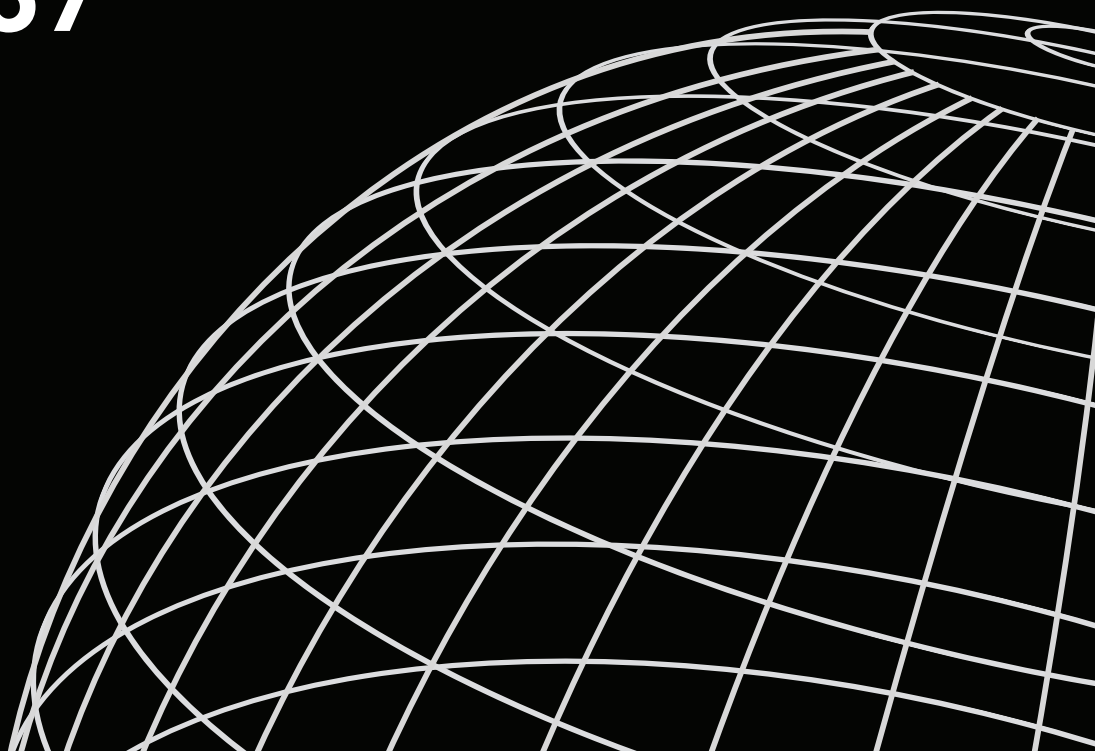# INTERNAL ADULT WOMEN MIGRANTS' USE AND ACCESS TO HEALTH SERVICES IN 15 DHS COUNTRIES

DHS ANALYTICAL STUDIES 87

DHS Analytical Studies No. 87

Internal Adult Women Migrants' Use and Access to Health Services in 15 DHS Countries

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PREFACE

The Demographic and Health Surveys (DHS) Program is one of the principal sources of international data on fertility, family planning, maternal and child health, nutrition, mortality, environmental health, HIV/AIDS, malaria, and provision of health services.

One of the objectives of The DHS Program is to analyze DHS data and provide findings that will be useful to policymakers and program managers in low and middle-income countries. The DHS Analytical Studies serve this objective by providing in-depth research on a wide range of topics, which typically include several countries and apply multivariate statistical tools and models. These reports are also intended to illustrate research methods and applications of DHS data that may build the capacity of other researchers.

The topics in this series are selected by The DHS Program in consultation with the U.S. Agency for International Development.

It is hoped that the DHS Analytical Studies will be useful to researchers, policymakers, and survey specialists, particularly those engaged in work in low and middle-income countries.

Sunita Kishor
Director, The DHS Program

ABSTRACT

This report uses Demographic and Health Survey data from 15 countries to examine internal migration of adult women age 18–49 between rural and urban areas and its relationship with access to and use of health services. The analysis includes the study of migrants' characteristics, trends in migration, and the relationship between migrant status and four outcomes related to access and use of health services. These outcomes are having at least four antenatal care visits, using modern contraceptives, having a major problem accessing health care for self due to obtaining money needed for treatment, and having a major problem accessing health care for self due to distance to facility. Migrant status included rural to urban migration and vice versa, while also distinguishing between recent (<3 years) and non-recent (3 to 9 years) migrants. The highest levels of rural to urban migration were found in Nepal, Kenya, Bangladesh, and South Africa (12 to 18%), but there were also high levels of urban to rural migration in Uganda and the Philippines (both at 10%). There were some moderate but statistically significant changes in migration levels as described in the trend analysis. Recent migrants were more likely to be young (age 18 to 24) and not currently in a union, while all migrant types had higher education than rural non-migrants. For the relationship with the outcomes, we find that there were few statistically significant findings for antenatal care (ANC) and modern contraceptive use outcomes. However, when there was statistical significance, the disparities by migrant status were often large, which warrants further country specific research. We also see some evidence of adaptation with disparities found between recent migrants and non-migrants, but no statistically significant difference between non-recent migrants and non-migrants. Overall, the largest and most consistent differences in the outcomes were found between those residing in urban or rural areas, regardless of duration of residence.

Key words: internal migrants, migration, rural to urban, adult women migrants, migration streams, duration of migration

1   BACKGROUND OF THE REPORT

1.1   Overview of the Problem

The past decades have been a period of tremendous social, economic, and demographic change, particularly for lower and middle-income countries (LMICs). Migration has been a fundamental component and driver of this process of change, with historically unprecedented numbers of people moving from their places of birth to seek opportunities elsewhere, often in urban areas. In 2005, an estimated 977 million individuals—roughly the equivalent of one-seventh of the global population—were migrants.[1] Of these, almost four of every five were internal migrants,[1] who move between localities and regions within countries, often for relatively short periods of time and for a wide variety reasons. Although the majority of this movement has been voluntary, much has also been in response to violence or natural disasters. This report focuses only on voluntary migration flows.

There is widespread acknowledgement that migration can be transformational for those who undertake it and can have significant implications for their health behavior. However, much of this research has either focused on international migration, only examined migrants in urban areas, or has treated internal migrants in urban or rural areas as a homogenous group. This is due in part to the complexity of internal migration—individuals move for an enormous range of reasons, for very different periods of time, and at very different stages of their lives. In contrast to international migration, internal migration is more likely to be circular; involving repeated movements between the "sending" and "destination" communities; be determined by factors such as the timing of key agricultural events; involve less time spent solely in "destination" communities, and potentially allowing for a greater degree of connection between migrants and their home communities.[2,3] As a result, there remain significant gaps in our understanding of how internal migration, particularly of varying frequencies and duration, can influence health behavior in LMICs.

This report addresses this gap by focusing on the relationship between migration and health outcomes for adult women migrants between urban and rural areas in 15 LMIC countries. We pay particular attention to the association between the time spent living in the migration destination and access to and use of health services, which will allow for an assessment of the potential differences between shorter and longer-term migration.

1.2   Migration, Behavioral Change, and Health

The relationship between migration and health outcomes is inconsistent and depends on who is migrating, when they do so in their lives, where they are migrating from or to, and why they migrated.[4,5] Migration is also a selective process, with those who chose to migrate potentially being quite different from those who chose not to in ways that influence their health behavior and outcomes. These may include easily observable characteristics such as age, education, marital status, health status or occupation and those that are less easily observed such as ambition, openness to new ideas, or comfort taking risks.[6–11] With health outcomes, the effect of migrant selection is especially complex. A substantial literature suggests that healthier individuals are more likely to be migrants (the "positive-selection" or "healthy migrant" hypothesis) and that return migrants, such as those moving back to rural areas after living in urban areas, may be less healthy than the migrants who are able to stay in the urban location (the "negative-selection" or "salmon-bias"

effect).[8,12,13] In some contexts, this selection could explain much of the differences observed between migrants and non-migrants,[11] and it means that simply comparing the health behaviors or outcomes of migrants to non-migrants could lead to misleading conclusions about the effect of migration on health.

Despite the challenges posed by the selectivity of migrants, a large body of research found that the changes in both the physical and social environments that can accompany migration, even internally within the same country, can have profound influences on health behaviors and outcomes. In terms of the physical environment, moving between rural and urban areas could have direct effect on the accessibility of healthcare, with the typically higher incomes, educational levels, and awareness of health issues and health infrastructure in urban areas potentially allowing greater access then in rural areas.[14,15] However, this increase could be at least partially offset for migrants by other factors, such as their relative poverty in the destination, the cost of accessing services, and other factors associated with urban environments. [16] Although urban residents as a group may enjoy better health than rural residents, the same may not be true for migrants, who often live in marginal communities within urban areas—such as slums—where health outcomes are poorer and who are typically poorer than long-term urban residents. This is especially likely for more recent urban migrants from rural areas. Conversely, migrants from urban to rural areas typically find their physical access to healthcare diminished, while potentially experiencing an increase in their relative socioeconomic standing.

In addition to potentially experiencing a very different physical environment than in their home communities, migrants often find themselves in very different social environments that may influence their beliefs, preferences, and health behaviors in a variety of ways.[17–21] For example, social norms and expectations for behavior, including those related to health, may be very different in urban and rural areas. Migrants from rural areas often find that social norms and expectations for behavior about premarital sex and use of health care services are very different in urban areas.

The effect of migration on health outcomes, including use of health services, is generally thought to operate through one or more of three processes – disruption, adaptation, and/or assimilation.[6,21–23] The *disruption* hypothesis focuses on how the migration experience interrupts normal behavior in ways that influence health behavior and outcomes, such as through spousal separation or economic disruption.[24,25] This is usually assumed to lead to comparatively short-term changes in behavior with very little change in the underlying beliefs and preferences. While also not necessarily implying more profound changes in beliefs or preferences, the *adaptation* hypothesis argues that migrants deliberately change their behavior in an attempt to adjust to the social rules and values of the new environment and fully take advantage of new opportunities. [21,26] Changes in behavior may take place relatively quickly as migrants seek to better "fit-in" at their new home, although these may represent a temporary reaction to their new situation rather than a profound change. In contrast, the *assimilation* hypothesis argues that migrants slowly adopt and internalize the norms and values of their new society.[26,27] This process is gradual, with migrants continuing to be strongly influenced by the norms and values of their home community, sometimes for generations. [21] This eventually results in full integration into the host community.

These processes could each influence behavior simultaneously, although this is most often viewed as a somewhat sequential process of personal and psychosocial change[26] where behavior changes first because of the disruption caused by the act of migration, then as a result of migrants adapting in an attempt to better meet their basic needs (such as employment or housing), and then finally when migrants internalize the

values, beliefs, and behavioral expectations of their destination location. While health behavior is influenced by both past and present context throughout this process,[3] the effect of past context is expected to weaken over time as migrants first adapt to and then assimilate the values and behaviors of their destination.

The sheer number of internal migrants in many settings, particularly between rural and urban areas, makes understanding how migration influences health behaviors particularly important for policymakers and planners. This report addresses this gap by focusing on four main research objectives that examine:

- The distribution and characteristics of adult women internal migrants who migrated between urban and rural areas

- The trends in migration between the most recent survey and a survey approximately 10 to 15 years prior

- The association between migration status and having at least four antenatal care (ANC) visits, modern contraceptive use, and problems in accessing care due to money or distance and whether migrants have worse or better outcomes compared to women from their place of origin

- If migrants who have lived longer in the current place of residence have better outcomes than recent migrants as the adaptation and assimilation hypotheses suggest

We hypothesize that recent rural to urban migrants will have lower utilization of services and more problems accessing care compared to urban residents, which would be consistent with the disruption hypothesis and with delays in the beginning of the adaptation or assimilation processes. We also hypothesize that non-recent rural to urban migrants would have better outcomes and are more similar to urban residents as they adapt to their environment, which would be consistent with the adaptation or assimilation hypotheses. We also hypothesize that urban to rural migrants would have better outcomes compared to rural residents and would be more similar to urban residents. This would reflect the influence of their time in urban areas and their potential improved socioeconomic standing compared to their rural peers.

2   DATA AND METHODS

2.1   Data

Table 1 summarizes the surveys in the analysis. This includes the most recent survey with available information on previous place of residence that is needed to construct the migration status variable. In addition, a DHS survey that is approximately 10 to 15 years before the most recent was also included for the trend analysis. Three countries—Nepal, South Africa, and Tanzania—could not be included in the trend analysis. For South Africa and Tanzania, previous surveys did not include information on previous place of residence, and for Nepal the definition for place of residence changed in the 2016 survey.

Table 1   Surveys in the analysis

Country	Most recent DHS survey year since 2010	Previous DHS with available data on previous place of residence since 2000
Bangladesh[1]	2017–18	2007
Benin	2017–18	2006
Cameroon	2018	2004
Haiti	2016–17	2005–06
Kenya	2014	2003
Liberia	2019–20	2007
Nepal	2016	na
Philippines	2017	2008
Rwanda	2019–20	2005
Sierra Leone	2019	2008
South Africa	2016	na
Tanzania	2015–16	na
Uganda	2016	2006
Zambia	2018	2007
Zimbabwe	2015	2005–06

[1] Ever-married women. na = not available.

2.2   Variables

2.2.1   Migration status

The main variable of interest is internal migration status among adult women, with a focus specifically on migration between urban and rural areas. Therefore, migrants between urban areas (urban-to-urban) and those between rural areas (rural-to-rural) are considered to be urban and rural non-migrants respectively, with the assumption that these moves involve relatively little change in either the physical or social environment related to healthcare behavior and access. In the DHS questionnaire, some surveys include questions on previous place of residence and the number of years the respondent lived in the current place of residence. From these questions, we can determine the migration status between urban and rural areas and the number of years migrants have lived in their current place of residence. Responses to previous place of residence include countryside, town, or city/capital area. Town and city were considered urban areas and countryside as rural areas. Therefore, this could be compared to current place of residence, urban or rural, to determine internal migration status. We assume that migrants who lived in the current place of residence

for 10 years or more are similar to residents and therefore classify this group as non-migrants. Therefore, the migration status variable was constructed with the following categories:

- Urban non-migrants (includes urban residents, urban-to-urban migrants, and rural-to-urban migrants that have stayed in the urban area for 10 or more years)

- Rural-to-urban migrants who have lived in the urban area for 3 to 9 years

- Rural-to-urban migrants who have lived in the urban area for <3 years (recent urban migrants)

- Rural non-migrants (includes rural residents, rural-to-rural migrants, and urban-to-rural migrants who have stayed in the rural area for 10 or more years)

- Urban-to-rural migrants who have lived in the rural area for 3 to 9 years

- Urban-to-rural migrants who have lived in the rural area for <3 years (recent rural migrants)

Since we know the duration of stay in the current place of residence, we were able to estimate the age at migration and exclude child migrants who have migrated before the age of 18. In addition, we exclude women with a current age of younger than 18. This was done because the reasons for migration and control over healthcare decisions are likely to be very different for these groups. We also exclude visitors and migrants from abroad from the analysis. The final analytical sample size is found in Appendix Table 1. The code to construct the migration measure and other variables in this analysis can be found on the DHS Program GitHub site in the Analysis Repository.[*]

While some of the migrants included in this study may have migrated involuntarily, the available data do not provide information on the reason for migration. As a result, both the analysis and interpretation assume that the migration was voluntary.

2.2.2 Outcome variables

We examine the relationship between four health outcomes that focus on access and use of health services and migration status among women age 18–49. These are:

- Having at least four ANC visits among women with a recent birth in the three years before the survey

- Currently using modern contraceptives. This excludes women who have never had sex

- Reporting finding money needed for treatment as a major problem in obtaining medical care for herself

- Reporting distance to health facility as a major problem in terms of accessing medical care for herself

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[*] https://github.com/DHSProgram/DHS-Analysis-Code/tree/main/AS87_migrants

2.2.3 Other variables

We include several background variables in the analysis. These are women's age, number of living children, education level, marital status, work status (paid or unpaid work), and wealth quintile. Bangladesh was the only ever-married sample in the analysis. Therefore, in Bangladesh only, marital status included women currently or formerly in a union. For the remaining surveys, marital status included women who were never in a union, currently in a union, and formerly in a union.

2.3 Methods

We describe the distribution of the internal migration status variable among adult migrant women age 18 to 49. We also examine the trends in migration status for all countries in Table 1 except Nepal, South Africa, and Tanzania where an examination of trends were not possible due to data constraints. We also examine the characteristics of migrants in the most recent survey for each country.

Cross-tabulations are performed to study the relationship between migration status and the outcomes of interest. In addition, adjusted logistic regression models are fit for each survey and each outcome. The adjusted models included the migration status variable and controlled for women's age, education, marital status, and work status. Household wealth status was found to be highly correlated with the migrant variable, while number of living children was highly correlated with women's age. Therefore, both these variables were not included in the regression models. However, the variables were used to describe the characteristics of migrants. Two adjusted models were fit, with one model with urban non-migrants as the reference category for the migrant status variable and another with rural non-migrants as the reference category. This was performed in order to compare each type of migrant to either urban or rural non-migrants.

All analyses considered the sampling design and sampling weights and were performed with Stata 17 software.

3   RESULTS

The results begin with discussing the migration status and trends followed by characteristics of migrants and cross-tabulation of migration status and outcomes variables. Finally, we present the results of the unadjusted and adjusted logistic regression models for each outcome.

3.1   Migration Status Distribution and Trends

Figure 1 shows the percentage distribution of adult women aged 18 to 49 by migration status for all surveys included in the analysis. The results are also presented in Appendix 1 along with the percentage of women living in urban and rural areas regardless of migration status. With the exception of Cameroon, Liberia, Nepal, the Philippines, and South Africa, the highest percentage of women are rural non-migrants followed by urban non-migrants. Figure 1 also shows that for all the countries except the Philippines, the proportion of rural non-migrants decreased in the later survey from the earlier survey. The largest decrease between the surveys for each country was found in Uganda followed by Liberia and Kenya, with an approximately 13 to 14 percentage point difference, and the smallest decrease was found in Haiti.

Figure 1   Distribution of women age 18–49 by migration status

Legend: ■ Rural non-migrants ■ Urban non-migrants ■ Rural-urban 3–9 years ■ Rural-urban <3 years ■ Urban-rural 3–9 years ■ Urban-rural <3 years

Countries and years:
- Bangladesh 2017–18
- 2007
- Benin 2017–18
- 2006
- Cameroon 2018–19
- 2004
- Haiti 2016–17
- 2005–06
- Kenya 2014
- 2003
- Liberia 2019–20
- 2007
- Nepal 2016
- Philippines 2017
- 2008
- Rwanda 2019–20
- 2005
- Sierra Leone 2019
- 2008
- South Africa 2016
- Tanzania 2015–16
- Uganda 2016
- 2006
- Zambia 2018
- 2007
- Zimbabwe 2015
- 2005–06

Internal migrants are categorized into two groups based on duration of residence in the current place of residence—those who lived in the urban area for 3 to 9 years and those who lived in the urban area for <3 years. In Figure 2, we focus on the percentage of migrants in each category in the most recent survey. Figure 2 shows that rural-urban migrants predominate in Nepal (18%), Kenya (13%), Bangladesh (12%), and South Africa (12%), particularly when compared to urban-rural migrants. More specifically, in these countries, over 6% and 5% of rural-urban migrants have lived in urban areas for 3 to 9 years and less than 3 years, respectively.

In contrast, according to the most recent survey, Benin, Cameroon, Haiti, Liberia, the Philippines, Uganda, and Zambia were found to have a predominance of urban-rural migrants compared to rural-urban migrants with the highest proportions found in Uganda and the Philippines at 10%. The percentage of migrants living in rural areas for 3 to 9 years varies widely, from 0.7% in Nepal and South Africa to 6% in the Philippines. Likewise, the percentage of recent migrants living in rural areas for less than 3 years ranges from 0.9% in Nepal to 6% in Uganda.

