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Research

Unintended pregnancy and contraceptive use among residents of slum and non-slum areas in Kinshasa, DRC: a comparative analysis using PMA survey data (2014–2020)

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Abstract
Urbanization is rapidly increasing worldwide, with slum settlements emerging as a significant concern, particularly in low- and middle-income countries like the Democratic Republic of Congo. This study examines contraceptive use and unintended pregnancies among women residing in slum and non-slum areas of Kinshasa between 2014 and 2020. We analyzed data from the Performance Monitoring for Action survey conducted between 2014 and 2020, encompassing 19,568 women. Logistic regression, adjusted for socio-demographic factors, was used to assess the association between residence type (slum vs. non-slum) and contraceptive use as well as unintended pregnancies. Results indicate a rise in contraceptive prevalence in Kinshasa from 2014 to 2020, with slum areas consistently exhibiting higher prevalence rates compared to non-slum areas. Long-term contraceptive method prevalence increased from 4 to 8% in slum areas, contrasting with the stable rate of approximately 3% in non-slum areas over the same period. Although there was a decline in unintended pregnancy prevalence in slum areas in recent years, rates remain elevated compared to non-slum areas. In bivariate analysis, women residing in slum areas were twice as likely to report unintended pregnancies compared to those in non-slum areas (OR: 2.33; 95% CI 2.008–2.698). However, after adjusting for socio-demographic characteristics, residence type (slum vs. non-slum) did not significantly influence the occurrence of unintended pregnancies. These findings underscore the persistent challenges faced by women in slum areas regarding unintended pregnancies, despite improvements in contraceptive prevalence. Addressing these disparities requires targeted interventions tailored to the specific needs of urban populations, particularly those residing in slum settlements.

Keywords Slum · Unintended pregnancy · Contraceptive use · DRC

1 Introduction

In recent decades, the global population residing in urban areas has increased at an alarming pace. According to projections by the United Nations (UN), by the year 2050, 68.0% of the world's population will live in urban areas [1]. This rapid urban expansion is accompanied by the proliferation of slum settlements, particularly prevalent in low- and middle-income countries (LMICs) where over 50% of individuals live in such poor urban setting [2]. In this context,

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the Democratic Republic of Congo (DRC) faces significant urbanization challenges with 80.4% of urban population living in slum. This is exemplified by the sprawling metropolis of Kinshasa, where slum settlements are widespread [3]. Slum areas are characterized by overcrowded and impoverished living conditions with households lacking basic amenities such as electricity, water, sanitation, waste management, and safety, and present unique health and social challenges, including limited access to reproductive health services and information [4, 5]. Such circumstances, as a result, pose a multitude of health risks, including exposure to unsafe sex, unclean water, and consumption of alcohol and tobacco [6, 7]. Notably, individuals residing in slums are often excluded from access to formal services, such as family planning (FP), as public authorities do not perceive these settlements as integral parts of the city. Thus, poor people living in slums have high fertility because they use contraceptives less and have greater unmet needs in terms of family planning [7].

It is therefore critical to develop targeted intervention strategies for addressing urban health disparities. The use of contraceptives is an effective approach to regulating fertility and population growth [8]. Contraceptive use prevents maternal mortality by avoiding teenage pregnancy, unwanted pregnancy, unsafe abortion, and birth spacing [8, 9].

Contraceptive use is a critical determinant of unintended pregnancy rates, yet access to and utilization of contraceptives are frequently constrained in slum settings due to a multitude of factors, including economic constraints, inadequate healthcare infrastructure, and sociocultural barriers [10]. Understanding the dynamics of contraceptive use and unintended pregnancies in slum areas compared to non-slum areas is essential for informing targeted interventions and policies to improve reproductive health outcomes among urban populations.

The Democratic Republic of Congo (DRC) is characterized by one of the highest population growth rates globally, standing at 3.2%, and its capital city, Kinshasa, qualifies as a megacity. With a current population of approximately 16.3 million individuals, Kinshasa is anticipated to expand to 26.7 million by 2035 [11]. The growth of Kinshasa's population can be attributed mainly to high fertility rates and the influx of migrants. The DRC exhibits one of the highest fertility rates globally, with 6.11 births per woman and a 2019 birth rate of 40.6 births per 1000 individuals [11]. The 2014 Demographic Health Survey (DHS) reported a modern contraceptive prevalence rate of 18% among women aged 15–49 years in union or marriage across the entirety of the DRC, while Kinshasa displays a prevalence rate of 34.0% [12] and an unintended pregnancy rate of 147 per 1000 women aged 15 to 49 [13]. Given the low prevalence of family planning (FP) in Kinshasa, several campaigns and strategies employing community health workers (CHWs) have been implemented since 2015. Specifically, FP programs targeting slum-dwelling populations and utilizing CHWs were designed to cater to the reality that informal neighborhoods tend to be served primarily by informal providers. Previous findings demonstrate a higher percentage of FP services received by slum dwellers from CHWs relative to non-slum dwellers and have highlighted the greater availability of CHWs as a means of mitigating the constraints on FP services in slum communities [14].