Figure 2   Percentage of internal migrant women age 18–49 in the most recent survey
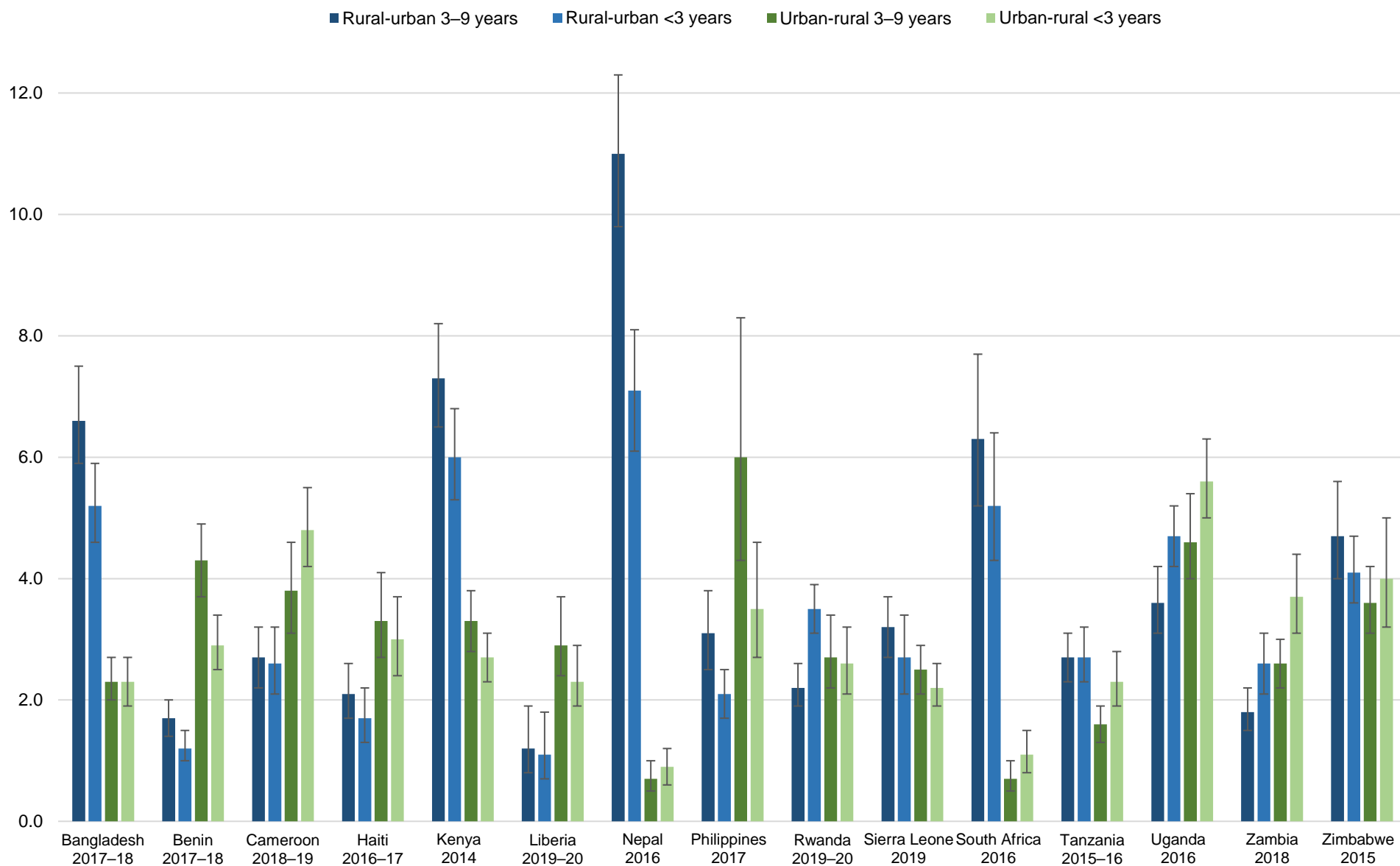
Appendix Table 2 examines the trends in the migration categories for all countries in the analysis except for Nepal, South Africa, and Tanzania, where estimation of trends was not possible. The results show that there were relatively small magnitudes in the difference between surveys for each migration category, ranging between 0 and 4 percentage points. The table first shows the overall trend of rural-urban and urban-rural migrants, and then examines the trends for each migration stream by duration of stay.

Overall, the largest increase in rural to urban migration was found in Kenya, Bangladesh, and Uganda, where the percentage of rural-urban migrants increased by 3 to 5 percentage points between the surveys that were approximately 10 years apart. There were also significant but smaller increases in Rwanda, Sierra Leone, and Zimbabwe. The largest decrease in rural to urban migration was found in the Philippines followed by Cameroon and Haiti. There were no significant changes in rural to urban migration in Benin, Liberia, and Zambia. When we examine this migration stream by duration of stay, we find that the increases in rural to urban migration observed in Bangladesh and Kenya were lower for recent migrants compared to migrants with a longer duration of stay. In Rwanda, Sierra Leone, and Zimbabwe, the significant increase was among only the recent migrants.

The largest increase in urban to rural migration was found in Rwanda, followed by the Philippines, Uganda, Cameroon, and Zimbabwe. In Rwanda, this increase was similar for recent and non-recent migrants (both approximately 2 percentage point increase). In the Philippines, the increase in urban to rural migration was significant only among non-recent migrants, while in Zimbabwe it was only among recent migrants. In Cameroon, the increase in urban to rural migration was higher among recent migrants compared to non-recent migrants. There was also a relatively large decrease in urban to rural migration found in Liberia (approximately 5 percentage point decrease), followed by Kenya (3 percentage points), and Sierra Leone (2 percentage points). In Kenya and Liberia, this decrease was similar for recent and non-recent migrants, although in Sierra Leone there was only a significant decrease among non-recent migrants. There was no significant change in urban-rural migrants observed in Bangladesh, Benin, Haiti, and Zambia.

3.2   Characteristics of Migrants

Appendix Table 3 describes the characteristics of women in our analytical sample by migration status for the most recent survey in each country. The individual characteristics that describe age, parity, education level, work status, and wealth status include the percentage of women age 18 to 24, with four or more children, with secondary or more education, who are working and paid, and those who are in the first or second wealth quintile. All variables examined were found to be significantly associated with the migration status variable. The findings provide insights into to the selection bias of internal migration.

There were some cross-cutting findings across the countries in the characteristics of migrants. Figure 3 shows the percentage of women age 18 to 24 by migration status. We see that for all countries, the highest level of women in this age group was found among recent migrants. This was usually the highest for rural to urban migrants, followed by urban to rural migrants. The younger profile of these migrants is likely the reason recent migrants had the lowest percentage of having four or more children.

Figure 3   Migration status by percentage of women age 18–24
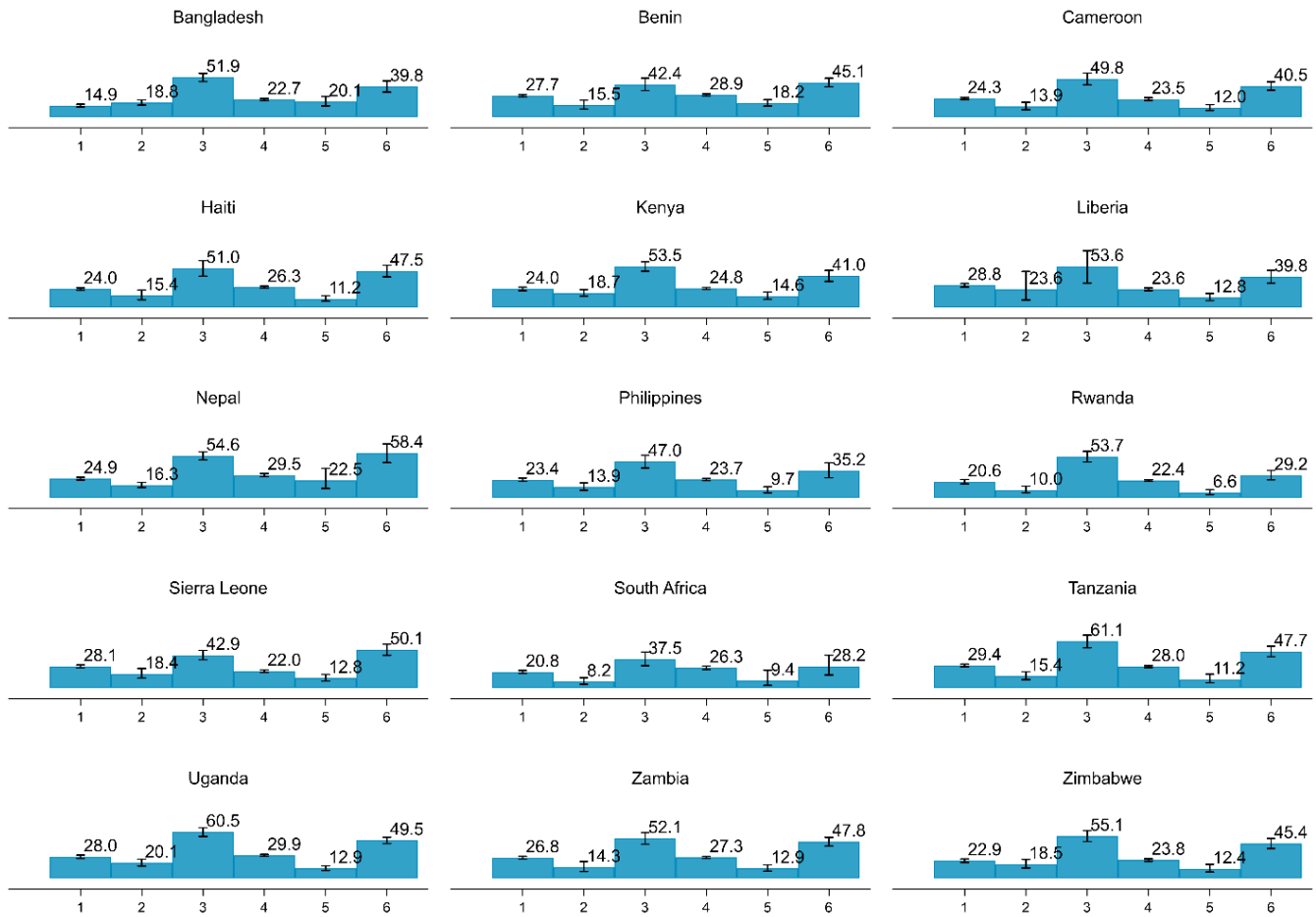
Note: Categories in order from 1–6 represent: 1. urban non-migrants, 2. rural-urban migrants 3–9 years, 3. rural-urban migrants <3 years, 4. rural non-migrants, 5. urban-rural migrants 3–9 years, 6. urban-rural migrants <3 years.

With education, the percentage of total women, regardless of migration status, with a secondary or higher education varies across study countries from 21% in Benin and Tanzania to 89% in South Africa. Appendix Table 2 shows that, in most countries, urban non-migrants had the highest percentage of women with secondary or higher education level compared to other migrant types. There were some exceptions. For example, in Nepal, recent migrants (in either direction of migration) had the highest percentage of women with secondary or more education. For all countries, all migrant types had higher levels of education compared to rural non-migrants. In terms of education, migrants were more similar to urban non-migrants regardless of the direction of migration.

In several countries, the lowest percentage of women currently in a union was found in recent rural-urban migrants (Figure 4 and Appendix Table 3). The difference between the percentage of women currently in a union between recent rural-urban migrants and other groups was especially apparent in Haiti, Kenya, Liberia, the Philippines, Rwanda, Tanzania, Uganda, and Zimbabwe (as shown in Figure 4). Since Bangladesh was the only ever-married survey in this analysis, the percentages reflect the proportion of women currently in a union versus formally in a union. Nepal had a unique pattern in which only urban non-migrants had the lowest proportion of women currently in a union, while the proportion was similar for the remaining groups. In Sierra Leone and Cameroon, the proportion of women currently in a union was the lowest for urban non-migrants,

followed by recent rural-urban migrants. In many countries, women living in rural areas had higher proportions of women currently in a union with the exception of South Africa where it was the lowest among rural non-migrants.

Figure 4   Migration status by percentage of women currently in a union
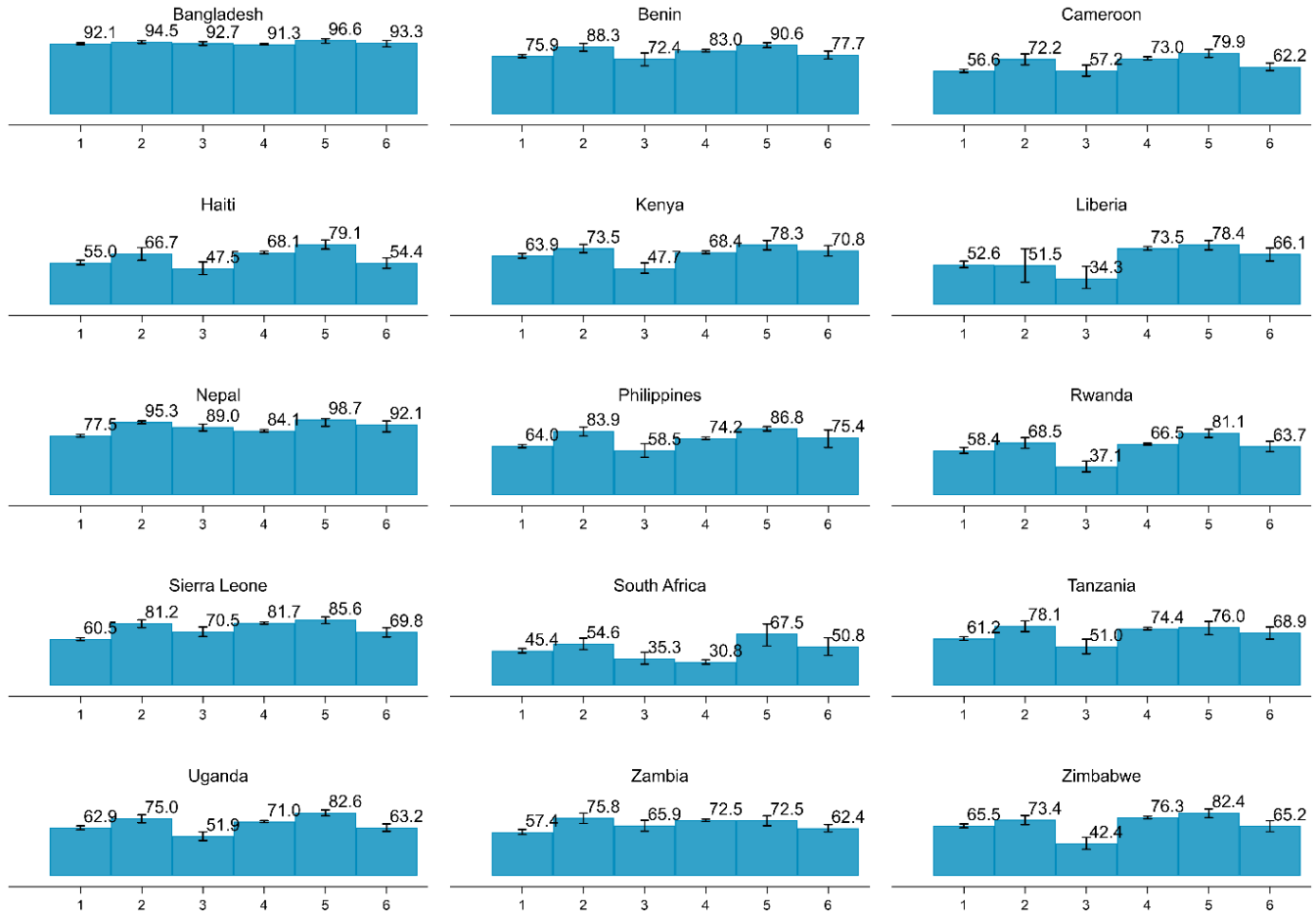
Note: Categories in order from 1 to 6 represent: 1. urban non-migrants, 2. rural-urban migrants 3–9 years, 3. rural-urban migrants <3 years, 4. rural non-migrants, 5. urban-rural migrants 3–9 years, 6. urban-rural migrants <3 years.

In many countries, migrants also had a higher proportion of women who worked for pay compared to non-migrants. In some countries, such as Bangladesh and Sierra Leone, this was only higher among rural to urban migrants compared to other groups. One exception was in Haiti where the lowest proportion of women that worked for pay was found among recent migrants, regardless of the type. However, this was higher for migrants who had stayed longer in the current place of residence. This increase in the percentage of women who work for pay with the increase in the duration of stay was also found in several other countries such as Cameroon, Liberia, Rwanda, Sierra Leone, Tanzania, Zambia, and Zimbabwe and was the case for rural to urban and urban to rural migrants.

Rural non-migrants had the highest proportion of women who are from households in the first or second wealth quintile. In general, the results show that migrants are more similar to non-migrants in their current place of residence than their place of origin.

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3.3   Cross-tabulation of Migrant Status and Outcomes

3.3.1   Antenatal care

Table 2 and Figure 5 summarize the cross-tabulation of having at least four ANC visits with migration status. Ideally, we hope to see high levels of ANC visits and at least a completion of four visits for all women, with no significant difference between the migration status categories. Overall, adult women in Liberia, Nepal, the Philippines, Sierra Leone, South Africa, and Zimbabwe had the highest proportion of at least four ANC visits, with more than three-quarters of women in most recent survey in each country. Table 2 shows that there were no significant differences between this outcome and migration status in Liberia 2019–20, Rwanda 2019–20, South Africa 2016, Zambia 2007 and 2018, and Zimbabwe 2015. For the remaining surveys, there were significant differences by migration status that were sometimes large. In many surveys, rural non-migrants had the lowest percentage of having at least four ANC visits, while urban non-migrants had the highest with migrants falling somewhere in between. In the most surveys, recent migrants from rural to urban areas had lower percentages of ANC visits compared to rural to urban migrants who have lived 3 to 9 years in the urban area. In other words, rural to urban migrants become more similar in terms of ANC visits to urban non-migrants the longer their duration of stay, which is consistent with the adaptation hypothesis. This difference between rural to urban migrants by duration of stay was highest in Haiti 2016–2017 (82% for 3 to 9 years and 52% for <3 years). The increase in ANC visits with an increase in duration of stay was also relatively high in Cameroon, Kenya, the Philippines, and Tanzania. In some surveys, there was a reverse trend with recent rural to urban migrants having more ANC visits- compared to the rural to urban migrants who stayed for 3 to 9 years in the urban area. This difference was the highest in Zambia where 62% of recent rural to urban migrants had at least four ANC visits compared with 48% of non-recent rural to urban migrants.

The same pattern is seen in some surveys for migrants to rural areas, where we see urban to rural migrants become more similar to rural non-migrants, with lower ANC visits the longer the duration of stay in the rural area. This was found to be highest in the Kenya 2003 survey, where 64% of recent urban-rural migrants had at least four ANC visit compared with 46% for non-recent urban-rural migrants (closer to the rural non-migrant value). However, several surveys (usually earlier surveys) had a reverse trend with a higher percentage of ANC visits with the longer the duration of stay. The gap was found to be the highest in the most recent survey of the Cameroon and Zimbabwe.

In terms of trends, we see some improvements in both the overall level of having at least four ANC visits and also in the disparities between the different migrant groups. For example, Figure 5 shows higher percentages of ANC visits in Bangladesh for all migration categories between the two surveys. There is also less dispersion in the estimates between the categories, which indicates less disparity in the most recent survey but with some relatively large differences. In Benin, we also see fewer disparities between the migration groups, although there were decreases in the proportions of ANC visits over time. We also see improvements in the Philippines, Rwanda, Sierra Leone, and Uganda.

Table 2 **Cross-tabulation of having at least four antenatal care visits for the most recent birth in the last 3 years and migration status among women age 18–49**

Country	DHS survey	Total % [95% CI]	Urban non-migrants % [95% CI]	Rural-urban migrants 3–9 years % [95% CI]	Rural-urban migrants <3 years % [95% CI]	Rural non-migrants % [95% CI]	Urban-rural migrants 3–9 years % [95% CI]	Urban-rural migrants <3 years % [95% CI]	p value
Bangladesh	2017–18	51.3 [48.4,54.3]	70.7 [64.8,76]	58.5 [50.8,65.8]	51.5 [43.1,59.8]	42.3 [38.6,46.1]	59.6 [44.5,73]	60.7 [45.5,74]	<.001
	2007	27.5 [24.1,31.1]	51.5 [44.2,58.8]	33.9 [24.3,45]	27 [16.8,40.5]	18.5 [15.1,22.5]	(33.4) [14.6,59.7]	(48.4) [29.1,68.2]	<.001
Benin	2017–18	51.9 [49.8,54]	57.2 [53.3,61.1]	64.3 [53.7,73.7]	56.8 [44.2,68.6]	47.7 [44.8,50.7]	48.4 [41.7,55.1]	56 [48.5,63.2]	<.001
	2006	59.1 [57,61.1]	70.8 [67.4,74]	68.8 [59.3,76.9]	66.5 [55.9,75.7]	51.4 [48.8,54.1]	63.6 [57.2,69.7]	74.2 [65.9,81]	<.001
Cameroon	2018–19	64.7 [61.6,67.6]	80.5 [77.6,83]	78.7 [70,85.4]	64.1 [51.9,74.8]	47.8 [42.8,52.8]	72.6 [63.4,80.3]	63.7 [56.5,70.3]	<.001
	2004	60.1 [57.7,62.4]	76.6 [73.5,79.3]	72.5 [61.8,81.2]	61.6 [49.9,72.2]	45.4 [41.8,49.2]	57.5 [47.9,66.5]	67.9 [59.3,75.5]	<.001
Haiti	2016–17	65 [61.9,67.9]	77.5 [73.5,81.1]	81.8 [66.2,91.2]	(52.9) [36.3,68.8]	57.8 [53.5,61.9]	72.3 [61.9,80.7]	67.3 [57.2,76]	<.001
	2005–06	52 [48.8,55.2]	70.4 [65.3,75]	64.1 [49.8,76.3]	48.8 [31.8,66.1]	43.8 [39.3,48.4]	54.9 [35.3,73.2]	44.1 [33.2,55.5]	<.001
Kenya	2014	56.6 [54.3,58.9]	66 [61.2,70.4]	73.7 [65.7,80.4]	60.7 [51.2,69.4]	48.5 [45.7,51.3]	58 [49.5,66]	66.2 [55.5,75.4]	<.001
	2003	51.9 [49.3,54.4]	67.5 [61.9,72.7]	71.5 [61.4,79.8]	64.7 [52.7,75]	47.1 [44.1,50.2]	45.6 [35.9,55.6]	63.7 [51.4,74.5]	<.001
Liberia	2019–20	87.5 [85.2,89.5]	90.6 [86.6,93.4]	nd	nd	84.1 [81.2,86.7]	84.8 [74,91.6]	90.5 [81.1,95.5]	.066
	2007	65.4 [61,69.5]	75.3 [68.7,80.9]	(84.8) [61.3,95.1]	(82.3) [65.6,91.9]	58.3 [51.8,64.5]	67.1 [57.8,75.3]	72.4 [62.4,80.5]	<.001
Nepal	2016	75.4 [72.2,78.3]	80.4 [75.3,84.6]	79.8 [73.6,84.8]	84.5 [75.5,90.6]	66.6 [61,71.7]	nd	nd	.001
Philippines	2017	86.7 [84.9,88.4]	88 [84.1,91]	95.2 [87.4,98.3]	84.1 [66.3,93.4]	83.4 [80.9,85.6]	92.7 [88.6,95.4]	88.9 [83.7,92.6]	.006
	2008	77.4 [75.4,79.3]	82.1 [78.8,84.9]	80.8 [73,86.7]	80.7 [72.9,86.6]	71.6 [68.4,74.6]	81.9 [73.7,88]	80 [72.1,86.1]	<.001
Rwanda	2019–20	47.3 [45.4,49.2]	51.4 [44.9,57.8]	49.3 [40.7,58]	52.4 [43.6,61.2]	46.3 [44.2,48.4]	48.6 [37,60.3]	49.9 [40.1,59.6]	.466
	2005	13 [11.8,14.4]	17.4 [14,21.3]	18.5 [12.4,26.6]	16.6 [9,28.5]	12.1 [10.8,13.7]	nd	nd	.002
Sierra Leone	2019	79.1 [76.9,81]	70.9 [65.9,75.4]	75.6 [65.6,83.4]	81.3 [72.8,87.6]	82.6 [80.4,84.6]	86.4 [80.1,90.9]	83.5 [74.8,89.5]	<.001
	2008	55.3 [52.4,58.3]	64.2 [58.3,69.7]	64.5 [48.9,77.6]	63.4 [47.5,76.8]	51.5 [47.8,55.2]	53.9 [44.8,62.8]	55.1 [42.9,66.8]	.001
South Africa	2016	77.8 [74.7,80.6]	77.2 [72.8,81]	71 [58.8,80.8]	71.4 [54.8,83.8]	80.2 [76.1,83.8]	nd	(97.5) [95.2,98.7]	.104
Tanzania	2015–16	49.4 [47.3,51.5]	64.4 [60.6,68]	64.9 [51.3,76.5]	54 [40.3,67.1]	43.2 [40.7,45.8]	56.5 [43.6,68.5]	51.3 [38.6,63.8]	<.001
Uganda	2016	60.4 [58.6,62.1]	67 [63.3,70.4]	62.3 [52.8,71]	67.4 [59.1,74.8]	57.2 [54.9,59.4]	66.9 [60,73.1]	63.9 [57.9,69.4]	<.001
	2006	46.5 [44.2,48.9]	58.3 [52,64.3]	66.8 [45.3,83]	49.8 [30.8,68.9]	44.2 [41.7,46.8]	44.5 [34.2,55.3]	52.5 [43.5,61.4]	.002
Zambia	2018	63.3 [61.2,65.3]	61.6 [57.9,65.1]	48.3 [36,60.8]	62.4 [51.3,72.4]	64.2 [61.5,66.9]	67.4 [58.8,75]	66.4 [59.6,72.7]	.144
	2007	59.5 [57.2,61.8]	56.8 [52.2,61.4]	59.8 [46.2,72]	57.8 [44.9,69.6]	60.5 [57.6,63.4]	65.5 [55.2,74.6]	57 [44.4,68.7]	.491
Zimbabwe	2015	75.3 [72.9,77.5]	78.2 [73.7,82.1]	74.4 [61.8,84]	68.7 [54.2,80.4]	75 [71.9,77.9]	75.6 [66.2,83.1]	68.6 [57.7,77.8]	.436
	2005–06	69.2 [66.6,71.6]	74.8 [70.6,78.7]	74.3 [66.2,81.1]	81.9 [67.1,91]	66.5 [63.3,69.6]	72 [55.9,83.9]	64.8 [50.9,76.6]	.010

Note: nd indicates that the estimate was not displayed because it was based on less than 25 unweighted cases. Estimates in parenthesis indicate that the estimate should be interpreted with caution because it is based on 25–49 unweighted cases.

Figure 5   **Percentage of adult women having at least four antenatal care visits for the most recent birth in the last 3 years by migration status among women age 18–49**

- ● Rural-urban 3–9 years
- ● Urban-rural 3–9 years
- ● Rural-urban <3 years
- ● Urban-rural <3 years
- ■ Rural non-migrants
- ■ Urban non-migrants
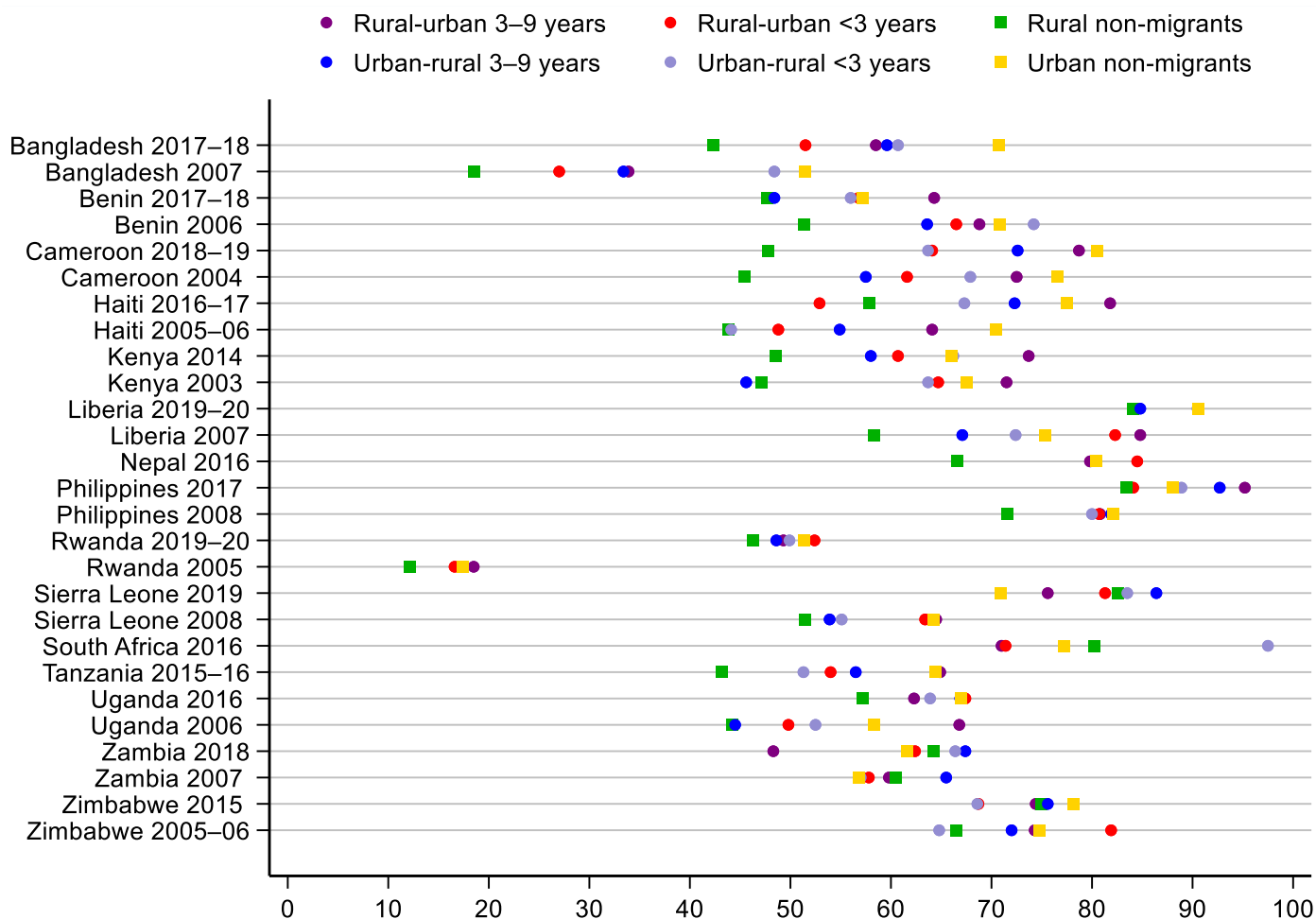
3.3.2   Modern contraceptive use

Table 3 and Figure 6 summarize the cross-tabulation of modern contraceptive use with migration status. As with the ANC outcome, we would ideally like to see no significant difference in modern contraceptive use by migration status. However, only two surveys showed no significant differences by migration status: Haiti 2016–17 and South Africa 2016. Modern contraceptive use ranged from a low of 13% in Benin to a high of 60% in Zimbabwe for the most recent survey. It was also close to 50% or higher in the most recent survey of Bangladesh, Kenya, Rwanda, and South Africa.

In most surveys, urban non-migrants and rural-urban migrants (regardless of duration) had the highest levels of modern contraceptive use with small differences between the three categories. In the Philippines 2017 and Rwanda 2019–20 surveys, an unexpected pattern occurred where rural non-migrants had higher levels of modern contraceptive use compared to urban non-migrants. In Zambia 2018, it was highest among urban-rural migrants who had lived in the rural area for 3 to 9 years. In Nepal 2016, all migrant types had lower modern contraceptive use compared to rural or urban non-migrants with recent migrants having the lowest levels. Recent urban-rural migrants also had the lowest levels of modern contraceptive use in Bangladesh 2017–2018, and in both the Philippines surveys. For Tanzania 2015–16, Uganda 2016, and Zimbabwe 2015, it was the

lowest as well but along with recent rural to urban migrants. Recent rural to urban migrants had the lowest modern contraceptive use in Kenya, Rwanda, Tanzania, and Zimbabwe in those countries most recent surveys.

To examine whether duration of stay after migration improves modern contraceptive use, we compared recent and non-recent migrations for rural-urban and urban-rural migrants. For rural-urban migrants, the greatest increase in modern contraceptive use with increased duration of stay was found in Zimbabwe 2015, Bangladesh 2007, Kenya both surveys, and Tanzania. However, in both Liberia surveys and the most recent survey in Sierra Leone, recent rural-urban migrants had higher levels compared to non-recent migrants. For urban-rural migrants, we observe that more surveys showed that the longer duration of stay decreased modern contraceptive use.

When we examine the changes between two surveys for the countries where trends were possible, we see some improvements. For example, in Bangladesh and Haiti, recent rural-urban migrants improved their modern contraceptive use from being the lowest in the earlier surveys to one of the highest. However, at the same time for Bangladesh, modern contraceptive use decreased among recent urban-rural migrants. Modern contraceptive use increased overall for all countries The greatest increase was found in Rwanda across all migrant categories, and was followed by relatively large increases in Kenya, Liberia, and Zambia.

Table 3   Cross-tabulation of modern contraceptive use and migration status among women age 18–49

Country	DHS survey	Total % [95% CI]	Urban non-migrants % [95% CI]	Rural-urban migrants 3–9 years % [95% CI]	Rural-urban migrants <3 years % [95% CI]	Rural non-migrants % [95% CI]	Urban-rural migrants 3–9 years % [95% CI]	Urban-rural migrants <3 years % [95% CI]	p value
Bangladesh	2017–18	47.3 [46,48.6]	49.6 [47.3,51.9]	54 [49.4,58.6]	55 [50.5,59.5]	45.1 [43.3,47]	49.7 [41.9,57.5]	34 [26.8,42]	<.001
	2007	42.5 [40.7,44.3]	48.5 [45.5,51.5]	54.6 [48.1,60.9]	36.6 [30.1,43.5]	39.8 [37.5,42.2]	41 [29.7,53.3]	38.7 [26,53.1]	<.001
Benin	2017–18	12.9 [12,13.8]	15.5 [14,17.2]	14 [8.9,21.3]	15.5 [9.9,23.6]	11 [10,12.1]	10.9 [8.3,14.2]	13.6 [9.8,18.6]	<.001
	2006	7 [6.5,7.7]	11 [9.9,12.3]	5.6 [3.1,9.8]	9.8 [5.7,16.4]	4.7 [4.1,5.5]	3.7 [2.2,6.1]	6.8 [4.2,10.9]	<.001
Cameroon	2018–19	18.9 [17.6,20.4]	24.3 [22.4,26.2]	21.8 [16.5,28.3]	20.6 [14.3,28.7]	11 [9.1,13.2]	17.2 [13.1,22.4]	20.2 [16.2,24.8]	<.001
	2004	15.2 [14.1,16.4]	23.7 [21.8,25.7]	13.6 [9.8,18.6]	15.5 [11.5,20.4]	6.5 [5.5,7.7]	9.1 [5.8,14.1]	12.5 [9,16.9]	<.001
Haiti	2016–17	27.1 [25.7,28.6]	27.2 [24.9,29.7]	34.5 [23.9,46.9]	33 [25.6,41.4]	26.7 [25,28.5]	23.7 [19.3,28.7]	26.5 [21.6,32.2]	.290
	2005–06	22.4 [20.9,24.1]	25.4 [23.2,27.8]	21.6 [15.5,29.4]	15 [10.2,21.7]	20.3 [18.1,22.8]	32 [24.1,41.2]	19.7 [12,30.7]	.003
Kenya	2014	46.5 [45.1,48]	49.5 [46.4,52.6]	55.9 [50.4,61.2]	41.9 [35.3,48.9]	43.6 [41.8,45.4]	51.1 [43.4,58.7]	47 [39.7,54.4]	<.001
	2003	29.1 [27.2,31.1]	38 [34.7,41.4]	38.9 [31.2,47.2]	24.4 [19.9,29.7]	25.9 [23.5,28.5]	34.8 [28.2,42.1]	28.3 [21.7,36.1]	<.001
Liberia	2019–20	25.9 [24,27.9]	25.6 [22.6,28.9]	(31.2) [16.7,50.7]	(41.9) [23.5,62.9]	24.3 [22.3,26.5]	39.7 [31.6,48.4]	27.8 [20.6,36.3]	.013
	2007	12.2 [10.8,13.8]	19.3 [16.8,22]	(8.3) [2.5,24.5]	22.8 [11.6,40]	6.8 [5.2,8.8]	8.5 [5.6,12.7]	14.2 [9.9,20]	<.001
Nepal	2016	42.3 [40.6,44]	48.8 [46.4,51.1]	35.9 [32.1,39.9]	28.7 [22.7,35.6]	39.5 [36.3,42.8]	(34.6) [21,51.2]	23.2 [12.4,39.1]	<.001
Philippines	2017	35.5 [34.2,36.8]	32 [30.2,33.8]	35.9 [28.7,43.8]	35.7 [27.1,45.4]	39.8 [38.1,41.6]	34.2 [26.8,42.5]	28.2 [22.6,34.6]	<.001
	2008	31.3 [30.1,32.6]	31.7 [29.8,33.7]	33.9 [28.8,39.5]	28.4 [23.7,33.7]	31 [29.2,32.9]	37.2 [31.9,42.8]	22.8 [17.6,29]	.026
Rwanda	2019–20	49.7 [48.5,51]	44.1 [40.6,47.6]	46.1 [39.1,53.2]	37.1 [31.8,42.7]	51.4 [50,52.9]	52.1 [45.6,58.6]	47.2 [40.3,54.2]	<.001
	2005	8.2 [7.4,9.1]	17 [14.3,20]	13.5 [8.6,20.5]	9.4 [5.1,16.7]	6.7 [5.9,7.5]	(15.5) [6.2,33.7]	(16.9) [5.9,39.7]	<.001
Sierra Leone	2019	24.9 [23.8,26.1]	30.5 [28.6,32.4]	25 [20,30.8]	32.7 [26.7,39.4]	20.5 [19,22.2]	21.7 [16.4,28.3]	27.1 [21.7,33.2]	<.001
	2008	8.5 [7.5,9.6]	17.6 [15.1,20.5]	10.6 [5.2,20.2]	10.9 [5.5,20.3]	4 [3.2,5]	5.5 [3.2,9.2]	5.9 [3.1,10.9]	<.001
South Africa	2016	52.9 [51.1,54.8]	53 [50.4,55.6]	55.7 [47.1,64]	52.5 [44.2,60.6]	52 [49.5,54.5]	57.9 [40,73.9]	56.2 [38.7,72.4]	.916
Tanzania	2015–16	32.2 [30.7,33.6]	35.7 [33.5,38]	38.1 [30.8,46]	24.2 [17.7,32.1]	30.8 [28.8,32.8]	30.4 [22.6,39.6]	26.2 [20.1,33.4]	.001
Uganda	2016	32.2 [31,33.5]	38.2 [35.6,40.8]	37.4 [32.4,42.8]	30.6 [26.1,35.5]	29.8 [28.3,31.2]	37.4 [32.7,42.3]	30.5 [26.6,34.8]	<.001
	2006	18.9 [17.5,20.4]	36.9 [33,41]	33.4 [24.8,43.1]	27.7 [20.5,36.4]	14.4 [13,15.9]	28.4 [21.4,36.7]	23.5 [16.8,31.8]	<.001
Zambia	2018	40.7 [39.3,42.2]	42.3 [39.8,44.9]	42 [33.8,50.8]	44.9 [36.1,54]	38.1 [36.2,39.9]	54 [47.5,60.4]	42.8 [38.1,47.6]	<.001
	2007	29.6 [28.1,31.1]	36.7 [33.9,39.6]	30.1 [21.6,40.2]	25.9 [18.2,35.5]	24.4 [22.5,26.4]	37.8 [31.3,44.8]	28.3 [20.1,38.3]	<.001
Zimbabwe	2015	60.1 [58.6,61.6]	62 [59,64.8]	69.9 [63.8,75.4]	50.5 [42.2,58.8]	59 [56.9,61.2]	65.7 [57.9,72.7]	51.7 [45,58.4]	<.001
	2005–06	50.3 [48.6,52]	55.9 [53,58.8]	62.8 [56.6,68.6]	52.7 [43.4,61.8]	46.9 [44.6,49.1]	42.5 [32.2,53.4]	49.6 [41.5,57.8]	<.001

Note: Estimates in parenthesis indicate that the estimate should be interpreted with caution because it is based on 25–49 unweighted cases.

Figure 6   Percentage of modern contraceptive use by migration status among women age 18–49

3.3.3   Problems accessing care due to getting money needed for treatment

Table 4 and Figure 7 summarize the cross-tabulation of problems accessing care due to money needed for treatment with migration status. For this outcome, we would ideally like to see low levels of problems accessing care due to money and with no significant differences by migration status. However, migration status was significantly associated with reporting a problem in obtaining money for treatment for all surveys (Table 4). Across study countries for the most recent survey, the percentage of women who reported a problem in obtaining the money needed for treatment ranged from 13% in South Africa to 74% in Haiti. More than half of women in Benin, Cameroon, Nepal, Sierra Leone, and Tanzania reported that obtaining the money needed for treatment was a problem in the most recent survey.

In all surveys, the highest percentage for this outcome was found among rural non-migrants. This was the one of the lowest among urban non-migrants for most surveys except in Liberia 2019–20 and Nepal 2016. In Liberia 2019–20 survey, rural to urban migrants had fewer problems accessing care due to money compared to urban non-migrants. In the Nepal 2016 survey, it was the urban to rural migrants that had the least problems. Except in Liberia and to a much lower degree in Benin, Cameroon, Nepal, and Tanzania, recent rural to urban migrants had more problems accessing care due to money compared to urban non-migrants in the most recent survey. The largest gap was found in Haiti, Sierra Leone, and Zimbabwe in the most recent survey.

We would expect to see rural to urban migrants who stayed longer in the urban area to have become more established financially compared to recent migrants and therefore have fewer problems accessing care due to getting money. However, this was only found in the recent surveys of Liberia and Sierra Leone and in the earlier survey of Zimbabwe. For the other migration stream from urban to rural areas, recent migrants in the most recent surveys of the Philippines, Sierra Leone, and Zimbabwe had significantly fewer problems accessing care due to cost compared to non-recent migrants.