While previous research has explored reproductive health disparities between urban and rural settings, there remains a paucity of studies specifically examining variations within urban areas, particularly between slum and non-slum populations. In addition, research on fertility and population growth in Kinshasa has notable limitations, including the absence of analysis of heterogeneity between subgroups in the population of Kinshasa (slum vs non-slum, etc.) and previous studies failed to account for changes over time. Slums generally exist in unplanned peripheral zones and do not have adequate social infrastructure, public roads, or drainage. However, in Kinshasa, due to the rapid urbanization and the lack of control over urbanization causes the proliferation of slums due to a housing crisis. Unfortunately, the urbanization plan for the city of Kinshasa is not only not updated or implemented but is also not respected. Thus, the slums in Kinshasa are not only found on the outskirts of Kinshasa but also within the non-slum, nestled in or next to non-slums.

Thus, this study aims to fill this gap by investigating the heterogeneity of contraceptive use and unintended pregnancies among women residing in slum and non-slum areas of Kinshasa. Specifically, we examined the differences in family planning (FP) outcomes between slum and non-slum residents over time.

By leveraging data from the Performance Monitoring for Action (PMA) survey conducted between 2014 and 2020, this study provides insights into the temporal trends and disparities in contraceptive prevalence and unintended pregnancy rates across different urban contexts. Understanding these dynamics is crucial for designing targeted interventions and strengthening health systems to address the reproductive health needs of urban populations, particularly those living in marginalized slum settlements.

2 Methods

2.1 Data

We used secondary data from PMA surveys. The PMA project is a large-scale family planning data collection and dissemination project funded by the Bill Melinda Gate foundation, which collects representative data annually across 11 countries, including DRC to measure various fertility and FP indicators (https://www.pmadata.org/, accessed on 12 April 2023).

Specifically, we focused on data series from Kinshasa within the framework of PMA surveys conducted in 2014 and 2020. The survey used a sampling approach that is representative of the population of the city of Kinshasa and its main results are comparable to data from the DHS from the same period. Women were identified using a multistage clustered sampling design, starting with the random selection of census enumeration areas (EAs) in Kinshasa, followed by the random selection of 35 households per EA after making a list of households in the EAs.

Study participants were women aged 15–49 who had declared themselves sexually active during the household interview according to the PMA protocol. A total of 19,568 women were invited to answer a series of questions designed to gather information on their current pregnancy status, whether the pregnancy was intended or planned, their future fertility intentions, and their current contraceptive use.

2.2 Study variables and outcomes

Independent variables included socio-demographic characteristics such as residence (slum or non-slum), age, level of education, marital status, and relationship to head of household, household wealth quintile. Household wealth quintile was calculated on the basis of household durables (TV, radio, car, etc.) and dwelling characteristics (availability of electricity, type of drinking water supply, type of toilet, number of rooms used for sleeping, flooring material, etc.) of the overall sample (slums and non-slums) and recoded into quintiles (lowest, lower, middle, higher and highest wealth quintile) using principal component analysis; parity, respondents' reproductive history, exposure to the FP awareness program and visits to the household by community health workers in the last 12 months.

UN-Habitat was used to classify the enumeration areas as slum or non-slum. It is recommended to use census areas to identify slum neighborhoods because they constitute the "smallest household mix" in many countries and are relatively homogeneous. In this study, slum families were grouped down to the enumeration area or cluster to define the slum-neighborhood variable. According to UN-Habitat, a cluster was qualified as a slum neighborhood when it included 50% or more slum households [15]. A total of 58 census areas were included in the analysis, with 14 classified as non-slums and 44 slums [14].

In terms of outcome variables, modern contraceptive use was defined as the woman's current use of a modern contraceptive method (defined as a male or female condom, sterilization, intrauterine dispositive, implant, injections, emergency contraceptive pill, pills, spermicides, or lactational amenorrhea), which was coded as 1 "yes" and 0 "no".

Traditional contraceptive methods, as per the DHS, typically include Rhythm method (also known as the calendar method); withdrawal (coitus interruptus); prolonged abstinence and folk methods (various local practices that are believed to prevent pregnancy).