In general, for most countries where trends could be observed, there was a decrease in the level of problems accessing care because of money over time. In Cameroon and Haiti, the decrease between the two surveys was relatively small. Five countries (Rwanda, Uganda, Liberia, Zimbabwe, and Zambia) have seen a notable decline in the proportion of women who reported obtaining money needed for treatment as major problem in accessing health care. However, the disparities between the migrant categories in these five countries did not decrease significantly and in Liberia it appeared to increase between the two surveys (Figure 7).

Table 4 **Cross-tabulation of having a major problem accessing health care for self due to obtaining money required for treatment and migration status among women age 18–49**

Country	DHS survey	Total	Urban non-migrants	Rural-urban migrants		Rural non-migrants	Urban-rural migrants		p value
				3–9 years	<3 years		3–9 years	<3 years	
		% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	p value
Bangladesh	2017–18	42.5 [40.7,44.2]	35.6 [32.5,38.9]	40.8 [35.8,46.1]	38.1 [32.1,44.5]	46.5 [44.3,48.8]	35.9 [29,43.4]	40.6 [33,48.7]	<.001
Benin	2017–18	53.5 [51.4,55.6]	49.9 [47,52.7]	49.7 [40.8,58.7]	46.9 [37.2,56.7]	56.5 [53.2,59.7]	55.5 [50,61]	51.4 [44.6,58.2]	.003
Cameroon	2018–19	67.4 [65.4,69.4]	59.2 [56.5,62]	62.2 [54.3,69.5]	57.1 [46,67.6]	79.5 [76.7,82.2]	69.8 [63.4,75.6]	72.2 [67,76.8]	<.001
	2004	67 [65.3,68.7]	58.3 [55.6,60.9]	68.9 [62,75]	57.7 [52.2,63.1]	77.6 [75,80]	68.3 [61.7,74.3]	66.9 [61,72.2]	<.001
Haiti	2016–17	73 [71.3,74.7]	64.7 [61.8,67.5]	74.7 [66.8,81.1]	78.4 [67.8,86.2]	79.8 [77.6,81.9]	72.3 [64,79.3]	69.8 [61.4,77]	<.001
	2005–06	80.9 [79.2,82.5]	71.4 [68.3,74.4]	82.3 [76.1,87.2]	81.3 [72.5,87.7]	87.2 [85.2,89]	87.6 [76.5,93.9]	86 [76.9,91.9]	<.001
Kenya	2014	36.8 [35.3,38.3]	26.1 [23.9,28.4]	25.7 [21.6,30.3]	28.4 [23.3,34.2]	45.5 [43.5,47.5]	40 [33.4,46.9]	34 [27.9,40.7]	<.001
Liberia	2019–20	37.6 [34,41.4]	32.2 [27,38]	(14.6) [5.2,35]	(21.7) [10.7,39.2]	46.6 [42.4,50.9]	44.2 [36,52.7]	41.5 [32.8,50.8]	<.001
	2007	56 [52.2,59.7]	47.4 [41.6,53.2]	(59.2) [43.7,73.2]	57.8 [43.2,71.2]	62.7 [57.7,67.4]	59.2 [48.5,69.1]	51.3 [42.6,60]	<.001
Nepal	2073	51.8 [49.4,54.3]	47.8 [44.2,51.5]	44.4 [40.1,48.8]	44.5 [38.5,50.6]	63 [59.8,66]	(38.8) [24.4,55.4]	37 [23.5,52.9]	<.001
Philippines	2017	44.2 [42.7,45.8]	38.4 [36.1,40.6]	47 [39.8,54.3]	43.2 [35.5,51.2]	49.9 [48,51.9]	49.6 [43.5,55.7]	39.3 [32.5,46.5]	<.001
	2008	55 [53.5,56.4]	49 [46.8,51.2]	51.2 [45.4,56.9]	56.2 [50.9,61.3]	62.2 [60.1,64.2]	53.6 [47.9,59.3]	59.1 [53.2,64.7]	<.001
Rwanda	2019–20	41.7 [40.4,43.1]	28.3 [24.6,32.3]	37.7 [30.9,45]	29.7 [24.9,35]	45.7 [44.3,47.1]	31.8 [26,38.3]	33.1 [25.9,41.3]	<.001
	2005	71.7 [70.2,73.2]	61.5 [57.1,65.7]	59.2 [52.5,65.5]	58.4 [50.4,66]	73.9 [72.2,75.5]	(58.7) [40,75.1]	(68.7) [50.8,82.4]	<.001
Sierra Leone	2019	67.7 [65.4,70]	50.7 [46.7,54.8]	52.3 [44.3,60.2]	59 [46.5,70.4]	80.9 [78.7,83]	81 [75.1,85.8]	71.1 [64.8,76.7]	<.001
	2008	81.1 [79.4,82.7]	68.2 [64.5,71.6]	83.6 [75.8,89.2]	69.7 [59.1,78.6]	87.9 [86,89.6]	83.1 [75.9,88.4]	78.4 [69.5,85.2]	<.001
South Africa	2016	12.7 [11.4,14]	9.2 [7.7,10.9]	10.9 [7,16.6]	11.9 [7.8,17.9]	19.5 [17.5,21.7]	11.5 [5.7,22.1]	13 [6.5,24.3]	<.001
Tanzania	2015–16	50.9 [49.3,52.5]	43.4 [40.4,46.4]	43.7 [36.9,50.8]	42.3 [35.6,49.2]	55.5 [53.6,57.4]	52.2 [43.6,60.6]	45.7 [39.1,52.6]	<.001
Uganda	2016	44.3 [42.8,45.8]	33 [30,36.3]	38 [32.8,43.5]	32.1 [27.3,37.4]	50.5 [48.7,52.2]	38.5 [33.5,43.8]	39 [34.8,43.4]	<.001
	2006	67.1 [64.8,69.2]	53.8 [48.1,59.4]	62.9 [51.5,73]	62.2 [51.7,71.7]	70.1 [67.6,72.5]	61.3 [52.2,69.7]	63.8 [56.5,70.6]	<.001
Zambia	2018	21.2 [19.4,23]	12.6 [10.3,15.4]	19.8 [11.1,32.7]	18 [11.4,27.4]	29.7 [27.3,32.3]	17.9 [12.9,24.2]	19.8 [15.4,25]	<.001
	2007	34.2 [32.1,36.3]	25.7 [22.7,28.9]	24.6 [17.1,34]	27.1 [18.8,37.4]	41.2 [38.2,44.3]	29.5 [22.9,37.2]	32.5 [25.9,39.9]	<.001
Zimbabwe	2015	45.5 [43.6,47.5]	30.7 [27.8,33.8]	45.1 [39.4,50.9]	40.3 [34.2,46.8]	55.3 [52.7,57.8]	45.6 [38.7,52.8]	37.8 [29.6,46.8]	<.001
	2005–06	59.2 [56.8,61.7]	41.9 [38.6,45.3]	47.3 [39.8,54.9]	53.8 [45.2,62.1]	70.3 [67.4,73.1]	61.7 [52.8,69.8]	49.8 [41.5,58.2]	<.001

Note: Estimates in parenthesis indicate that the estimate should be interpreted with caution because it is based on 25–49 unweighted cases.

Figure 7   **Percentage of having a major problem accessing health care for self due to obtaining money required for treatment by migration status among women age 18–49**

Legend:
- Rural-urban 3–9 years
- Rural-urban <3 years
- Rural non–migrants
- Urban-rural 3–9 years
- Urban-rural <3 years
- Urban non–migrants

Countries (top to bottom): Bangladesh 2017–18, Benin 2017–18, Cameroon 2018–19, Cameroon 2004, Haiti 2016–17, Haiti 2005–06, Kenya 2014, Liberia 2019–20, Liberia 2007, Nepal 2016, Philippines 2017, Philippines 2008, Rwanda 2019–20, Rwanda 2005, Sierra Leone 2019, Sierra Leone 2008, South Africa 2016, Tanzania 2015–16, Uganda 2016, Uganda 2006, Zambia 2018, Zambia 2007, Zimbabwe 2015, Zimbabwe 2005–06

X-axis: 0 to 100

3.3.4   Problems accessing care due to distance to health facility

Table 5 and Figure 8 summarize the cross-tabulation of problems accessing care due to distance to health facility with migration status. As with the previous outcome, we would ideally like to see low levels of this outcome and no significant differences by migration status. More than one-third of women in Bangladesh, Cameroon, Haiti, Nepal, Sierra Leone, Tanzania, Uganda, and Zimbabwe reported distance as a major problem in accessing medical help in both surveys. The percentage of women who reported distance as a major problem in health care access ranges widely from 11% in South Africa 2016 to 51% in Nepal 2016.

Table 5 shows that in all countries, rural non-migrants had the highest or close to the highest problem accessing care distance compared to other categories. In Bangladesh 2017–18, Liberia 2019–20, Sierra Leone 2019, and South Africa 2016 urban to rural migrants had higher proportions of this problem but it was very close to the rural non-migrant estimate. In fact, for most surveys, urban to rural migrants had similar problems accessing care due to distance as rural non-migrants.

On the other hand, urban non-migrants had either the lowest or one of the lowest problems accessing care due to distance. In Benin, Kenya, and Liberia (both surveys), rural to urban migrants had fewer problems accessing

care due to distance than urban non-migrants. Rural to urban migrants who lived longer in the urban area did not have significantly fewer problems accessing care due to distance compared to recent rural to urban migrants.

There were few improvements in this indicator where trends could be observed. The largest improvements, in terms of reduction in the overall proportion of women who have this problem, were found in Liberia and Rwanda. However, as can be seen in Figure 6, the disparities by migration status did not decrease with the overall decrease.

Table 5 **Cross-tabulation of having a major problem accessing health care for self due to distance to health facility and migration status among women age 18–49**

| Country | DHS survey | Total | Urban non-migrants | Rural-urban migrants | | Rural non-migrants | Urban-rural migrants | | p value |
| | | | | 3–9 years | <3 years | | 3–9 years | <3 years | |
		% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	
Bangladesh	2017–18	38.3 [36.5,40]	27.8 [25.2,30.6]	29.2 [24.7,34.1]	32.3 [27.3,37.7]	44.4 [42.1,46.7]	36.2 [29.2,43.8]	45.8 [37.9,53.9]	<.001
Benin	2017–18	31.8 [29.8,33.9]	25.9 [22.8,29.1]	19 [13.3,26.3]	19.2 [11.8,29.8]	36.6 [33.8,39.6]	35.5 [29.5,42]	32.8 [26.4,39.9]	<.001
Cameroon	2018–19	38.7 [36.4,41]	26.7 [24.2,29.4]	30.2 [23.8,37.5]	28.3 [21.9,35.8]	54.8 [50.4,59.1]	48.3 [40.9,55.8]	50.9 [44.9,56.8]	<.001
	2004	38.7 [36.2,41.2]	24.9 [22.4,27.5]	28.3 [22.7,34.6]	26 [21.3,31.5]	55.6 [50.7,60.3]	48.4 [41.7,55.1]	46.7 [39,54.6]	<.001
Haiti	2016–17	38.3 [35.9,40.9]	18.9 [16.8,21.2]	21.5 [15.7,28.7]	22.8 [14.9,33.3]	54.7 [50.5,58.8]	45.3 [38.9,51.9]	44.8 [37,52.9]	<.001
	2005–06	44.6 [41.7,47.4]	25.3 [22.3,28.6]	35.6 [27.3,44.8]	28.8 [20,39.5]	60 [55.8,64.1]	47.3 [35.2,59.7]	43 [32.8,53.7]	<.001
Kenya	2014	22.7 [21.5,24]	12.7 [11.1,14.5]	8.3 [6.2,11]	10.5 [7.5,14.5]	31.7 [29.8,33.6]	27 [21.4,33.5]	22.9 [17.7,29]	<.001
Liberia	2019–20	29.6 [25.8,33.6]	19.4 [14.6,25.4]	(3.8) [1.3,10.2]	(11.8) [3.9,30.6]	44.6 [39.6,49.7]	47.5 [39.1,56.1]	44.5 [35.2,54.3]	<.001
	2007	51.4 [46.2,56.6]	24.2 [19.3,29.8]	(21.4) [11.3,36.7]	16.4 [7.9,30.9]	71.9 [63.3,79.1]	64.4 [53.9,73.7]	54.7 [44.5,64.5]	<.001
Nepal	2073	50.9 [48,53.8]	42.6 [38.4,46.9]	40.8 [36.2,45.6]	43.3 [36.4,50.5]	68.7 [64.8,72.4]	(53.5) [33.8,72.1]	53.8 [38.1,68.8]	<.001
Philippines	2017	20.8 [19.6,22.2]	11.4 [10,13]	22.2 [17,28.5]	17.9 [13.1,24.1]	29.7 [27.6,31.9]	26 [23.2,29]	25.6 [20.2,31.8]	<.001
	2008	27.2 [25.8,28.7]	16.2 [14.6,18]	19.1 [14.8,24.3]	21.8 [17.6,26.6]	41 [38.5,43.6]	33.7 [28.7,39.1]	35.2 [29.9,40.8]	<.001
Rwanda	2019–20	22.1 [20.6,23.7]	7.7 [6,9.9]	9.3 [5.5,15.2]	10 [6.6,14.8]	26.3 [24.4,28.3]	15.7 [11.1,21.7]	17 [10.8,25.7]	<.001
	2005	40 [37.3,42.8]	28.1 [23.5,33.2]	28.5 [21,37.3]	25.6 [19.2,33.2]	42.4 [39.3,45.5]	(41.3) [23.4,61.9]	(31) [15.8,52]	<.001
Sierra Leone	2019	44.7 [41.7,47.7]	25.4 [22,29.1]	28.1 [21.3,36.2]	29.9 [20,42.2]	59.7 [55.3,63.9]	60.7 [52.1,68.7]	49.1 [40.7,57.5]	<.001
	2008	53.3 [49.6,56.9]	34.7 [29.8,40]	48.7 [38.7,58.8]	43.3 [29.4,58.4]	62.6 [57.7,67.3]	59.3 [50.1,67.9]	56.4 [46.2,66.1]	<.001
South Africa	2016	11 [9.8,12.3]	6.7 [5.5,8.3]	8.7 [5.4,13.9]	7.1 [4,12.4]	19.7 [17.5,22.1]	22.3 [9.2,44.9]	12.1 [5.8,23.5]	<.001
Tanzania	2015–16	42.9 [40.7,45.1]	31.5 [28.8,34.3]	37.1 [29.8,45.1]	35.9 [29,43.5]	48.7 [45.7,51.8]	48.8 [39.4,58.3]	47.3 [39.8,54.9]	<.001
Uganda	2016	36.7 [34.9,38.6]	18.7 [16.1,21.6]	19.4 [13.9,26.4]	19.6 [15.9,24]	45.5 [43.3,47.8]	37.4 [31.4,43.8]	33.8 [29.4,38.5]	<.001
	2006	55.2 [52.2,58.1]	23.8 [18.9,29.4]	24.6 [17.3,33.7]	29.1 [21.2,38.5]	63.1 [59.7,66.3]	50.7 [40.7,60.6]	49 [38.9,59.2]	<.001
Zambia	2018	29.2 [27.1,31.4]	11.8 [9.8,14.2]	13.3 [9,19.1]	18 [12.9,24.5]	45.8 [42.6,49.1]	35.3 [28.2,43.2]	36.4 [30.3,43.1]	<.001
	2007	42.4 [39.3,45.5]	19.5 [16,23.6]	23.8 [15.3,35]	24.2 [16.2,34.5]	59.3 [54.8,63.6]	52 [42.8,61.1]	47 [37.7,56.5]	<.001
Zimbabwe	2015	34 [31.5,36.6]	8.5 [6.7,10.7]	13.4 [9.2,19]	13.8 [9.4,19.8]	51.6 [47.6,55.6]	40 [32,48.6]	39.5 [29.4,50.6]	<.001
	2005–06	41.8 [39.4,44.3]	13.6 [11.5,16]	19.2 [13.7,26.1]	21.9 [14.6,31.5]	59.3 [55.3,63.2]	55.5 [42.9,67.4]	46.8 [39,54.9]	<.001

Note: Estimates in parenthesis indicate that the estimate should be interpreted with caution because it is based on 25–49 unweighted cases.

Figure 8   Percentage of having a major problem accessing health care for self due to distance to health facility by migration status among women age 18–49

Legend:
- Rural-urban 3–9 years
- Rural-urban <3 years
- Rural non-migrants
- Urban-rural 3–9 years
- Urban-rural <3 years
- Urban non-migrants

Countries (y-axis):
Bangladesh 2017–18, Benin 2017–18, Cameroon 2018–19, Cameroon 2004, Haiti 2016–17, Haiti 2005–06, Kenya 2014, Liberia 2019–20, Liberia 2007, Nepal 2016, Philippines 2017, Philippines 2008, Rwanda 2019–20, Rwanda 2005, Sierra Leone 2019, Sierra Leone 2008, South Africa 2016, Tanzania 2015–16, Uganda 2016, Uganda 2006, Zambia 2018, Zambia 2007, Zimbabwe 2015, Zimbabwe 2005–06

X-axis: 0 to 100

3.4   Regression Results

Two adjusted logistic regression models were fit for each outcome—one with urban non-migrants as the reference category and another with rural non-migrants as the reference category. The results are summarized in Appendix Tables 4–7 and Figures 9–12.

3.4.1   Antenatal care

Appendix Table 4 and Figure 9 summarize the adjusted logistic regression results of migration status with having at least four antenatal care visits for the most recent birth in the last 3 years. For the regression figures, we indicate a worse outcome with red (such as lower odds of ANC visits), blue indicates a better outcome, and gray indicates no significant difference. The intensity of the colors indicate the strength of the association in either direction as indicated by the legend. In general, while we do not observe many significant findings in ANC visits between migrants of any type and urban non-migrants or rural non-migrants, when the association was significant, the disparities were large. For example, recent rural-urban migrants in Bangladesh (both surveys), Cameroon (both surveys), and the Haiti 2016–17 survey had between 40–60% lower odds of attending at least four ANC visits compared to urban non-migrants. In Bangladesh, this disparity did not improve greatly for rural-urban migrants who had stayed longer in the urban area. However, for Cameroon and Haiti, we do not

see a significant difference between non-recent rural-urban migrants and urban non-migrants, which implies that rural-urban migrants have adapted in a positive way in these countries when they have stayed longer in the urban area. In addition, in Bangladesh and Cameroon, the disparities found between recent rural-urban migrants and urban non-migrants did not improve greatly between the two surveys. In the Philippines, non-recent rural-urban migrants had greater odds of ANC visits compared to urban non-migrants, while in Zambia they had lower odds.

Figure 9 **Adjusted odds ratios of migrations status and having at least four antenatal care visits for the most recent birth in the last 3 years among women age 18–49**
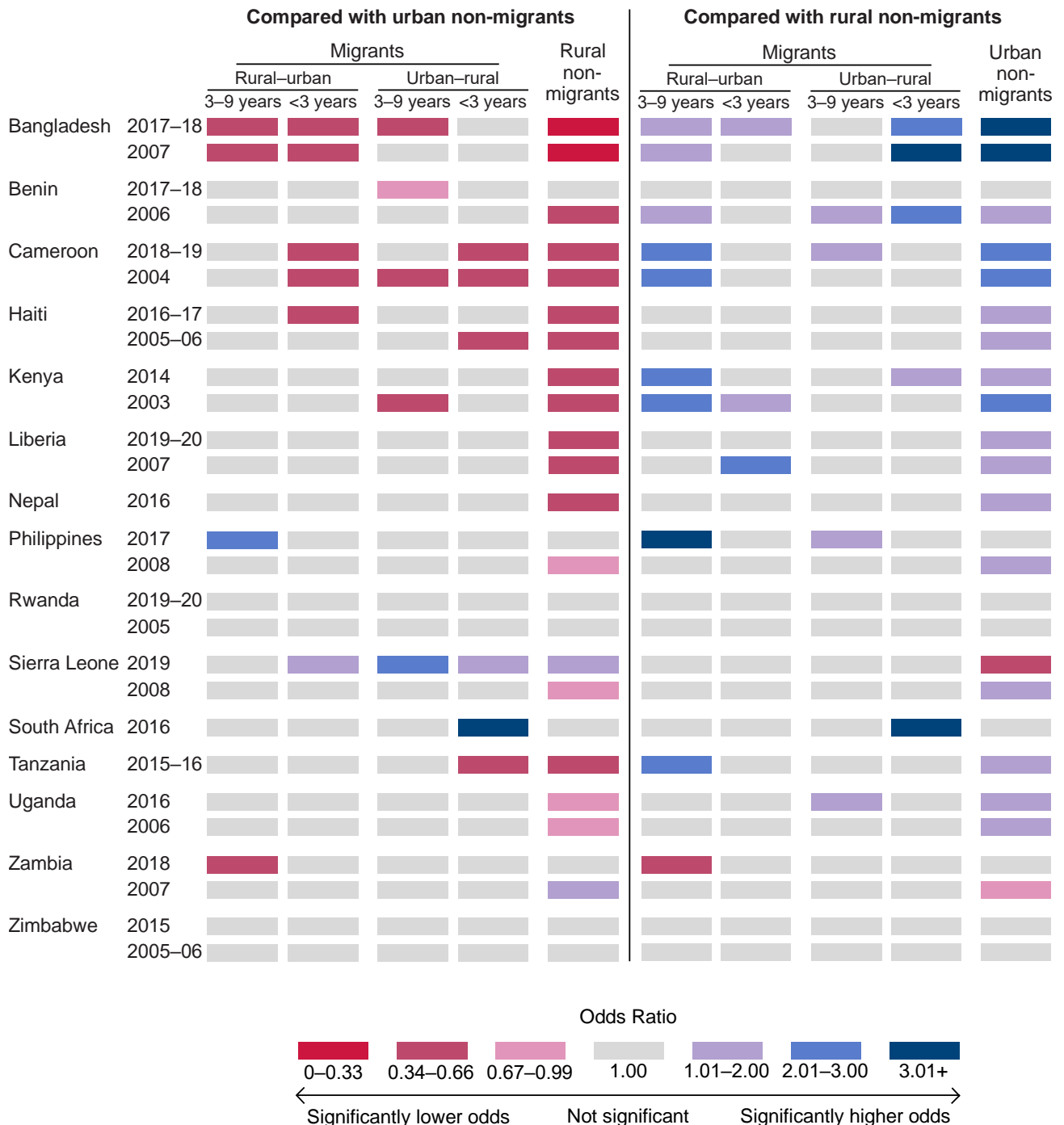
An unexpected finding was the greater odds of ANC visits among rural non-migrants and migrants to rural areas in the most recent Sierra Leone survey. Further examination found that the proportion of ANC visits in this survey was higher in rural areas overall compared to urban areas. In a few countries, urban-rural migrants had lower odds of ANC visits compared to urban non-migrants including the most recent surveys of Bangladesh, Benin, Cameroon, and Tanzania. The highest disparities were found in the earlier surveys of Haiti and Kenya with more than 65% lower odds of ANC visits for urban-rural migrants compared to urban non-migrants.