In addition, unintended pregnancy was a binary variable coded as 0 "no" if at the time of the interview, the pregnant respondent said that the pregnancy was intended or planned, or if her last delivery in the last 5 years was intended, and as 1 "yes" if the current pregnancy was not intended or planned, or if her last delivery in the last 5 years was not intended or planned. Only pregnant or multiparous women were asked about pregnancy intention.

2.3 Data analysis

Data analysis was carried out using Stata 18/SE software, and the survey design was taken into account through the application of weights. Descriptive statistics were utilized to characterize the sample, while the Kolmogorov–Smirnov normality test was employed to assess the distribution of certain quantitative variables. Means and standard deviations (SDs) were calculated for continuous variables exhibiting a normal distribution. Median and interquartile range were calculated for non-normally distributed data, while proportions and their respective 95% confidence intervals (CIs) were established for categorical variables. The relationships between the dependent variables and each independent variable were evaluated using either Pearson's chi-square test or Fisher's exact test.

During the analyses, marital status was grouped into alone (single, divorced/separated and widowed) and in union.

To answer the research question regarding the impact of residing in slum areas on unintended pregnancy while controlling for socio-demographic factors, a two-stage approach was adopted. First, we fitted a regression model to assess the association between slum residences and unintended pregnancy. Then, we employed a second model incorporated sociodemographic variables to determine whether they could explain the observed association between slum residence and unintended pregnancy. At the end of the bivariate analysis, the significantly associated variables ($p < 0.05$) were retained in the multivariate analysis after checking the multi-collinearity between the explanatory variables (FIV = 2.15). The results of the regression analyses were presented as odds ratios (OR) with a 95% confidence interval.

3 Results

3.1 Characteristics of the study population across the different waves of the surveys

Overall, around three quarters of respondents resided in slum areas during each data collection round. The distribution of women by age group, over time remained almost stationary and similar as is the distribution according to marital status. More than half of the women were in union while those living alone were between 46 and 49%. There was statistically significant variation across survey waves in terms of distribution by marital status, wealth index and the participant's relationship with the head of household (Table 1).

Overall, more than half of pregnancies were declared unintended. Half of the respondents had their first sexual intercourse before the age of 17 and had given birth for the first time around the age of 20. Half of the respondents had used a contraceptive method for the first time after the age of 20. More than half had at least one child when they first used a contraceptive method. Nulliparous women represented around a quarter of respondents and around five respondents out of a hundred were pregnant during each survey wave (Table 2).

3.2 Exposure to the family planning awareness program

Exposure to media is one of the interventions in demand creation. The majority of respondents have seen family planning services on television, and few have received a call or text message about family planning (Table 3).

3.3 Trends in visits to respondents' homes by health workers and choice of contraceptive method

Figure 1 shows that over the years, women who live in poor neighborhoods (slums) are the most beneficiaries of visits from community health workers (CHWs) who distribute and talk about FP methods compared to those who live in non-slum ($p < 0.001$) (Fig. 1).

Women of childbearing age living in the slums used more modern contraceptive methods compared to those not living in the slums who used more traditional methods. The use of long-acting methods increased significantly over the survey waves among women living in slums compared to their counterpart living in "non-slums" ($p < 0.001$) (Fig. 2a–c).

Figure 3a shows that in the non-slum, the prevalence of unintended pregnancy was stationary between 2014 and 2016 (around 45%) then experienced an increase in 2017 before falling again in 2020. In the slum, the same peak was also observed between 2017 and 2018 to decrease in 2020. Note that the gap between the two types of residence has narrowed over time, going from 16 points of difference in 2014 to narrowing to almost 10 points in 2020. Women living in the slums seem to use modern contraception more compared to women living outside the slums (Fig. 3b).

The prevalence of the long-term methods in slum neighborhoods (slums) increased from 4 to 8% from 2014 to 2020 while it remained around 3% in non-slums settlements (Fig. 2). The implant was the modern method most used in the slums and the male condom in the non-slums (Fig. 4a, b).