When we compare migrants to rural non-migrants, we can see that in several surveys rural-urban migrants have higher odds of ANC visits compared to their place of origin and especially if they have stayed longer in the urban area, with odds ratios ranging between 1.6 and 3.2. One exception was found in Zambia, where rural-urban migrants who have stayed 3 to 9 years in the urban area have 50% lower odds of ANC visits compared to rural non-migrants.

In a few countries, urban-rural migrants also had higher odds of ANC visits compared to rural non-migrants, which implies that their behaviors when they lived in urban areas has remained when they had migrated to the rural areas. The odds were highest in Bangladesh where recent urban-rural migrants had more than twice the odds of ANC visits in both surveys compared to rural non-migrants. However, when the urban-rural migrants in Bangladesh lived for 3 to 9 years in the rural area, they were not significantly different in their ANC visits compared to rural non-migrants. This shows evidence of adaptation but in a negative direction, with the higher use of ANC services associated with living in urban areas largely disappearing when women moved to rural areas. This pattern was also found in the most recent survey of Kenya and in South Africa (to be interpreted with caution for South Africa because of the small number of observations in this group).

3.4.2   Modern contraceptive use

Appendix Table 5 and Figure 10 summarize the adjusted logistic regression results of migration status and modern contraceptive use. The results show few statistically significant findings, but when significance was found, there were high disparities between migrants and non-migrants, although without a broadly consistent pattern. There was approximately 30% to 45% lower odds in modern contraceptive use among recent rural-urban migrants in the earlier surveys of Bangladesh, Cameroon, Haiti, and Zambia compared to urban non-migrants. However, this disparity was not found in the most recent survey of these countries. In Tanzania, recent rural-urban migrants had 36% lower odds in modern contraceptive use compared to urban non-migrants. In Nepal, rural-urban migrants who had stayed in the urban area for 3 to 9 years had lower odds of modern contraceptive use compared to urban non-migrants. Recent urban-rural migrants also had lower odds of modern contraceptive use compared to urban non-migrants. In Cameroon and Sierra Leone, this disparity was only in the earlier survey and was not present in the most recent survey, while in the Philippines the disparity was found in both surveys. In Bangladesh, Tanzania, and Uganda, it was in the most recent survey. For some surveys such as Benin, Haiti, and Zimbabwe, a lower odds in modern contraceptive use was only found in urban-rural migrants who stayed longer in the rural area. In the most recent surveys of Liberia and Zambia, greater odds in modern contraceptive use was found in non-recent urban-rural migrants.

Figure 10   Adjusted odds ratios of migrations status and modern contraceptive use among women age 18–49

Figure 10   Adjusted odds ratios of migrations status and modern contraceptive use among women age 18–49
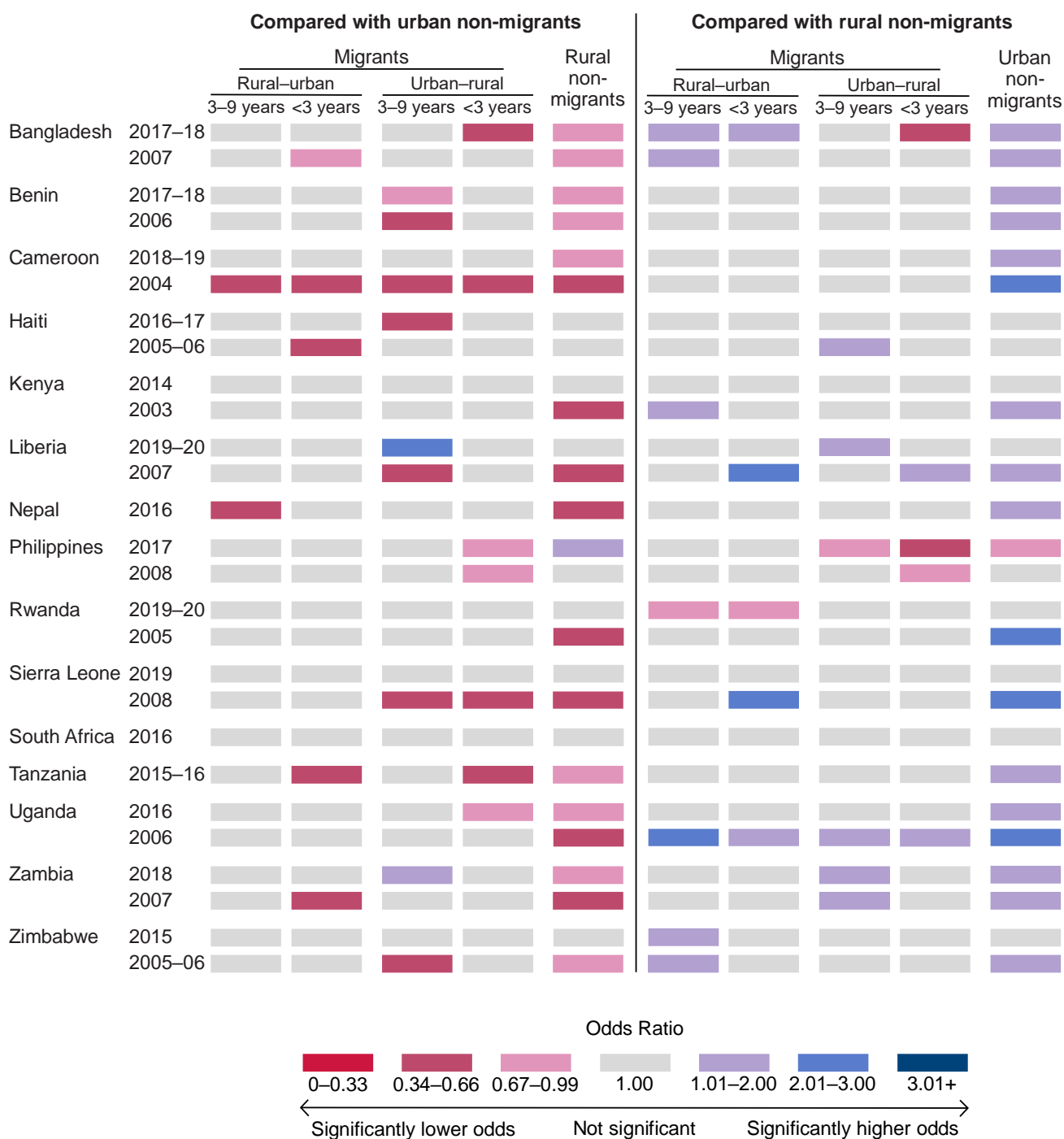
When we compare migrants to rural non-migrants, we find that in some surveys, migrants who moved from a rural to an urban area generally had higher odds of modern contraceptive use compared to rural non-migrants. These odds were the highest in the earlier surveys of Liberia, Sierra Leone, and Uganda and were approximately two times or higher odds. However, for these countries, the disparity between recent rural-urban migrants and rural non-migrants was lost in the most recent survey. In the most recent survey in Bangladesh, there was a higher odds of modern contraceptive use among rural-urban migrants compared to rural non-migrants

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regardless of the duration of stay. In the most recent survey of Rwanda, we observe an opposite trend with rural-urban migrants having lower odds of modern contraceptive use regardless of duration of stay compared to rural non-migrants.

In the most recent surveys of Liberia and Zambia, urban-rural migrants who stayed 3 to 9 years in the rural area had higher odds of modern contraceptive use compared to rural non-migrants. This disparity was also found in the earlier surveys of Haiti, Uganda, and Zambia. In the Uganda 2006 survey, there was a higher odds of modern contraceptive use among urban-rural migrants compared to rural non-migrants regardless of duration of stay, although this significance was lost in the most recent survey. The Philippines had an opposite trend with lower odds of modern contraceptive use in urban-rural migrants compared to rural non-migrants. However, the Philippines had an unexpected finding of higher modern contraceptive use in rural areas overall compared to urban areas. Further examination indicated that this was due to higher use of pills in rural areas compared to urban areas, which was the most commonly used contraceptive method in the Philippines.

3.4.3   Problems accessing care due to getting money needed for treatment

Appendix Table 6 and Figure 11 summarize the adjusted logistic regression results of migration status and having a major problem accessing care due to finding money needed for treatment. Since having a problem accessing care is a negative outcome, a greater odds would indicate a worse outcome and is therefore shown in red. Recent rural-urban migrants in the most recent survey of Haiti, the earlier survey of the Philippines, and both surveys in Zimbabwe had higher odds of having problems obtaining money for care compared to urban non-migrants. In Zimbabwe, this disparity persisted even for non-recent rural-urban migrants in the most recent survey. We observe more significant findings for urban-rural migrants compared to urban non-migrants. In Cameroon (both surveys), Haiti 2005–06, Kenya 2014, Sierra Leone 2019, and Zimbabwe 2005–06, there was a higher odds of having problems accessing care due to money for urban-rural migrants compared to urban non-migrants regardless of duration of stay. In Sierra Leone 2019, there was twice the odds for recent urban-rural migrants and more than three times the odds for non-recent urban-rural migrants. In the most recent survey of Liberia, the Philippines, and Zimbabwe, there was a higher odds of problems accessing care due to money only for non-recent urban-rural migrants compared to urban non-migrants.

Figure 11   Adjusted odds ratios of migrations status and having a major problem accessing care due to getting money for treatment among women age 18–49

		Compared with urban non-migrants					Compared with rural non-migrants				
		Migrants				Rural non-migrants	Migrants				Urban non-migrants
		Rural–urban		Urban–rural			Rural–urban		Urban–rural		
		3–9 years	<3 years	3–9 years	<3 years		3–9 years	<3 years	3–9 years	<3 years	
Bangladesh	2017–18										
Benin	2017–18										
Cameroon	2018–19										
	2004										
Haiti	2016–17										
	2005–06										
Kenya	2014										
Liberia	2019–20										
	2007										
Nepal	2016										
Philippines	2017										
	2008										
Rwanda	2019–20										
	2005										
Sierra Leone	2019										
	2008										
South Africa	2016										
Tanzania	2015–16										
Uganda	2016										
	2006										
Zambia	2018										
	2007										
Zimbabwe	2015										
	2005–06										

Odds Ratio

0–0.33	0.34–0.66	0.67–0.99	1.00	1.01–2.00	2.01–3.00	3.01+

← Significantly lower odds   Not significant   Significantly higher odds →

When we compare rural-urban migrants to rural non-migrants, we find that in several surveys, rural-urban migrants have lower odds in having problems accessing care due to money. This was also true for recent urban-rural migrants in several surveys. However, in many cases such as in Liberia 2007, Nepal 2016, Philippines 2017, Sierra Leone (both surveys), and Zimbabwe (both surveys), there was only significant lower odds for recent migrants but not for non-recent urban-rural migrants compared to the rural non-migrants. This implies adaptation in the negative direction. In other words, migrants who stay longer are more similar to rural non-migrants who have been shown to have more problems accessing care due to money and therefore have lost their urban advantage. Overall, rural-to-urban migrants either were statistically indistinguishable from urban

non-migrants or continued to have higher odds of reporting money as a major problem for accessing health care. Similarly, urban-to-rural migrants were either statistically indistinguishable from rural non-migrants or had lower odds of reporting financial barriers to care.

3.4.4 Problems accessing care due to distance to health facility

Appendix Table 7 and Figure 12 summarize the adjusted logistic regression results of migration status and having a major problem accessing care due distance to health facility.

In general, we see many significant and higher odds of problems accessing care due to distance in rural areas whether for migrants or non-migrants compared to urban non-migrants. In some surveys such as in the Philippines (both surveys), the most recent survey of Zambia and Zimbabwe, recent rural-urban migrants also had a higher odds of problems accessing care due to distance compared to urban non-migrants, which indicated that they may have moved to areas with low availability of services. In the Philippines and Zimbabwe this higher odds was also found in non-recent rural-urban migrants. In the most recent surveys of Kenya and Liberia, we see an opposite trend with a lower odds of problems accessing care due to distance for non-recent rural-urban migrants compared to urban non-migrants.

Figure 12   Adjusted odds ratios of migrations status and having a major problem accessing care due to distance to health facility among women age 18–49
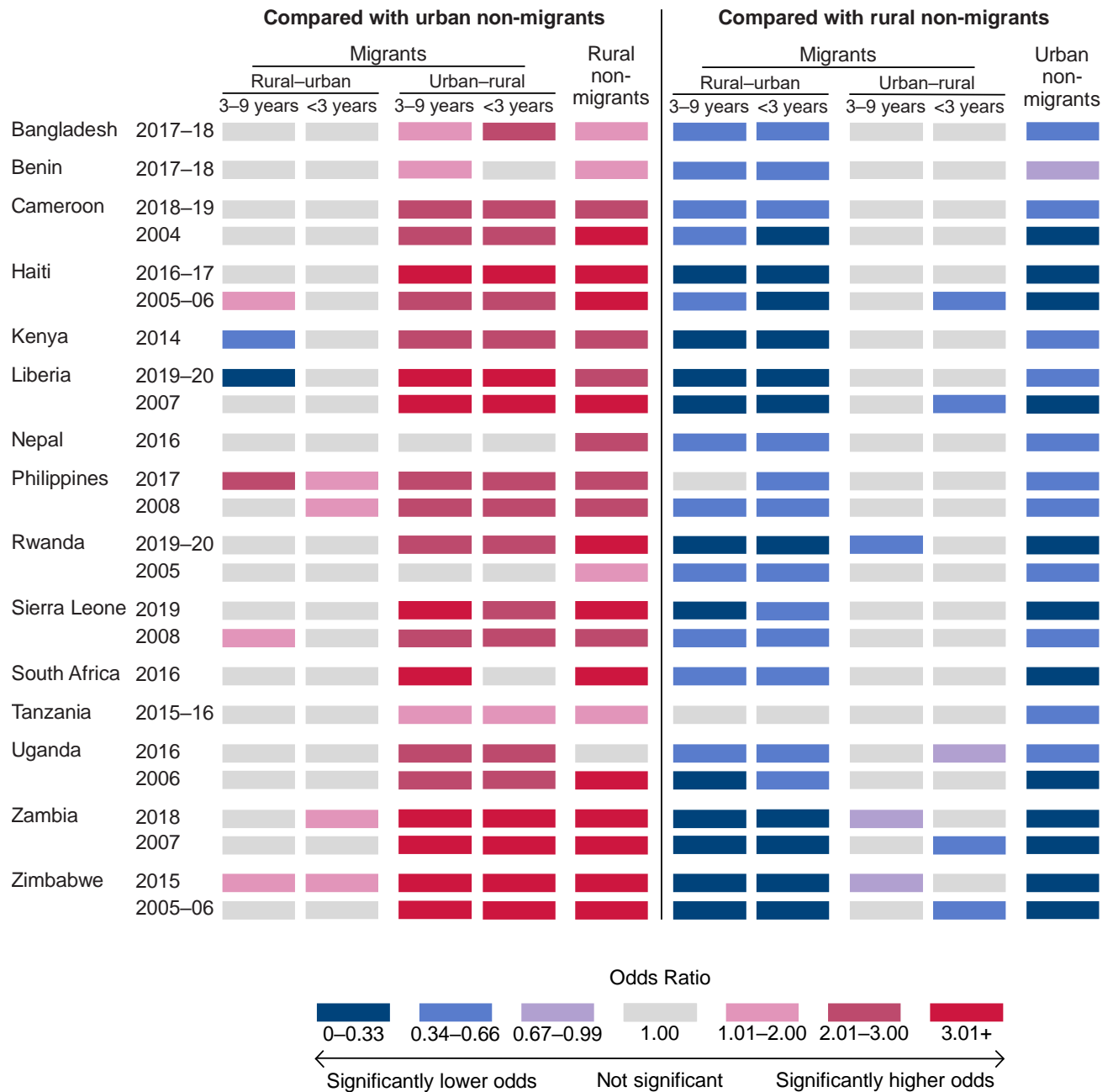
When we compare to rural non-migrants, we also see lower odds of problems accessing care due to distance for migrants that moved from a rural area to an urban area. In a few surveys, we also see this lower odds among urban-rural migrants compared to rural non-migrants. However, this disparity was only found in the most recent surveys of Haiti, Rwanda, Zambia, and Zimbabwe only among non-recent urban-rural migrants, and in Uganda among recent urban-rural migrants.

4 DISCUSSION AND CONCLUSIONS

Migration between two very different social and physical environments, even within the same country, is an increasingly common part of life throughout the world. The overwhelming majority of migration is internal within countries, although much of the discussion of migration and its effects has focused on the relatively smaller proportion of individuals who migrate between countries. Much of the research on the association between internal migration and health outcomes and behaviors has typically focused on a narrow set of outcomes and only on rural-to-urban migration. This report begins to address some of these gaps in the literature by examining characteristics of migrants and trends in migration, and testing three main hypotheses drawn from the literature on the effects of migration on health:

- Recent rural to urban migrants will have lower utilization of services and more problems accessing care compared to urban residents due to the disruptions associated with migration and because they have had less time to adapt or assimilate to the urban environment

- Longer-term rural to urban migrants will have better outcomes and be more similar to urban residents than more recent migrants, which reflects successful adaptation or assimilation

- Urban to rural migrants will have better outcomes than rural residents and be more similar to urban residents

4.1 Trends and Patterns in Internal Migration

The complexity and diversity of internal migration processes is evident when examining both the trends in internal migration and the direction of the migration stream. In a number of countries, and most notably Bangladesh, Kenya and Uganda, the portion of migrants who moved into urban areas from rural locations increased over time, although rural-to-urban migration fell in Cameroon, Haiti, and the Philippines. We also see relatively high levels of rural-to-urban migration in Bangladesh, Kenya, Nepal, and South Africa compared to the remaining countries with between 12–18% of adult women migrants age 18 to 49 migrating to urban areas in these countries. This may reflect the particular socioeconomic context in these countries.

Less discussed in the literature is the migration from urban to rural areas. Significant increases in the proportions of the population who had moved from urban to rural areas were observed in some countries (most notably in Cameroon, the Philippines, Uganda, and Zimbabwe) and reached close to 10% of adult women in the Philippines and Uganda. We also observe a higher level of urban to rural migration compared to rural to urban migration in a number of countries. The migration from urban to rural areas may be due to the circular or cyclical nature of internal migration movements or could possibly be a consequence of socioeconomic conditions in urban areas. Other reasons may include employment growth and expansion of essential services in rural areas, lower cost of living and housing, the attraction of rural life, and the greater linkages between rural and urban areas. With few exceptions, however, the largest proportion of women across time were non-migrants. Increases in specific types of migrants were relatively small, which suggested that internal migration in most countries is following a consistent pattern rather than representing major shifts in the types of migration.

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The characteristics of current internal migrants at the most recent survey also demonstrates the diversity of internal migration movements across different countries. However, some common patterns are evident. In particular, the data provide a strong illustration of the selective nature of migration in most contexts. Generally, migrants are more likely to have higher education than non-migrants, likely to be younger, have fewer children, and are more likely to work for pay. In several countries, recent migrants were less likely to be in union, although there was considerable variation in this pattern across countries. While we control for these factors in our models, these, in addition to other related unobservable characteristics, can have strong associations with health behaviors and use of health care, as found in a number of studies. [8,11,22] For example, younger, single women with higher education may be more likely to use modern contraception. Because these factors are associated with migration, it may make the effect of migration on these behaviors appear stronger than it is when simply comparing migrants to non-migrants. Furthermore, while the evidence is less clear when comparing different types of migrants to each other, it could also be the case that longer-term migrants differ from shorter-term migrants in ways that predated migration. This is consistent with prior literature, which has found migration selection to influence fertility, [6,22,23] infant mortality, [28] contraceptive use, [29] and the health of young women, [30] among other outcomes. Wang and Hu, [11] find that this selective process explains many of the health disparities between non-migrants and migrants in China. This may partly explain both the lack of consistent effects related to migration duration and exacerbation of the differences observed between urban and rural residents in terms of health outcomes. As a result, care must be taken in interpreting differences between migrant groups, particularly when not accounting for these underlying factors.

4.2   Association of Migration Location with Health Outcomes

The analyses of the relationship between migration status and health outcomes was guided by a number of specific hypotheses developed from the broader literature on the effects of migration on behavior. In particular, we focus on the relationship between the duration of the migration experience and health outcomes and the "direction" of the migration movement (from rural to urban areas or vice versa). The ideal situation in terms of service provision would be to have few or no differences between the different types of migrants in terms of access to and use of health care. However, we expected that the physical and social environments in urban areas generally leads to greater access and use of health care than in rural areas. As a result, rural-to-urban migration should generally result in improvements in health access and outcomes, while urban-to-rural migration would generally result in lower access and use, all else being equal.

While there is considerable variation in the associations found between migration type and health outcomes across the countries and between outcomes, the results of the analyses provide a powerful illustration of the significant differences in health outcomes between residents of urban and rural areas and broadly confirm our expectations. While migrants, both generally and of different duration in their destination location, differ from non-migrants in some countries and for some of the outcomes examined, the general pattern observed is one where permanent rural residents have the poorest outcomes and permanent urban residents the best. While the pattern is inconsistent across outcomes and countries, the magnitude of the relationship between migration and the health outcomes is typically very large. For example, the odds of ANC use for rural-to-urban migrants is roughly twice that of rural non-migrants in several surveys, which indicates that movement to an urban area was likely to be beneficial.

These findings suggest that the physical environment, such as the distance between health care facilities, plays an important role in shaping the outcomes examined in this report, particularly for services that require visits to physical facilities such as ANC or delivery. This is also supported by the findings for the problems accessing care due to distance where we see strong evidence in almost all surveys that distance was an issue for rural residents (both migrants and non-migrants) compared to urban residents in accessing health services.

4.3   Association of Migration Duration and Health Outcomes

The first two hypotheses guiding the study each argue broadly that the behavior of migrants should become increasingly similar to permanent residents of the places that the migrant moved to over time. Because this process is gradual, however, differences should be observed between those who arrived more recently and those who are longer-term migrants. We find some support for this hypothesis in the results. For example, in Cameroon and Haiti, recent rural-urban migrants had more than 50% lower odds attending at least four ANC visits, while rural-urban migrants with a longer duration of stay have no significant difference in ANC visits compared to the urban non-migrants. In other words, the longer-term migrants were statistically indistinguishable from urban non-migrants in terms of completing the required number of ANC visits, while more recent migrants were significantly less likely to have done so and were more similar to rural non-migrants. This was also the finding from the most recent survey in Tanzania with approximately 40% lower odds of modern contraceptive use for recent rural-urban migrants compared to urban non-migrants, but with no significant difference for migrants with a longer duration of stay.

This suggests that while recent migrants may have some disruption in the way they access and use health services, non-recent migrants have adapted over time and are more similar to urban non-migrants, which is consistent with the hypothesized relationship. Recent migrants to urban areas may not be able to use urban health facilities due to separation of spouses or families, unemployment, loss of income, and lack of awareness of where to find health services. The lack of significance difference between non-recent rural-urban migrants and urban non-migrants is an example of positive adaptation, which is the process by which migrants learn a new language, adopt culture, values, and belief, learn new aspects of life, and adjust their behavior in response to their new environment.[26]

Finally, we find mixed, limited support for the third hypothesis that argued that urban to rural migrants would have persistently better outcomes than rural non-migrants. For example, in Bangladesh and Kenya, recent urban-rural migrants have greater odds of ANC visits compared to rural non-migrants, although no significant difference was observed between non-recent urban-rural migrants and rural non-migrants. This may indicate that the positive health behaviors the women had adopted as migrants in the urban setting were lost after staying more than three years in their new rural area. This "negative adaptation," however, is consistent with the general expectation that rural residents have poorer health access and outcomes than their urban peers and with the broader hypotheses of adaptation and assimilation into migrant environments.

4.4   Improvements Over Time and Areas of Concern

For countries where trends can be observed, we see some improvements over time. For example, in Bangladesh, Cameroon, Haiti, and Zambia, rural-urban migrants in the earlier survey had lower odds of modern contraceptive use compared to urban non-migrants, although there was no significant difference in the recent survey. This implies that there may have been improvements in providing access to modern

contraceptive methods to migrants in urban areas. We also observe improvements in outcomes in the dispersion of each outcome by migrant status (as shown in Figures 5–8). A more narrow spread of the outcome across the migrant categories over time implies lower disparities and improvements of use and access between surveys. This can be seen clearly in Liberia, Rwanda, Uganda, and Zimbabwe for ANC visits, and Haiti and Uganda for modern contraceptive use. In addition, we also observe many non-significant findings in the regression models that persisted over time. This is not necessarily an improvement but shows consistent evidence of lack of significant disparities between migrants and residents between the surveys.

On the other hand, we also observe some areas of concern in terms of the outcomes examined. For example, rural-urban migrants in Bangladesh, regardless of duration, have lower odds of ANC visits compared to urban non-migrants. This has not changed in the 10 years between the two surveys we examined. Recent rural-urban migrants in Cameroon had lower ANC visits compared to urban non-migrants in both surveys that were 14 years apart. In Zimbabwe, rural-urban migrants still had a high odds of problems accessing care due to costs compared to urban non-migrants, and in the most recent survey, this was also high among non-recent migrants. In the Philippines, Zambia, and Zimbabwe, rural-urban migrants still had problems accessing care due to distance compared to urban non-migrants even after moving to urban areas that should have more facilities. This implies that they may have moved to poorer urban areas with few or limited facilities. In addition, overall, we do not see improvements in problems accessing care either due to costs or distance for rural residents (both migrants and non-migrants) over time when compared to urban non-migrants.

4.5   Limitations

This study has a number of limitations that should be taken into account when interpreting the findings:

- While we explore and attempt to account for migrant selection, the cross-sectional nature of the available data makes a full accounting impossible. This may have a number of implications for the findings. In particular, the selective nature of internal migration between rural and urban areas in either direction may obscure some of the effects of assimilation or adaptation. For example, if migrants are self-selected based on similarities to their new peers in destination locations (including in terms of overall health), it is reasonable to expect to observe a more immediate and long-term difference in behavior or outcomes when compared to non-migrants in their "home" community that would exist even in the absence of migration experience.

- The operationalization of "recent" migrants used in this study (having resided in the destination for less than three years) may be too long a period to capture the immediate changes in behavior due to adaptation or disruption. In other words, these processes could be more relevant immediately after migration and, as a result, our measure may capture migrants who are already relatively well established and settled in their destination. However, using a shorter duration would reduce the analyses samples significantly, which would potentially limit the analysis that could be conducted.

- We are unable to capture the cumulative effect of multiple migration experiences, fully address repeated circular migration movements, or internally displaced persons. As a result, we cannot fully examine the overall relationship between experience of migration and health outcomes, nor explore how this is shaped by different types of migration.

- Our measure of the duration of stay in current residence is likely to be influenced by both recall bias and a general lack of precision. For example, heaping at 10 years is likely to have an effect in our categorization of migrants and also in the selection of the analytical sample since we excluded child migrants from the analysis.

- Finally, the data do not include information on women's reasons for migration, their motivation for migration, or the individual(s) with whom they are migrating, as well as information about the socioeconomic situation of migrants in the previous location. These factors that may be related to their use of health care.

4.6   Conclusions

This study demonstrates the complexity of examining the relationship between internal migration and a range of health behaviors and outcomes. As expected, the trend analysis indicates that migration is an increasingly common part of the lives of many women in LMICs, although this appears to be consistent with established patterns. In particular, there were increases over time in rural-to-urban migration in half of the countries where trends could be observed. We also observed increases in urban-to-rural migration in several countries. The results suggest that these migration movements are strongly associated with a range of health outcomes and behaviors. In general, urban residents, regardless of migration status, had more favorable health outcomes and behaviors, which are likely to reflect both improved access to health services and social norms around health care that increase use. While we observe many non-significant findings, we find that when there were significant differences between migrants and non-migrants, the disparities were large. There was also evidence of areas of concern and lack of improvement in outcomes by migrant status. We found evidence of adaptation, whether in the negative or positive direction, in several surveys, although there was relatively little evidence of a consistent pattern across all countries. These country specific findings could be reflective of the situation in these countries, or the result of either the migrant selection process or the way that migration duration was categorized. Further research is needed to better understand both factors and how they influence our understanding of how migration influences behavior. More research is also needed to better understand the drivers and consequences of migration from urban to rural areas, which represents a significant amount of migration flows in most countries.

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APPENDIX TABLES

Appendix Table 1   Percentage distribution of place of residence and internal migrations status among women age 18–49

Country	Survey	Current place of residence				Urban non-migrants		Rural-urban migrants				Rural non-migrants		Urban-rural migrants				Total observations
		Urban		Rural				3–9 years		<3 years				3–9 years		<3 years		
		%	[95% CI]	%	[95% CI]	%	[95% CI]	%	[95% CI]	%	[95% CI]	%	[95% CI]	%	[95% CI]	%	[95% CI]	
Bangladesh	2017–18	38.1	[36.7,39.6]	61.9	[60.4,63.3]	26.3	[24.8,27.8]	6.6	[5.9,7.5]	5.2	[4.6,5.9]	57.3	[55.8,58.7]	2.3	[2,2.7]	2.3	[1.9,2.7]	9,343
	2007	32.5	[30.4,34.7]	67.5	[65.3,69.6]	24.4	[22.5,26.4]	4.4	[3.8,5.1]	3.7	[3.1,4.4]	63.4	[61.2,65.6]	2.0	[1.6,2.6]	2	[1.5,2.7]	4,442
Benin	2017–18	41.6	[39.1,44.1]	58.4	[55.9,60.9]	38.7	[36.3,41.2]	1.7	[1.4,2]	1.2	[1,1.5]	51.2	[48.8,53.6]	4.3	[3.7,4.9]	2.9	[2.5,3.4]	11,292
	2006	38.5	[36.8,40.3]	61.5	[59.7,63.2]	35.2	[33.5,36.9]	2.1	[1.8,2.4]	1.3	[1,1.5]	54.8	[53,56.5]	4.1	[3.6,4.6]	2.6	[2.3,3]	11,695
Cameroon	2018–19	56.3	[53.2,59.3]	43.7	[40.7,46.7]	51.0	[48.1,53.9]	2.7	[2.2,3.2]	2.6	[2.1,3.2]	35.1	[32.7,37.6]	3.8	[3.1,4.6]	4.8	[4.2,5.4]	8,963
	2004	54.2	[51.9,56.5]	45.8	[43.5,48.1]	45.9	[43.8,48.1]	4.2	[3.7,4.8]	4.1	[3.5,4.6]	40.1	[38,42.3]	2.9	[2.5,3.3]	2.8	[2.4,3.3]	6,777
Haiti	2016–17	44.3	[41.6,47.1]	55.7	[52.9,58.4]	40.5	[38.0,43.0]	2.1	[1.7,2.6]	1.7	[1.3,2.2]	49.3	[46.8,51.9]	3.3	[2.7,4.1]	3	[2.4,3.7]	11,479
	2005–06	43.3	[40.2,46.4]	56.7	[53.6,59.8]	38.1	[35.3,41]	2.7	[2.2,3.3]	2.4	[2,3]	51.4	[48.4,54.4]	2.2	[1.4,3.3]	3.1	[2.1,4.7]	7,857
Kenya	2014	42.9	[41.2,44.6]	57.1	[55.4,58.8]	29.6	[28.1,31.2]	7.3	[6.5,8.2]	6.0	[5.3,6.8]	51.1	[49.5,52.8]	3.3	[2.8,3.8]	2.7	[2.3,3.1]	10,723
	2003	26.9	[24.7,29.2]	73.1	[70.8,75.3]	18.6	[16.8,20.4]	3.7	[3.1,4.4]	4.6	[4,5.4]	64.4	[62,66.6]	4.7	[4,5.4]	4.1	[3.2,5.1]	5,706
Liberia	2019–20	58.8	[55.3,62.3]	41.2	[37.7,44.7]	56.5	[52.9,60]	1.2	[0.8,1.9]	1.1	[0.7,1.8]	35.9	[32.8,39.1]	2.9	[2.4,3.7]	2.3	[1.9,2.9]	5,667
	2007	40.2	[37,43.4]	59.8	[56.6,63]	38.4	[35.3,41.5]	0.7	[0.5,1]	1.1	[0.8,1.7]	49.7	[46.5,52.8]	5.5	[4.4,6.7]	4.7	[3.7,6]	5,587
Nepal	2016	66.8	[62.4,70.9]	33.2	[29.1,37.6]	48.7	[45.4,52.1]	11.0	[9.8,12.3]	7.1	[6.1,8.1]	31.6	[27.7,35.8]	0.7	[0.5,1]	0.9	[0.6,1.2]	7,271
Philippines	2017	49.0	[45.2,52.8]	51.0	[47.2,54.8]	43.8	[40.4,47.3]	3.1	[2.5,3.8]	2.1	[1.7,2.5]	41.5	[38.6,44.5]	6.0	[4.3,8.3]	3.5	[2.7,4.6]	18,153
	2008	55.7	[53.6,57.8]	44.3	[42.2,46.4]	46.8	[44.8,48.7]	4.1	[3.6,4.8]	4.8	[4.2,5.5]	38.9	[37,40.8]	2.9	[2.5,3.3]	2.5	[2.1,3.1]	9,943
Rwanda	2019–20	20.3	[19.2,21.5]	79.7	[78.5,80.8]	14.6	[13.8,15.5]	2.2	[1.9,2.6]	3.5	[3.1,3.9]	74.4	[73.1,75.7]	2.7	[2.2,3.4]	2.6	[2.1,3.2]	10,703
	2005	16.0	[15,17]	84.0	[83,85]	11.9	[11,12.8]	2.2	[1.9,2.6]	1.9	[1.6,2.2]	83.1	[82,84.1]	0.4	[0.3,0.7]	0.5	[0.3,0.7]	8,342
Sierra Leone	2019	43.9	[41.4,46.3]	56.1	[53.7,58.6]	38.0	[35.7,40.3]	3.2	[2.7,3.7]	2.7	[2.1,3.4]	51.4	[49.1,53.8]	2.5	[2.1,2.9]	2.2	[1.9,2.6]	11,400
	2008	34.0	[30.9,37.4]	66.0	[62.6,69.1]	29.9	[27.1,32.9]	2.5	[2,3]	1.6	[1.3,2.2]	59.0	[55.8,62.1]	4.5	[3.8,5.3]	2.5	[2,3.1]	5,578
South Africa	2016	67.7	[65.3,70]	32.3	[30,34.7]	56.1	[53.6,58.6]	6.3	[5.2,7.7]	5.2	[4.3,6.4]	30.5	[28.4,32.8]	0.7	[0.5,1]	1.1	[0.8,1.5]	6,214
Tanzania	2015–16	35.5	[33.5,37.5]	64.5	[62.5,66.5]	30.1	[28.3,31.9]	2.7	[2.3,3.1]	2.7	[2.3,3.2]	60.7	[58.7,62.6]	1.6	[1.3,1.9]	2.3	[1.9,2.8]	10,264
Uganda	2016	29.3	[27.4,31.2]	70.7	[68.8,72.6]	20.9	[19.3,22.6]	3.6	[3.1,4.2]	4.7	[4.2,5.2]	60.5	[58.6,62.4]	4.6	[4,5.4]	5.6	[5,6.3]	12,649
	2006	18.2	[16.4,20.1]	81.8	[79.9,83.6]	13.2	[11.9,14.7]	2.1	[1.7,2.5]	2.9	[2.3,3.5]	74.9	[72.8,76.8]	3.0	[2.4,3.7]	4	[3.3,4.9]	5,807
Zambia	2018	47.7	[44.8,50.5]	52.3	[49.5,55.2]	43.3	[40.5,46.1]	1.8	[1.5,2.2]	2.6	[2.1,3.1]	46.1	[43.5,48.7]	2.6	[2.2,3]	3.7	[3.1,4.4]	9,660
	2007	41.5	[39.2,43.8]	58.5	[56.2,60.8]	37.9	[35.6,40.3]	1.5	[1.2,1.9]	2.1	[1.7,2.5]	52.5	[50.2,54.9]	3.4	[2.8,4.1]	2.6	[2.3,3.2]	5,045
Zimbabwe	2015	39.8	[37.5,42.2]	60.2	[57.8,62.5]	31.0	[29,33.1]	4.7	[4,5.6]	4.1	[3.6,4.7]	52.5	[50.3,54.8]	3.6	[3.1,4.2]	4	[3.2,5]	6,890
	2005–06	38.3	[35.3,41.4]	61.7	[58.6,64.7]	31.1	[28.6,33.7]	4.7	[4,5.5]	2.5	[2.1,3.1]	56.4	[53.5,59.2]	2.9	[2.4,3.6]	2.4	[2,2.9]	6,488

Appendix Table 2   Migration trends among women age 18–49

| Country | DHS survey | Rural-urban migrants | | | | | | | | |
| | | Total | | | 3–9 years in current residence | | | <3 years in current residence | | |
		% [95% CI]	diff.	*p* value of diff.	% [95% CI]	diff.	*p* value of diff.	% [95% CI]	diff.	*p* value of diff.
Bangladesh	2017–18	11.9 [10.6,13.2]	3.8	**<.001**	6.6 [5.9,7.5]	2.2	**<.001**	5.2 [4.6,5.9]	1.5	**.002**
	2007	8.1 [7.1,9.2]			4.4 [3.8,5.1]			3.7 [3.1,4.4]		
Benin	2017–18	2.9 [2.5,3.5]	-1	.183	1.7 [1.4,2]	-0	.076	1.2 [1,1.5]	-0	.844
	2006	3.4 [3,3.8]			2.1 [1.8,2.4]			1.3 [1,1.5]		
Cameroon	2018	5.3 [4.5,6.1]	-3	**<.001**	2.7 [2.2,3.2]	-2	**<.001**	2.6 [2.1,3.2]	-2	**<.001**
	2004	8.3 [7.5,9.1]			4.2 [3.7,4.8]			4.1 [3.5,4.6]		
Haiti	2016–17	3.8 [3.1,4.8]	-1	**.029**	2.1 [1.7,2.6]	-1	.085	1.7 [1.3,2.3]	-1	.052
	2005–06	5.2 [4.4,6]			2.7 [2.2,3.3]			2.4 [2,3]		
Kenya	2014	13.3 [12.2,14.4]	5	**<.001**	7.3 [6.5,8.2]	3.6	**<.001**	6 [5.3,6.8]	1.4	**.008**
	2003	8.3 [7.4,9.4]			3.7 [3.1,4.4]			4.6 [4,5.4]		
Liberia	2019–20	2.3 [1.7,3.3]	0.5	.302	1.2 [.8,1.9]	0.5	**.032**	1.1 [.7,1.8]	0	.919
	2007	1.8 [1.3,2.5]			.7 [.5,1]			1.1 [.8,1.7]		
Philippines	2017	5.2 [4.4,6.1]	-4	**<.001**	3.1 [2.5,3.8]	-1	**.020**	2.1 [1.7,2.5]	-3	**<.001**
	2008	8.9 [7.9,10.1]			4.1 [3.6,4.8]			4.8 [4.2,5.5]		
Rwanda	2019–20	5.7 [5.2,6.3]	1.6	**<.001**	2.2 [1.9,2.6]	0	.889	3.5 [3.1,3.9]	1.6	**<.001**
	2005	4.1 [3.6,4.6]			2.2 [1.9,2.6]			1.9 [1.6,2.2]		
Sierra Leone	2019	5.9 [4.9,7]	1.8	**.005**	3.2 [2.7,3.7]	0.7	.051	2.7 [2.1,3.4]	1.1	**.006**
	2008	4.1 [3.4,4.9]			2.5 [2,3]			1.6 [1.3,2.2]		
Uganda	2016	8.3 [7.5,9.2]	3.4	**<.001**	3.6 [3.1,4.2]	1.5	**<.001**	4.7 [4.2,5.2]	1.8	**<.001**
	2006	4.9 [4.1,5.8]			2.1 [1.7,2.5]			2.9 [2.3,3.5]		
Zambia	2018	4.4 [3.7,5.2]	0.8	.093	1.8 [1.5,2.2]	0.3	.256	2.6 [2.1,3.1]	0.5	.108
	2007	3.6 [3,4.2]			1.5 [1.2,1.9]			2.1 [1.7,2.5]		
Zimbabwe	2015	8.8 [8,9.8]	1.5	**.020**	4.7 [4,5.6]	0	.981	4.1 [3.6,4.7]	1.6	**<.001**
	2005–06	7.3 [6.4,8.3]			4.7 [4,5.5]			2.5 [2.1,3.1]		