Table 1 Weighted background characteristics for women, Kinshasa 2014 to 2020

	2014		2015		2016		2017		2018		2020		Total		p
	n	%*	n	%*	n	%*	n	%*	n	%*	n	%*	n	%*	
Age (year) (mean ± SD)	28.03 ± 9.15		27.92 ± 9.25		28.11 ± 9.23		27.81 ± 9.45		28.25 ± 9.35		28.30 ± 9.56		28.11 ± 9.29		
Age range (years)															0.310
15–19	617	21.1	1260	22.9	595	21.6	593	24.2	588	21.8	579	22.2	4232	22.3	
20–24	621	21.4	1077	19.6	576	20.9	545	20.6	518	19.7	550	20.9	3887	20.4	
25–34	917	31.5	1695	30.8	859	31.1	853	29.0	853	31.3	778	28.6	5955	30.5	
35–49	747	26.0	1465	26.7	708	26.3	731	26.3	766	27.1	732	28.2	5149	26.8	
Marital status															**0.003**
Single	1293	44.5	2775	48.1	1259	45.4	1246	43.8	1211	43.7	1293	50.3	9077	46.5	
Married	1429	49.4	2644	47.0	1339	49.6	1308	48.8	1330	49.3	1299	42.7	9349	47.6	
Divorced/separated	127	4.2	215	3.6	107	3.9	120	4.8	141	5.4	138	5.3	848	4.3	
Widowed	53	1.9	77	1.4	33	1.2	48	2.6	43	1.5	40	1.7	294	1.6	
Household wealth quintile															**< 0.001**
Lowest wealth quintile	516	18.0	977	17.4	448	15.8	397	16.8	404	17.0	549	18.7	3291	17.3	
Lower wealth quintile	562	19.7	1165	21.0	559	21.1	560	20.0	534	21.0	574	18.9	3954	20.4	
Middle wealth quintile	565	19.8	1128	19.9	583	20.5	516	18.9	612	22.7	519	20.1	3923	20.2	
Higher wealth quintile	620	21.0	1188	20.7	586	20.4	611	21.2	558	18.7	562	20.2	4125	20.5	
Highest wealth quintile	617	21.4	1197	21.0	557	22.3	637	23.2	616	20.6	559	22.1	4183	21.6	
Settlement															**< 0.001**
Slum	2086	76.2	4228	78.8	2072	70.3	991	69.2	959	68.7	2.1	66.8	12,436	73.5	
Non slum	669	23.8	1326	21.2	666	29.7	499	30.8	491	31.3	670	33.2	4321	26.5	
Level of education															**< 0.001**
Never	40	1.4	157	2.7	56	2.2	55	1.9	34	1.7	10	0.4	352	1.9	
Primary	275	9.7	1107	19.4	469	18.5	472	22.4	284	13.9	200	7.4	2807	15.6	
Secondary	2117	74.2	3529	65.0	1669	63.6	166	61.7	1841	69.1	1926	72.9	12,742	67.5	
Tertiary	422	14.7	701	12.9	412	15.7	404	13.9	438	15.3	503	19.3	2880	15.0	
Relationship with the head of household															**< 0.001**
Head/wife of head	1039	36.8	2049	36.4	1087	40.5	1061	37.0	1091	40.3	1201	43.7	7528	38.7	
Daughter of the head of household	1140	39.3	2293	40.2	1051	37.6	1068	40.7	1033	34.5	985	35.3	7570	38.4	
Others related	721	23.9	1365	23.4	600	21.8	593	22.3	601	25.2	584	21.0	4464	22.9	

* Weighted

SD standard deviation

Table 2 Weighted background obstetrical-gynecologic characteristics for women, Kinshasa 2014 to 2020

	2014		2015		2016		2017		2018		2020		Total		p
	n	%*	n	%*	n	%*	n	%*	n	%*	n	%*	n	%*	
Previous delivery/current pregnancy (dichotomous)															**0.001**
Intended	770	44.4	1498	45.4	731	49.6	634	40.3	689	41.4	794	50.5	5116	45.8	
Unintended	989	55.6	1853	54.6	803	50.4	836	59.7	860	58.6	809	49.5	6.15	54.2	
Number of lifetime births															**0.005**
None	1186	40.8	2215	40.4	1077	40.3	1102	42.8	1086	40.7	1077	41.8	7743	40.9	
1–2 children	832	28.6	1595	28.7	749	28.9	714	27.4	663	25.9	756	28.1	5309	28.2	
3–4 children	494	17.1	965	17.5	448	17.5	413	16.0	507	20.1	505	19.3	3332	17.8	
5 or more children	387	13.5	721	13.4	333	13.3	362	13.9	342	13.2	300	10.8	2445	13.0	
Are you pregnant now?															**< 0.001**
Don't know/no response	35	1.2	59	0.9	18	0.6	24	1.0	4	0.2	8	0.2	148	0.8	
No	2701	93.1	5124	93.5	2464	94.7	2387	93.8	2471	94.2	2473	94.1	17.62	93.8	
Yes	166	5.6	314	5.6	125	4.7	134	5.2	123	5.6	158	5.7	1.02	5.4	
Reproductive history															
Median age at first sex (p25–p75)	17 (15–19)		17 (15–18)		17 (15–18)		17 (15–18)		17 (15–18)		17 (15–19)		17 (15–18)		
Median age at first birth (p25–p75)	–		21 (18–24)		21 (18–24)		20 (18–24)		–		21 (18–24)		20 (18–24)		
Median Age at first contraceptive use (p25–p75)	20 (17–26)		20 (17–25)		20 (17–26)		20 (18–26)		20 (18–25)		20 (18–25)		20 (17–25)		