Continued…

Appendix Table 2—*Continued*

Country	DHS survey	Urban-rural migrants								
		Total			3–9 years in current residence			<3 years in current residence		
		% [95% CI]	diff.	*p* value of diff.	% [95% CI]	diff.	*p* value of diff.	% [95% CI]	diff.	*p* value of diff.
Bangladesh	2017–18	4.6 [4.1,5.1]	0.6	.294	2.3 [2,2.7]	0.3	.411	2.3 [1.9,2.7]	0.3	.464
	2007	4 [3.3,4.9]			2 [1.6,2.6]			2 [1.5,2.7]		
Benin	2017–18	7.2 [6.3,8.2]	0.5	0.392	4.3 [3.7,4.9]	0.2	.557	2.9 [2.5,3.4]	0.3	.380
	2006	6.7 [6,7.4]			4.1 [3.6,4.6]			2.6 [2.3,3]		
Cameroon	2018	8.6 [7.5,9.9]	2.9	**<0.001**	3.8 [3.1,4.6]	0.9	**.023**	4.8 [4.2,5.5]	2	**<0.001**
	2004	5.7 [5,6.4]			2.9 [2.5,3.3]			2.8 [2.4,3.3]		
Haiti	2016–17	6.4 [5.3,7.7]	1.1	0.404	3.3 [2.7,4.1]	1.1	.064	3 [2.4,3.7]	-0	.845
	2005–06	5.3 [3.6,7.8]			2.2 [1.4,3.3]			3.1 [2.1,4.7]		
Kenya	2014	5.9 [5.3,6.6]	-3	**<0.001**	3.3 [2.8,3.8]	-1	**.001**	2.7 [2.3,3.1]	-1	**.003**
	2003	8.8 [7.5,10.2]			4.7 [4,5.4]			4.1 [3.2,5.1]		
Liberia	2019–20	5.3 [4.4,6.4]	-5	**<0.001**	2.9 [2.4,3.7]	-3	**<.001**	2.3 [1.9,2.9]	-2	**<.001**
	2007	10.2 [8.5,12.1]			5.5 [4.4,6.7]			4.7 [3.7,6]		
Philippines	2017	9.5 [7,12.8]	4.1	**0.001**	6 [4.3,8.3]	3.1	**<.001**	3.5 [2.7,4.6]	1	.056
	2008	5.4 [4.8,6.1]			2.9 [2.5,3.3]			2.5 [2.1,3.1]		
Rwanda	2019–20	5.3 [4.4,6.4]	4.4	**<0.001**	2.7 [2.2,3.4]	2.3	**<.001**	2.6 [2.1,3.2]	2.1	**<.001**
	2005	.9 [.7,1.2]			.4 [.3,.7]			.5 [.3,.7]		
Sierra Leone	2019	4.7 [4.2,5.3]	-2	**<0.001**	2.5 [2.1,2.9]	-2	**<.001**	2.2 [1.9,2.6]	-0	.368
	2008	7 [6,8.1]			4.5 [3.8,5.3]			2.5 [2,3]		
Uganda	2016	10.2 [9.1,11.5]	3.2	**<0.001**	4.6 [4,5.4]	1.6	**.001**	5.6 [5,6.3]	1.6	**.004**
	2006	7 [5.9,8.2]			3 [2.4,3.7]			4 [3.3,4.9]		
Zambia	2018	6.3 [5.4,7.3]	0.3	0.663	2.6 [2.2,3]	-1	**.022**	3.7 [3.1,4.4]	1.1	**.010**
	2007	6 [5.1,7.1]			3.4 [2.8,4.1]			2.6 [2,3.2]		
Zimbabwe	2015	7.6 [6.5,8.9]	2.3	**<0.001**	3.6 [3.1,4.2]	0.7	.110	4 [3.2,5]	1.6	**<.001**
	2005–06	5.3 [4.7,6.1]			2.9 [2.4,3.6]			2.4 [2,2.9]		

Note: Nepal, South Africa, and Tanzania are not included in this analysis.

Appendix Table 3   Migrant status by background variables among women age 18–49

	Bangladesh	Benin	Cameroon	Haiti	Kenya	Liberia	Nepal	Philippines	Rwanda	Sierra Leone	South Africa	Tanzania	Uganda	Zambia	Zimbabwe
	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]
% 18–24															
Urban non-migrants	14.9 [13.3,16.8]	27.7 [26.1,29.4]	26.5 [25.1,27.9]	25.9 [24,27.8]	24 [21.8,26.3]	28.8 [26.5,31.2]	24.9 [23.1,26.7]	23.4 [21.3,25.7]	20.6 [17.9,23.7]	28.1 [26.2,30.1]	20.8 [19,22.9]	29.4 [27.7,31.2]	28 [25.9,30.2]	26.8 [24.9,28.7]	22.9 [20.8,25.2]
Rural-urban 3–9 years	18.8 [15.7,22.5]	15.5 [10.5,22.2]	14.3 [10.1,19.9]	15.6 [10.3,22.8]	18.7 [14.9,23.2]	23.6 [10.5,44.9]	16.3 [13.3,20]	13.9 [9.8,19.3]	10 [6.6,14.9]	18.4 [13,25.4]	8.2 [4.9,13.5]	15.4 [11.2,21.1]	20.1 [16.1,24.8]	14.3 [9.1,21.7]	18.5 [13.5,24.7]
Rural-urban <3 years	51.9 [46.5,57.1]	42.4 [34.7,50.5]	52.9 [45.2,60.5]	53.1 [42.6,63.8]	53.5 [47.2,59.7]	53.6 [33.8,72.3]	54.6 [49.2,60]	47 [38.9,55.2]	53.7 [46.7,60.5]	42.9 [37,49]	37.5 [29.1,46.8]	61.1 [52.6,68.9]	60.5 [54.7,66.1]	52.1 [44.4,59.7]	55.1 [47.9,62.2]
Rural non-migrants	22.7 [21.3,24.2]	28.9 [27.4,30.4]	27 [25.1,29]	29.5 [28,31]	24.8 [23.5,26.2]	23.6 [21.9,25.4]	29.5 [27.4,31.6]	23.7 [22.3,25.1]	22.4 [21.4,23.5]	22 [20.3,23.8]	26.3 [24,28.7]	28 [26.8,29.3]	29.9 [28.7,31.2]	27.3 [26,28.6]	23.8 [22.3,25.4]
Urban-rural 3–9 years	20.1 [14.5,27.1]	18.2 [14.4,22.7]	12.4 [9.1,16.8]	11.6 [8.5,15.8]	14.6 [10.5,20]	12.8 [8.8,18.2]	22.5 [12.5,37.2]	9.7 [6.5,14.2]	6.6 [4.1,10.5]	12.8 [9.1,17.6]	9.4 [3.6,22.4]	11.2 [6.8,18]	12.9 [10.1,16.3]	12.9 [9.4,17.5]	12.4 [8.2,18.2]
Urban-rural <3 years	39.8 [32.7,47.5]	45.1 [39.6,50.6]	41.8 [36.4,47.4]	47.7 [40.3,55.3]	41 [34.1,48.2]	39.8 [32,48.1]	58.4 [46.5,69.4]	35.2 [26.5,45.1]	29.2 [23.2,36]	50.1 [42.8,57.3]	28.2 [17.3,42.4]	47.7 [40.9,54.6]	49.5 [45.3,53.6]	47.8 [42.2,53.5]	45.4 [39.1,51.9]
Total	22.3 [21.2,23.4]	28.4 [27.3,29.4]	27.2 [26.1,28.4]	28.1 [27,29.3]	25.9 [24.8,27.1]	26.9 [25.4,28.5]	27.8 [26.4,29.1]	23.3 [22.1,24.5]	22.7 [21.8,23.7]	25.2 [23.9,26.4]	22.6 [21.2,24.1]	29.2 [28.2,30.2]	30.9 [30,31.9]	27.9 [26.8,28.9]	25 [23.9,26.1]
% with 4 or more children															
Urban non-migrants	12 [10.7,13.5]	34.9 [32.9,36.9]	19.8 [18.4,21.4]	22.1 [20.4,23.8]	19 [17,21.2]	21.8 [19.1,24.9]	13.7 [11.9,15.6]	14.6 [13,16.4]	22.4 [20.1,25]	20.4 [18.8,22]	8.7 [7.4,10.2]	19.7 [17.9,21.6]	30.6 [28,33.3]	25.8 [24,27.6]	14.5 [12.8,16.4]
Rural-urban 3–9 years	12.3 [9.2,16.4]	22.6 [16.7,30]	14.2 [9.8,20.1]	20 [15.2,25.8]	10.5 [8,13.7]	33.2 [19.5,51.3]	6.6 [5,8.8]	24.1 [18.6,30.6]	20.4 [15.6,26.2]	29.5 [24.6,34.9]	11 [6.7,17.5]	25.4 [19.1,32.9]	29.9 [23.9,36.6]	36 [28.4,44.5]	9.4 [6.3,13.8]
Rural-urban <3 years	8.6 [6,12.2]	17.7 [11.9,25.6]	22 [16.7,28.6]	24.6 [18.7,31.6]	8.1 [5.4,12]	15.6 [7.6,29.3]	2.2 [1.2,3.9]	7.3 [4.5,11.6]	5.8 [3,6.9]	14.2 [10.8,18.4]	4 [2,8]	7.9 [4.9,12.4]	13.3 [10.2,17.1]	21.1 [15.8,27.6]	5.2 [3.1,8.7]
Rural non-migrants	16.5 [15.1,18]	44.8 [43.2,46.4]	13.4 [12.3,14.6]	17.2 [16,18.5]	40 [38.6,41.5]	49.9 [47.6,52.2]	21.6 [19.4,24]	24.2 [22.8,25.7]	31.7 [30.6,32.8]	39.4 [37.8,41]	14.5 [12.8,16.3]	45.4 [43.7,47]	47.5 [46.1,49]	51.2 [49.7,52.6]	33.5 [31.6,35.5]
Urban-rural 3–9 years	8.8 [5.1,14.7]	28.2 [23.7,33.2]	12.8 [9.5,17]	19.1 [15.1,23.7]	24.2 [18.8,30.5]	40.8 [33.4,48.6]	0	19.7 [15.3,24.9]	26.1 [21,32]	31.6 [24.6,39.4]	8.4 [3.5,18.9]	30.7 [22.7,40]	42.7 [37.5,48.2]	42.4 [36,49.1]	24.2 [17.9,32]
Urban-rural <3 years	6 [2.7,12.8]	18.2 [14.5,22.6]	25.8 [21.3,30.8]	29.7 [24.2,35.9]	9.7 [6.5,14.2]	20.8 [15.5,27.3]	0	10.3 [6.8,15.2]	11.2 [7,17.3]	14.9 [10.6,20.5]	7.2 [3,16.2]	12 [8.3,17.2]	18 [14.8,21.7]	19.8 [16.3,23.7]	12.7 [8.7,18.3]
Total	14.2 [13.2,15.3]	38.8 [37.6,40]	17.5 [16.6,18.5]	19.8 [18.9,20.8]	28.4 [27.3,29.6]	32.5 [30.3,34.8]	14.4 [13.2,15.7]	18.9 [17.9,19.9]	28.5 [27.6,29.5]	30.4 [29.3,31.6]	10.4 [9.3,11.5]	35.1 [33.8,36.4]	39.9 [38.6,41.1]	37.7 [36.4,39.1]	24.1 [22.8,25.5]
% with secondary or more education															
Urban non-migrants	59.9 [56.6,63.2]	30.7 [27.9,33.6]	71 [68.4,73.5]	70.4 [67,73.5]	59.4 [56.1,62.7]	59 [54.3,63.6]	54 [50.9,57.1]	90.4 [88.8,91.8]	57.9 [53.3,62.3]	57.5 [55.4,59.5]	92.6 [91.3,93.8]	37.7 [34.7,40.9]	62.8 [59.4,66.1]	69.2 [65.8,72.4]	92.4 [90.1,94.1]
Rural-urban 3–9 years	55 [49.2,60.7]	35.5 [28.3,43.4]	51.8 [43.5,60]	59.6 [48,70.3]	59.9 [53.9,65.5]	57.1 [32.4,78.7]	61.2 [56.8,65.5]	90.2 [85.8,93.3]	43.8 [36.8,51.1]	42.3 [36.4,48.5]	89.7 [81.7,94.4]	26.5 [18.6,36.2]	47.3 [41,53.6]	49.3 [39.3,59.2]	84.5 [79.1,88.6]
Rural-urban <3 years	56.1 [50,61.9]	40.7 [31.6,50.5]	58.8 [50.6,66.6]	57.3 [47.8,66.3]	54.1 [47.6,60.4]	55.5 [39.1,70.9]	75.5 [69.8,80.5]	89.8 [84.6,93.4]	48.1 [43.4,52.9]	56.9 [48.9,64.5]	89.2 [82.9,93.4]	31.6 [24.8,39.3]	50.8 [45.4,56.2]	50.5 [42.3,58.8]	84 [78.4,88.4]
Rural non-migrants	50.2 [48.5,52.3]	12.8 [11.6,14.2]	22.7 [20.1,25.4]	37.6 [34.7,40.6]	31.6 [29.9,33.3]	16.2 [13.8,18.9]	38.3 [34.9,41.9]	78.3 [76.5,79.9]	19 [17.7,20.4]	17.3 [15.5,19.3]	82.9 [80.7,84.8]	11.1 [9.8,12.5]	22.7 [21.1,24.4]	24.4 [22.7,26.2]	57.5 [54.6,60.4]
Urban-rural 3–9 years	69.5 [61.7,76.2]	20.4 [16.7,24.7]	45.6 [39.4,52.1]	54.4 [47.7,61]	42 [34.5,50]	35.3 [28.7,42.5]	67 [50.6,80.1]	88.2 [84.2,91.3]	41 [32.6,49.8]	30.7 [24.2,38]	94.7 [91.5,97.9]	23.7 [16.9,32.2]	48.4 [42.6,54.3]	52.2 [45.4,59]	81.2 [74.5,86.4]
Urban-rural <3 years	59.1 [51.2,66.5]	28.7 [23.1,35.1]	54.7 [48.6,60.7]	66.6 [59.4,73.2]	57.6 [49.8,65.1]	46.2 [37.1,55.6]	75.5 [57.4,87.6]	92.8 [89.3,95.3]	52.5 [45.7,59.1]	49.7 [42.5,56.9]	96.2 [87.6,98.9]	50.5 [43.1,57.9]	51.1 [46.5,55.6]	63.5 [58.1,68.7]	85.9 [80.3,90.1]
Total	54 [52.3,55.8]	21.2 [19.9,22.7]	51.5 [49,53.9]	53.1 [50.8,55.4]	44.3 [42.6,46]	42.6 [39.3,45.9]	51.7 [49.4,53.9]	85.3 [84.2,86.3]	27.7 [26.4,29.1]	35.5 [33.9,37.1]	89.3 [88.2,90.4]	21.2 [19.7,22.7]	36.1 [34.3,37.9]	47.1 [45,49.2]	72.7 [70.6,74.6]
% currently in a union															
Urban non-migrants	92.1 [90.8,93.3]	75.9 [73.8,77.9]	57.4 [55.2,59.5]	55 [52.1,57.9]	64.7 [61.9,67.4]	52.6 [48.4,56.7]	77.5 [75.6,79.2]	64 [61.9,66]	58.4 [54.6,62.1]	60.5 [58.6,62.3]	45.4 [42.6,48.2]	61.2 [58.8,63.7]	62.9 [60.3,65.4]	57.4 [54.1,60.7]	65.5 [62.9,67.9]
Rural-urban 3–9 years	94.5 [92.4,96]	88.3 [82.3,92.5]	73.2 [65.9,79.5]	66.7 [57.9,74.5]	66.9 [61.8,71.7]	51.5 [30.9,71.6]	95.3 [93.2,96.8]	83.9 [76.9,89]	68.5 [61,75.2]	81.2 [75.7,85.7]	54.6 [46.8,62.1]	78.1 [70.5,84.1]	75 [69.5,79.8]	75.8 [68.6,81.9]	73.4 [67,78.9]
Rural-urban <3 years	92.7 [90,94.8]	72.4 [63.4,79.9]	58.3 [50.5,65.6]	47.5 [39,56.2]	60.3 [54.2,66.1]	34.3 [21.8,49.3]	89 [83.9,92.7]	58.5 [49.3,67.2]	37.1 [30.5,44.3]	70.5 [63.9,76.3]	35.3 [27.9,43.5]	51 [41.6,60.3]	51.9 [46.3,57.5]	65.9 [58.6,72.6]	42.4 [34.9,50.3]
Rural non-migrants	91.3 [90.4,92.1]	83 [81.5,84.5]	75.5 [73.1,77.7]	68.1 [66.4,69.8]	51.7 [49.8,53.6]	73.5 [71.1,75.9]	84.1 [82.4,85.6]	74.2 [72.5,76]	66.5 [65.3,67.7]	81.7 [80.2,83]	30.8 [28.1,33.6]	74.4 [72.8,75.9]	71 [69.7,72.3]	72.5 [70.9,74.2]	76.3 [74.5,78]
Urban-rural 3–9 years	96.6 [92.6,98.5]	90.6 [87.1,93.3]	80.9 [75.3,85.5]	79.1 [72.5,84.4]	62.5 [56.2,68.5]	78.4 [71.7,83.9]	98.7 [90.8,99.8]	86.8 [83.9,89.2]	81.1 [75.2,85.8]	85.6 [80.7,89.4]	67.5 [52.6,79.6]	76 [66.6,83.4]	82.6 [78.5,86.1]	72.5 [65.6,78.4]	82.4 [76.1,87.3]
Urban-rural <3 years	93.3 [88.1,96.4]	77.7 [72.2,82.5]	63.4 [58,68.5]	54.4 [47.7,61.1]	55.2 [48.3,62]	66.1 [57.3,73.9]	92.1 [83,96.6]	75.4 [72.6,84.9]	63.7 [56.7,70.1]	69.8 [63.5,75.5]	50.8 [38.7,62.8]	63.2 [58.3,67.9]	62.4 [57.5,67.1]	65.2 [57.7,72]	65.2 [57.7,72]
Total	92 [91.3,92.6]	80.4 [79.2,81.5]	65.4 [63.7,67]	62.4 [60.7,64]	57.6 [56.2,59.1]	60.9 [58.2,63.6]	82.6 [81.5,83.7]	70.5 [69.2,71.8]	64.7 [63.5,65.8]	73.1 [71.9,74.3]	41.2 [39.4,43.1]	69.8 [68.5,71.1]	68.7 [67.6,69.9]	65.5 [63.8,67.2]	71.2 [69.8,72.6]
% working and paid															
Urban non-migrants	35.6 [32.9,38.5]	69.3 [66.7,71.7]	56.5 [54.6,58.5]	52.5 [50.2,54.8]	64.7 [61.9,67.4]	48.6 [42.9,54.4]	35.2 [31.8,38.8]	50.4 [47.6,53.1]	54.9 [52,57.8]	42.2 [38.9,45.7]	44.6 [41.5,47.7]	65.5 [62.6,68.2]	67.5 [65,69.9]	50.6 [48.5,52.8]	58.7 [56.4,61]
Rural-urban 3–9 years	46.2 [40.4,52.2]	71.5 [62,79.5]	61.3 [52.8,69.2]	53.2 [42,64.1]	66.9 [61.8,71.7]	51.2 [30.7,71.2]	34.2 [28.8,40]	40.7 [34.5,47.2]	63.5 [56.3,70.1]	56.3 [48.1,64.2]	42.1 [13.8,80.8]	67.2 [58.9,74.5]	73.6 [68.3,78.3]	61.3 [51.2,70.5]	57.3 [51,63.3]
Rural-urban <3 years	40.7 [34.3,47.5]	68.8 [59.6,76.6]	40.2 [32.9,47.9]	32.2 [22.9,43.2]	60.3 [54.2,66.1]	40.3 [24.3,58.7]	26.1 [20.1,33.1]	46.6 [38.5,54.8]	58.1 [52.3,63.7]	44.6 [35.2,54.3]	35.4 [27.2,44.7]	49.7 [40.7,58.7]	61.5 [56.6,66.2]	30.2 [23,38.5]	54.3 [47.4,61]
Rural non-migrants	43.3 [40.7,46]	65.9 [63.9,67.9]	56.8 [53.6,60]	51.9 [49.9,54]	51.7 [49.8,53.6]	38.5 [33.4,43.9]	25.6 [22.5,28.9]	36.3 [34.5,38.2]	58.4 [56.9,60]	32.4 [28.2,37]	28.3 [25.6,31.2]	40.6 [38.5,42.7]	62.6 [60.9,64.2]	36.9 [34.5,39.4]	35.5 [32.9,38.1]
Urban-rural 3–9 years	39.4 [32.3,47]	78.8 [73.8,83.1]	68.2 [62.8,73.2]	57.2 [51.3,62.9]	62.5 [56.2,68.5]	57.4 [49,65.3]	34.1 [20.7,50.6]	39.1 [35.3,43.1]	58.1 [51.7,64.2]	38.5 [30.8,46.9]	27.8 [14.5,46.5]	63.3 [54.5,71.2]	71.5 [66,76.4]	44 [37.5,50.7]	47 [40.3,53.9]
Urban-rural <3 years	29.3 [22.3,37.5]	66.4 [60.3,72]	47.3 [41.5,53]	35.3 [29.3,41.8]	55.2 [48.3,62]	45.9 [37.9,54.1]	33.3 [21.9,47.1]	35.7 [26.6,46]	48.5 [41.6,55.5]	33.6 [27.1,40.9]	38.6 [26.3,52.6]	48.9 [41.7,56.1]	65.1 [61,68.9]	37.3 [31.8,43.3]	45 [35.9,54.5]
Total	40.9 [39,42.9]	67.9 [66.4,69.4]	56.3 [54.7,58]	51.5 [50,53]	57.6 [56.2,59.1]	45.1 [41.2,49.1]	31.4 [28.9,33.9]	43 [41.4,44.6]	57.8 [56.4,59.1]	37.4 [34.7,40.2]	38.8 [36.6,41.1]	49.6 [47.9,51.3]	64.5 [63.3,65.8]	43.3 [41.7,45]	45.3 [43.5,47.1]
% in first and second wealth quintile															
Urban non-migrants	8.6 [6.8,10.8]	21.9 [18,26.3]	5.8 [4.1,8]	2.6 [1.8,3.8]	9.3 [8,10.9]	13.9 [9.9,19.1]	28.9 [24.2,34.2]	17.8 [15.5,20.4]	5.8 [4.2,7.9]	2.4 [1.6,3.6]	16.8 [13.7,20.5]	4.7 [2.6,8.5]	7.6 [5.5,10.5]	1.6 [1.1,2.5]	0
Rural-urban 3–9 years	10.6 [7.2,15.4]	15.3 [8.7,25.5]	11.3 [6.7,18.4]	14 [7.8,23.8]	8.6 [6.6,11.3]	5.1 [1.6,15]	21.9 [17.5,27.2]	28.9 [22.6,36.2]	15.7 [11.5,21]	2.6 [1.3,5]	47.6 [36.8,58.7]	9 [5.2,15]	17.6 [13,23.3]	8.9 [5.6,14]	0
Rural-urban <3 years	8.2 [5.7,11.8]	13.1 [7.6,21.7]	14 [9.1,20.9]	6.2 [2.8,13]	8 [5.9,10.7]	10.8 [3.8,26.7]	18.1 [14.1,23]	21.5 [16.3,27.9]	8.2 [5.3,12.6]	0.4 [.1,3]	50 [40.8,59.3]	4.6 [1.9,10.6]	9.9 [7,13.9]	8.9 [5.9,13.2]	0
Rural non-migrants	46.3 [43.3,49.4]	50.7 [47.2,54.2]	73.4 [69.7,76.9]	60.6 [55.6,65.3]	49.5 [47.3,51.8]	77.6 [73.5,81.2]	59.1 [52.8,65.1]	53.6 [50.7,56.5]	47.8 [45.7,49.9]	66.1 [62.7,69.3]	72.9 [69,76.5]	52.1 [48.8,55.3]	46.9 [44.7,49.1]	68.9 [66.5,71.2]	59.8 [56.2,63.4]
Urban-rural 3–9 years	29.6 [23.5,36.5]	36.4 [30,43.3]	48.4 [38.7,58.3]	33.4 [25.4,42.4]	33.9 [27.6,40.9]	65.9 [56.6,74.1]	27.6 [15.1,45]	35.2 [25.1,46.8]	24.6 [18.8,31.5]	58.9 [49.8,67.3]	32.9 [20.4,48.5]	30.5 [22.4,39.9]	24 [18.8,30.2]	40.6 [33.3,48.2]	34 [27,41.8]
Urban-rural <3 years	34.9 [27.8,42.7]	34.3 [27.2,42.1]	51.7 [44.3,59.1]	35.6 [27.7,44.4]	27 [20.9,34.2]	66.5 [56.8,74.9]	34.4 [20.2,52.1]	32.2 [23,42.9]	16.2 [11.7,22]	51.3 [43.7,58.7]	33 [21.1,47.6]	22.1 [15.6,30.3]	24.5 [20.3,29.4]	34.4 [27.3,42.2]	30.7 [22.5,40.4]
Total	31.4 [29.3,33.6]	37.4 [34.8,40]	33.7 [31,36.6]	33.5 [30.7,36.4]	31 [29.5,32.6]	39.3 [35.4,43.3]	37 [33.4,40.7]	34.6 [32.6,36.7]	38.1 [36.3,40]	37.6 [35.1,40.2]	37.9 [34.8,41.1]	34.4 [31.9,36.9]	33.6 [31.7,35.5]	35.1 [32.9,37.4]	33.9 [31.4,36.5]