Table 2 (continued)

	2014		2015		2016		2017		2018		2020			Total		p
	n	%*	n	%*	n	%*	n	%*	n	%*	n	%*	n		%*	
Median number of children at first use (p25–p75)	1 (0–2)		1 (0–2)		1 (0–2)		1 (0–3)		1 (0–3)		1 (0–2)			1 (0–2)		

* Weight

Bold values indicate the analyses were carried out with weighting

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Table 3 Exposure to FP programming among non-slum and slum women, by year of survey

Exposition to FP (%)	2014			2015			2016			2017			2018			2020		
	Slum	Non slum	Total	Slum	Non slum	Total	Slum	Non slum	Total	Slum	Non slum	Total	Slum	Non slum	Total	Slum	Non slum	Total
Saw something about FP on the TV	51.3	56.2	52.5	53.7	60.4	55.3	60.1	68.1	62.5	63.3	67.8	60.0	58.9	66.2	57.6	49.3	56.6	51.8
Heard about FP on radio	28.9	28.6	29.1	34.7	35.2	34.8	36.6	30.0	34.6	36.4	39.2	35.3	34.7	39.5	35.1	34.6	30.4	33.2
Read about FP in a magazine/newspaper	9.7	9.3	9.5	9.3	8.9	9.5	13.9	11.3	13.1	13.4	12.3	11.5	13.8	8.9	10.4	10.0	18.7	12.9
Received a call about FP	–	–	–	–	–	–	–	–	–	–	–	–	6.7	3.7	5.1	4.4	3.3	4.0
Social media	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5.2	11.4	7.2

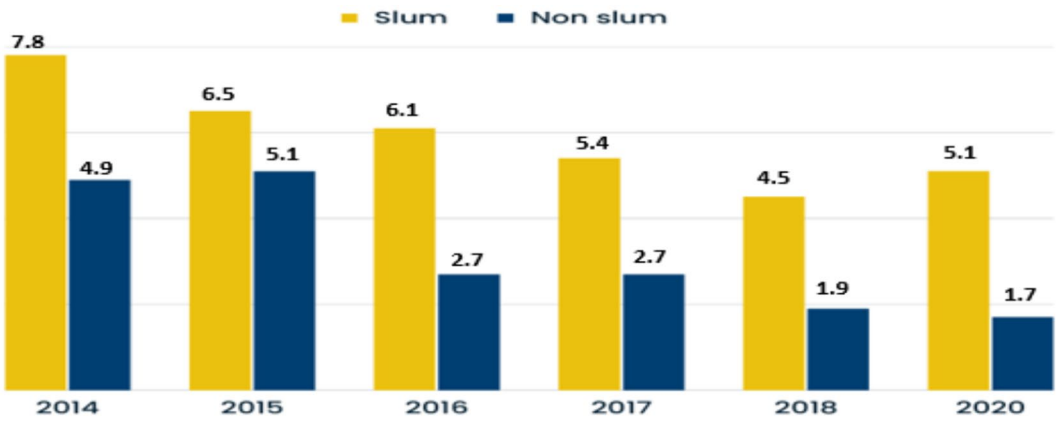


Fig. 1 Visit of CHWs in the last 12 months

3.4 Factors associated with contraceptive use

3.4.1 Use of modern contraceptive methods (MCM)

Figure 5 shows logistic regression results of factors associated with contraceptive use. The results show that there was no statistically significant difference between women living in slums and those living in non-slums regarding the use of contraceptive methods. Women aged 20–24 and 25–34 were more likely to use modern methods compared to those under 20. In relation to parity, women with at least one child were more likely used MCM compared to nulliparous. MCMs were used 1.86 (95% CI 1.208–2.914; $p = 0.005$) times among women who were visited by CHWs compared to those who were not visited. The daughter (child of the head of household) was more likely to use modern methods compared to the wife of the head of household or head of household (female) (OR: 1.79 (95% CI 1.252–2.551; $p < 0.001$).

3.5 Factors associated with unintended pregnancies

3.5.1 Bivariate analysis between residence (slum vs non-slum), wealth index and declaration of unintended pregnancy

In bivariate analysis, women living in the "slums" were more likely to report unintended pregnancies compared to those living in the "non-slums" (OR: 1.62; 95% CI 1.197–2.181; $p = 0.002$).

Women living in households classified as "lowest wealth quintile" (OR: 2.33; 95% CI 2.008–2.698; $p < 0.001$), "lower wealth quintile" (OR: 2.13; 95% CI 1.865–2.436; $p < 0.001$), "middle wealth quintile" (OR: 1.78; 95% CI 1.562–2.031; $p < 0.001$) and "higher wealth quintile" (OR: 1.48; 95% CI 1.301–1.680; $p < 0.001$), were more likely to report unwanted pregnancies compared to those living in households classified as "highest wealth quintile".

3.5.2 Multivariate analysis

After adjustment for other socio-demographic and economic characteristics, there is no significant association between the woman's residence (slum or non-slum) and reporting an unintended pregnancy (ORa: 1.35; 95% CI 0.986–1.862; $p = 0.061$). However, other factors were significantly associated with the declaration of unintended pregnancy including age, marital status, wealth quintile, the woman's educational level, and parity. The odds ratio of unintended pregnancies/births were 9.95, 4.17, 1.68 times respectively among women aged 15–19 years, 20 to 24 years and those aged 24 to 34 compared to women aged 35 to 49 years. The odds ratio of these unintended pregnancies or births was twice among women who lived alone compared to those who lived in a union. Compared to the household wealth quintile, the odds ratio of desired pregnancies or births were 1.73, 1.58, 1.52 and 1.34 times respectively among the 1st, the 2nd and the 3rd wealth quintile compared to the 5th, and the odd ratio adjusted