Note: All variables were significantly associated with migrant status for all surveys.

Appendix Table 4　**Adjusted odds ratios of migration status and having at least four antenatal care visits for the most recent birth in the last 3 years among women age 18–49**

Country	Survey year	Urban non-migrants reference					Rural non-migrants reference				
		Rural-to-Urban Migrants		Rural non-migrants	Urban-to-Rural Migrants		Urban non-migrants	Rural-to-Urban Migrants		Urban-to-Rural Migrants	
		3–9 years	<3 years		3–9 years	<3 years		3–9 years	<3 years	3–9 years	<3 years
Bangladesh	2017–18	**0.52***	**0.48**	**0.29***	**0.52*	0.65	**3.39***	**1.77**	**1.64*	1.77	**2.19*
	2007	**0.51*	**0.43**	**0.26***	0.56	1.02	**3.83***	**1.95*	1.66	2.13	**3.89**
Benin	2017–18	1.2	0.87	0.83	**0.69*	0.91	1.21	1.45	1.05	0.83	1.1
	2006	0.95	0.9	**0.58***	0.82	1.2	**1.72***	**1.63*	1.55	**1.41*	**2.07***
Cameroon	2018–19	0.99	**0.56*	**0.43***	0.73	**0.48***	**2.32***	**2.31***	1.29	**1.69*	1.12
	2004	1.04	**0.57*	**0.4***	**0.41***	**0.58*	**2.5***	**2.61***	1.42	1.01	1.45
Haiti	2016–17	1.27	**0.42*	**0.6***	0.88	0.74	**1.67***	2.12	0.7	1.46	1.24
	2005–06	0.93	0.55	**0.52***	0.57	**0.33***	**1.93***	1.79	1.05	1.1	0.64
Kenya	2014	1.34	0.83	**0.61***	0.76	1.01	**1.63***	**2.2***	1.36	1.24	**1.64*
	2003	1.16	0.96	**0.5***	**0.35***	0.8	**2.01***	**2.34***	**1.94*	0.7	1.6
Liberia	2019–20	1.98	0.36	**0.61*	0.6	1.01	**1.63*	3.24	0.59	0.97	1.64
	2007	2.15	1.68	**0.66*	0.8	1.07	**1.52*	3.27	**2.55*	1.21	1.62
Nepal	2016	1	1.2	**0.63*	1	0.74	**1.58*	1.58	1.9	1	1.16
Philippines	2017	**2.86*	0.74	0.91	1.76	1.06	1.1	**3.15*	0.82	**1.94*	1.17
	2008	0.89	0.85	**0.71*	0.98	0.92	**1.41*	1.26	1.2	1.39	1.3
Rwanda	2019–20	1.01	1.14	1.09	0.99	1.03	0.92	0.93	1.05	0.91	0.95
	2005	1.23	0.88	0.86	1.76	1.8	1.17	1.44	1.03	2.06	2.1
Sierra Leone	2019	1.26	**1.79*	**1.88***	**2.54**	**1.98*	**0.53***	.67	0.95	1.35	1.05
	2008	1.09	1.03	**0.7*	0.76	0.79	**1.44*	1.57	1.47	1.09	1.14
South Africa	2016	0.83	0.72	1.22	1.16	**12.76**	0.82	0.68	0.59	0.95	**10.47**
Tanzania	2015–16	1.1	0.72	**0.54***	0.78	**0.56*	**1.85***	**2.03*	1.33	1.45	1.04
Uganda	2016	0.81	1.05	**0.73**	1	0.89	**1.37**	1.1	1.44	**1.37*	1.22
	2006	1.58	0.83	**0.78*	0.69	0.99	**1.29*	2.04	1.08	0.89	1.27
Zambia	2018	**0.58*	1.03	1.16	1.31	1.23	0.86	**0.5**	0.89	1.13	1.06
	2007	1.23	1.19	**1.38**	1.54	1.13	**0.73**	0.9	0.86	1.11	0.82
Zimbabwe	2015	0.81	0.63	0.94	0.87	0.67	1.06	0.86	0.67	0.93	0.71
	2005–06	1.02	1.62	0.83	0.96	0.66	1.21	1.23	1.95	1.16	0.8

Note: Logistic models are adjusted for women's age, education, marital status, and work for pay status. In South Africa, there were <25 observations in each category of urban-rural migrants and therefore results should be interpreted with caution for these groups. *p < .05, **p < .01, ***p < .001.

Appendix Table 5   Adjusted odds ratios of migration status and modern contraceptive use among women age 18–49

| Country | Survey year | Urban non-migrants reference | | | | | Rural non-migrants reference | | | | |
| | | Rural-to-Urban Migrants | | Rural non-migrants | Urban-to-Rural Migrants | | Urban non-migrants | Rural-to-Urban Migrants | | Urban-to-Rural Migrants | |
		3–9 years	<3 years		3–9 years	<3 years		3–9 years	<3 years	3–9 years	<3 years
Bangladesh	2017–18	1	1.18	**0.79***	0.82	**0.46***	**1.27***	**1.27***	**1.49***	1.03	**0.58**
	2007	1.19	**0.67***	**0.7***	0.66	0.72	**1.43***	**1.69***	0.96	0.94	1.03
Benin	2017–18	0.81	0.95	**0.8***	**0.69***	0.9	**1.25***	1.01	1.19	0.86	1.13
	2006	0.67	1.07	**0.74**	**0.47**	0.71	**1.36**	.9	1.45	0.64	0.97
Cameroon	2018–19	0.91	0.89	**0.67***	0.73	0.79	**1.5***	1.37	1.33	1.1	1.19
	2004	**0.66***	**0.66***	**0.46***	**0.39***	**0.45***	**2.19***	1.45	1.43	0.86	0.98
Haiti	2016–17	1.31	1.2	0.87	**0.7***	0.85	1.15	1.51	1.38	0.81	0.98
	2005–06	0.85	**0.56***	0.89	1.3	0.74	1.13	0.96	0.64	**1.47***	0.84
Kenya	2014	1.09	0.89	0.9	0.96	0.86	1.11	1.2	0.99	1.06	0.95
	2003	1.16	0.8	**0.7***	0.76	0.76	**1.44***	**1.67**	1.15	1.1	1.09
Liberia	2019–20	1.31	1.84	1.23	**2.23***	1.12	.81	1.07	1.5	**1.81**	0.91
	2007	0.5	1.52	**0.51***	**0.55***	0.89	**1.96***	0.99	**2.99***	1.08	**1.75***
Nepal	2016	**0.75**	0.76	**0.71***	0.76	0.58	**1.41***	1.05	1.08	1.08	0.81
Philippines	2017	0.98	1.13	**1.3***	0.87	**0.68***	**0.77***	0.76	0.87	**0.67***	**0.52***
	2008	1	0.88	0.98	1.07	**0.67***	1.02	1.02	0.89	1.09	**0.69***
Rwanda	2019–20	0.83	0.79	1.15	0.97	0.91	0.87	**0.73***	**0.69**	0.85	0.79
	2005	0.75	0.54	**0.45***	0.7	1.17	**2.24***	1.68	1.2	1.56	2.63
Sierra Leone	2019	0.87	1.16	0.89	0.82	0.9	1.12	0.98	1.31	0.92	1.01
	2008	0.71	0.88	**0.35***	**0.44**	**0.38**	**2.87***	2.05	**2.54**	1.28	1.09
South Africa	2016	1.02	0.82	0.99	1.07	1	1.01	1.03	0.83	1.08	1.01
Tanzania	2015–16	1.01	**0.64***	**0.85***	0.71	**0.65***	**1.17***	1.18	0.76	0.84	0.76
Uganda	2016	0.92	0.81	**0.77***	0.86	**0.75***	**1.29***	1.18	1.05	1.12	0.97
	2006	0.95	0.82	**0.42***	0.73	0.65	**2.36***	**2.25***	**1.93**	**1.72**	**1.53***
Zambia	2018	0.79	1.04	**0.8**	**1.4***	0.98	**1.25**	0.99	1.3	**1.76***	1.23
	2007	0.72	**0.62***	**0.59***	1.04	0.71	**1.71***	1.24	1.05	**1.77***	1.22
Zimbabwe	2015	1.27	0.8	0.94	0.99	0.71	1.07	**1.35***	0.85	1.06	0.76
	2005–06	1.08	0.86	**0.69***	**0.47***	0.69	**1.46***	**1.57**	1.26	0.68	1

Note: Logistic models are adjusted for women's age, education, marital status, and work for pay status. *p < .05, **p < .01, ***p < .001.

Appendix Table 6   Adjusted odds ratios of migration status and having a major problem accessing care due to obtaining money for treatment among women age 18–49

Country	Survey year	Urban non-migrants reference					Rural non-migrants reference				
		Rural-to-Urban Migrants		Rural non-migrants	Urban-to-Rural Migrants		Urban non-migrants	Rural-to-Urban Migrants		Urban-to-Rural Migrants	
		3–9 years	<3 years		3–9 years	<3 years		3–9 years	<3 years	3–9 years	<3 years
Bangladesh	2017–18	1.16	1.1	1.43***	1.12	1.3	0.7***	0.82	0.77	0.79	0.91
Benin	2017–18	1.06	0.91	1.24*	1.21	1.07	0.81*	0.85	0.73	0.98	0.86
Cameroon	2018–19	1.03	0.79	1.88***	1.41*	1.59**	0.53***	0.55**	0.42***	0.75	0.85
	2004	1.4*	0.93	1.76***	1.46*	1.48**	0.57***	0.8	0.53***	0.83	0.84
Haiti	2016–17	1.51	1.7*	1.71***	1.37	1.18	0.58***	0.88	0.99	0.8	0.69
	2005–06	1.4	1.39	1.7***	2.32*	2.47**	0.59***	0.83	0.82	1.37	1.45
Kenya	2014	1.09	1.16	1.89***	1.75***	1.55**	0.53***	0.58***	0.62**	0.93	0.82
Liberia	2019–20	0.35	0.55	1.46*	1.59*	1.5	0.69*	0.24*	0.38*	1.09	1.03
	2007	1.42	1.41	1.81***	1.39	1.05	0.55***	0.79	0.78	0.77	0.58**
Nepal	2016	0.99	1.02	1.49***	0.92	0.79	0.67***	0.66***	0.68*	0.61	0.53*
Philippines	2017	1.44*	1.22	1.41***	1.57**	1.04	0.71***	1.03	0.87	1.12	0.74*
	2008	1.07	1.34*	1.42***	1.12	1.4*	0.71***	0.76*	0.95	0.79	0.99
Rwanda	2019–20	1.4	0.92	1.64***	1.08	1.18	0.61***	0.85	0.56***	0.66**	0.72
	2005	0.78	0.79	1.31**	0.87	1.19	0.76**	0.6***	0.6**	0.67	0.91
Sierra Leone	2019	0.92	1.34	3.37***	3.67***	2.3***	0.3***	0.27***	0.4**	1.09	0.68*
	2008	1.97**	0.96	2.28***	1.62*	1.37	0.44***	0.86	0.42***	0.71	0.6*
South Africa	2016	1.15	1.31	2.12***	1.19	1.52	0.47***	0.55*	0.62	0.56	0.72
Tanzania	2015–16	0.98	0.92	1.28***	1.33	1.3	0.78***	0.77	0.72*	1.05	1.02
Uganda	2016	1.16	0.91	1.57***	1.2	1.25	0.64***	0.74*	0.58***	0.77*	0.8*
	2006	1.23	1.34	1.32*	1.13	1.29	0.76*	0.93	1.02	0.86	0.98
Zambia	2018	1.68	1.43	2.49***	1.38	1.69**	0.4***	0.67	0.57	0.55**	0.68*
	2007	0.8	1	1.66***	1.07	1.26	0.6***	0.48**	0.6*	0.65*	0.76
Zimbabwe	2015	1.87***	1.59**	2.25***	1.72**	1.38	0.44***	0.83	0.71*	0.76	0.61**
	2005–06	1.2	1.67**	2.73***	2**	1.47*	0.37***	0.44***	0.61*	0.73	0.54***

Note: Logistic models are adjusted for women's age, education, marital status, and work for pay status. * p<0.05, ** p<0.01, ***p<0.001

Appendix Table 7   Adjusted logistic regression results of migration status and having a major problem accessing care due to distance to health facility among women age 18–49

Country	Survey year	Urban non-migrants reference					Rural non-migrants reference				
		Rural-urban		Rural non-migrants	Urban-rural		Urban non-migrants	Rural-urban		Urban-rural	
		3–9 years	<3 years		3–9 years	<3 years		3–9 years	<3 years	3–9 years	<3 years
Bangladesh	2017–18	1.02	1.22	1.98***	1.49*	2.18***	0.51***	0.52***	0.62***	0.75	1.1
Benin	2017–18	0.73	0.71	1.43***	1.48*	1.36	0.7***	0.51**	0.5*	1.03	0.95
Cameroon	2018–19	1.11	0.94	2.63***	2.43***	2.64***	0.38***	0.42***	0.36***	0.93	1
	2004	1.12	1.02	3.23***	2.8***	2.72***	0.31***	0.35***	0.32***	0.87	0.84
Haiti	2016–17	1.12	1.18	4.56***	3.42***	3.43***	0.22***	0.24***	0.26***	0.75*	0.75
	2005–06	1.46*	1.05	3.66***	2.55***	2.21***	0.27***	0.4***	0.29***	0.7	0.6*
Kenya	2014	0.64*	0.83	2.66***	2.35***	2.03***	0.38***	0.24***	0.31***	0.88	0.76
Liberia	2019–20	0.16**	0.53	2.43***	3.34***	3.08***	0.41***	0.07***	0.22**	1.37	1.27
	2007	0.78	0.57	6.24***	5***	3.38***	0.16***	0.13***	0.09***	0.8	0.54**
Nepal	2016	0.95	1.07	2.29***	1.87	1.7	0.44***	0.41***	0.47***	0.82	0.74
Philippines	2017	2.11***	1.57*	2.79***	2.59***	2.49***	0.36***	0.76	0.56**	0.93	0.89
	2008	1.21	1.44*	2.91***	2.48***	2.68***	0.34***	0.42***	0.49***	0.85	0.92
Rwanda	2019–20	1.15	1.22	3.79***	2.1**	2.34**	0.26***	0.3***	0.32***	0.55**	0.62
	2005	0.99	0.83	1.7***	1.83	1.12	0.59***	0.58*	0.49***	1.08	0.66
Sierra Leone	2019	1.07	1.24	3.7***	4.05***	2.71***	0.27***	0.29***	0.34***	1.1	0.73
	2008	1.64*	1.35	2.66***	2.33***	2.19**	0.38***	0.62*	0.51*	0.87	0.82
South Africa	2016	1.27	1.06	3.14***	3.91*	1.97	0.32***	0.41**	0.34***	1.25	0.63
Tanzania	2015–16	1.17	1.17	1.63***	1.85**	1.98***	0.62***	0.72	0.72	1.14	1.22
Uganda	2016	0.98	1.02	3***	2.45***	2.14***	0.33***	0.33***	0.34***	0.82	0.71**
	2006	0.92	1.24	3.75***	2.83***	2.65***	0.27***	0.24***	0.33***	0.75	0.71
Zambia	2018	1.1	1.59**	5.62***	3.93***	4.34***	0.18***	0.2***	0.28***	0.7*	0.77
	2007	1.2	1.3	5.28***	4.19***	3.51***	0.19***	0.23***	0.25***	0.79	0.67*
Zimbabwe	2015	1.57*	1.72*	8.97***	6.32***	6.7***	0.11***	0.17***	0.19***	0.7*	0.75
	2005–06	1.45	1.71	8.36***	7.3***	5.68***	0.12***	0.17***	0.2***	0.87	0.68*

Note: Logistic models are adjusted for women's age, education, marital status, and work for pay status. *p < .05, **p < .01, ***p < .001.

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