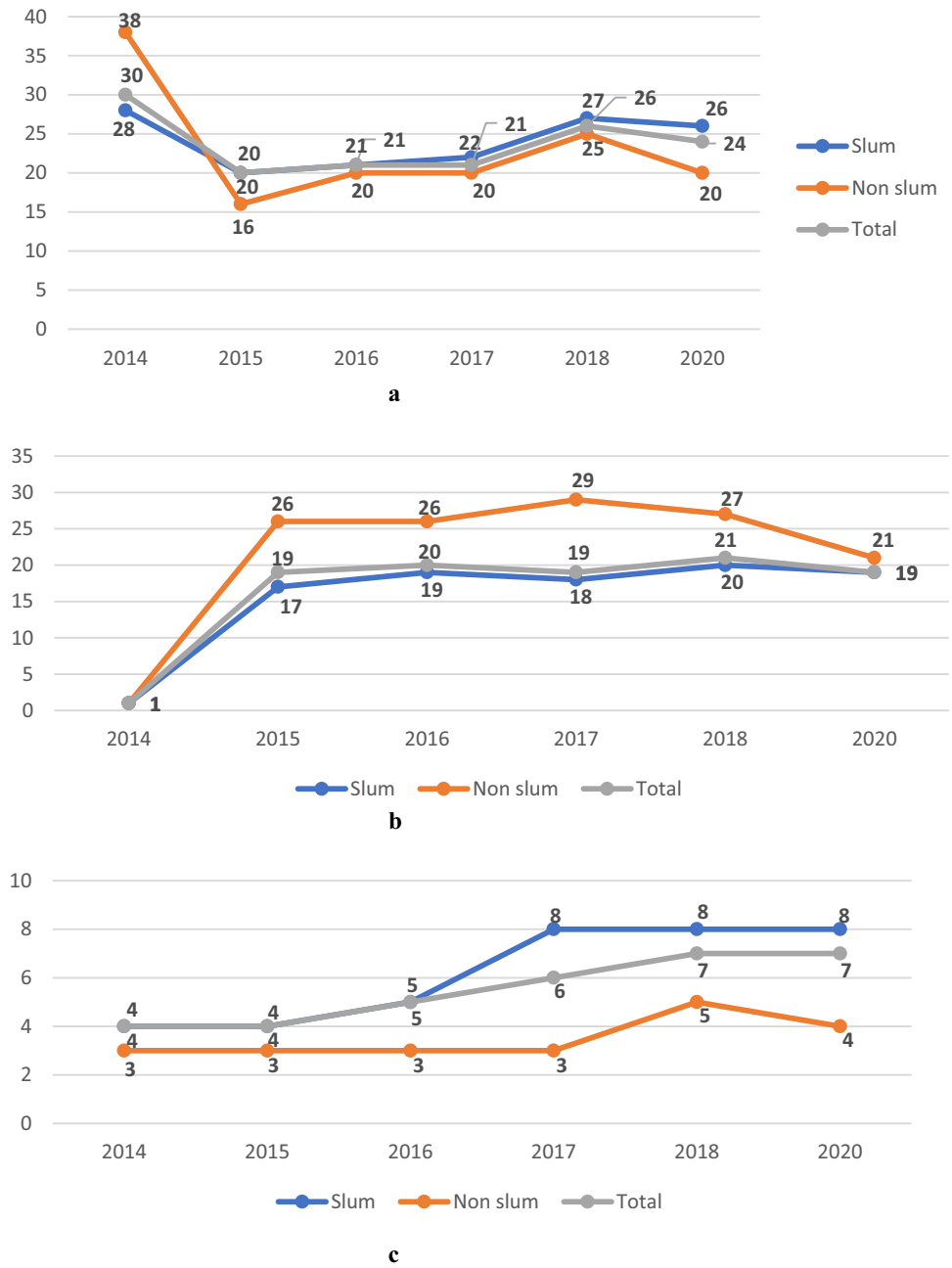
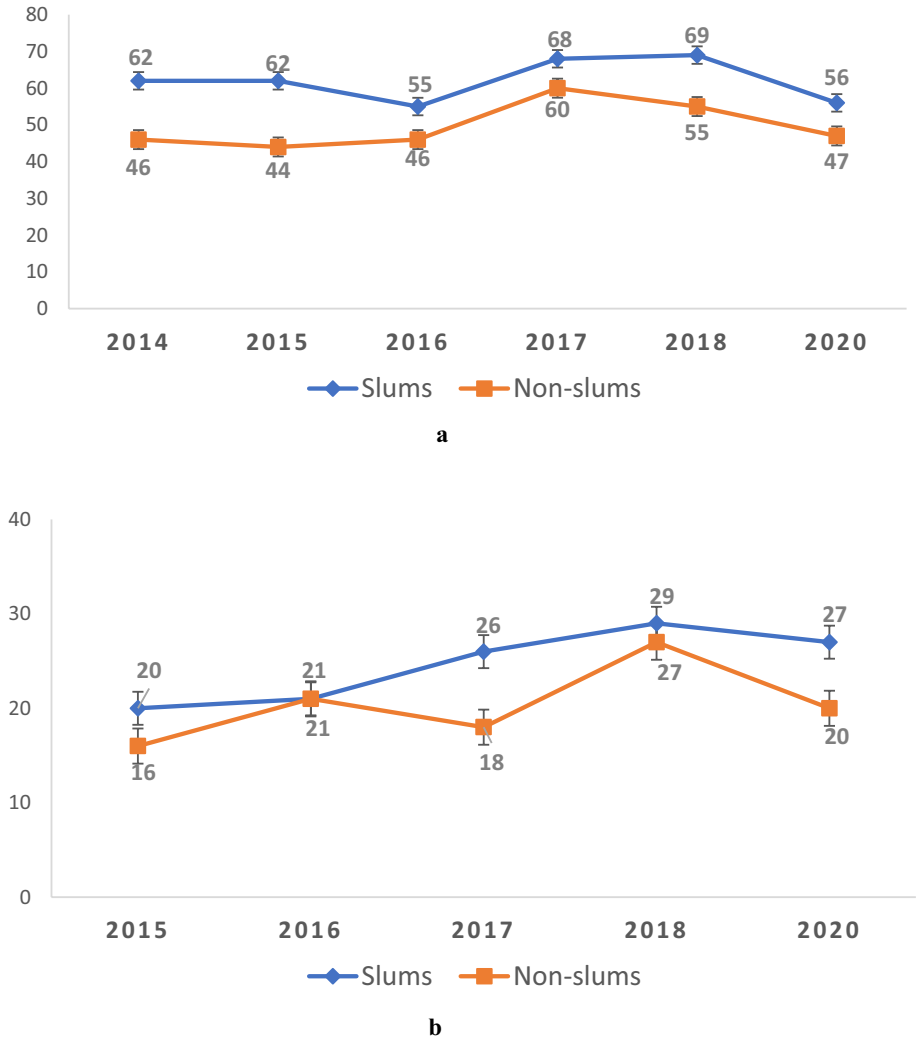


Fig. 2 **a** Modern contraceptive method use by type of residence over the years. **b** Traditionnal contraceptive method use by type of residence over the years. **c** LARC by type of residence over the years

was 1.34 times among the 4th compared to the 5th wealth quintile. The odds ratio of unintended pregnancy is 1.77, 2.99 and 5.61 times respectively among women with 1–2 children, 3–4 children and among women with at least five children compared to nulliparous women. The number of pregnancies decreases each time the level of education increases, and the odds ratio of unintended pregnancy is 1.34 and 1.23 times respectively among women of childbearing age with a level of primary education and secondary education compared to those without education. The daughter of the head of the household and the other members of the household were exposed respectively 1.59 and 1.47 times to unintended pregnancies or births in relation to the female head of household or the wife of the head of household (Fig. 5).



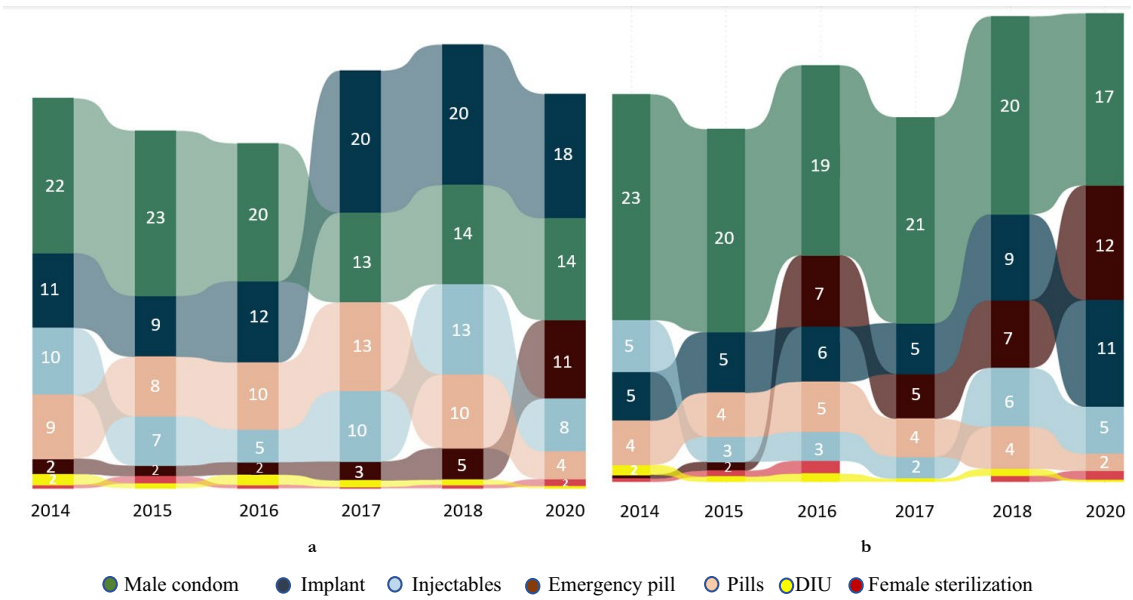


Fig. 3 **a** Trend in prevalence of unintended pregnancy by residence. **b** Trend in modern contraceptive prevalence by residence

Fig. 4 **a** Contraceptive methods use in slum from 2014 to 2020. **b** Contraceptive methods use in non-slum from 2014 to 2020

4 Discussion

The results of the present study showed an increase of contraceptive prevalence in Kinshasa over the years, but it still remains low. The percentage increased from 19.6 to 29.2% in slums and from 15.9 to 19.8% in non-slums from 2015 to 2020. Contraceptive prevalence remained high in slums compared to non-slums. This result is similar to the results of the study conducted in Kinshasa by Akilimali et al., which showed that slums had a higher contraceptive prevalence than non-slums [14]. However, the one conducted in Rwanda in 2019 revealed contradictory results where women residing in slums used contraceptives less than those who lived outside the slums [16]. These surprising results could be explained by the population heterogeneity between slums and non-slums [16–18]. Slum settlements are located on the outskirts of cities but in Kinshasa, slums are located inside the city and three out of four urban citizens live in slum conditions. There are slums in the very center of the urban environment where we have several pockets of slums which could be the particularity of Kinshasa and differ from the slums of other countries which are more on the peripheries.

The higher contraceptive prevalence in slums compared to non-slums could be explained by the provision of contraceptive methods by CHWs. Since 2015, Kinshasa has seen the implementation of numerous campaign days and strategies using CHWs, such as the project Momentum, Access and Quality (Acqual) projects implemented in collaboration with Lelo Family Planning and Drammen Kommunale Trikk (DKT) to provide contraceptive counseling and a variety of contraceptive methods at the community level. These strategies used nursing students as youth ambassadors for contraceptive methods at the community level. The students (youth ambassadors) trained interested clients on how to self-inject contraceptives subcutaneously and also offered intramuscular injectable methods and implants [19–21]. The provision of contraceptive methods by CHWs is a service that improves access to contraception. As shown in our results, women who were visited by CHWs used modern contraceptive methods twice as often as those who were not visited and there is a higher percentage of slums residents reported having received FP services from CHWs than that of non-slum residents.

Indeed, the prevalence of the long-term method in slum neighborhoods increased by 100% from 2014 to 2020, going from 4 to 8% while the increase in non-slum neighborhoods was 33%, going from 3 to 4%. This increase is due to community-based distribution campaigns for contraceptive methods by CHWs where women are more likely to choose implants among the methods offered to them [20, 21]. These slum-based campaign days and strategies using CHWs could explain both the comparatively higher modern contraceptive prevalence, and the higher use of implants and injectables.

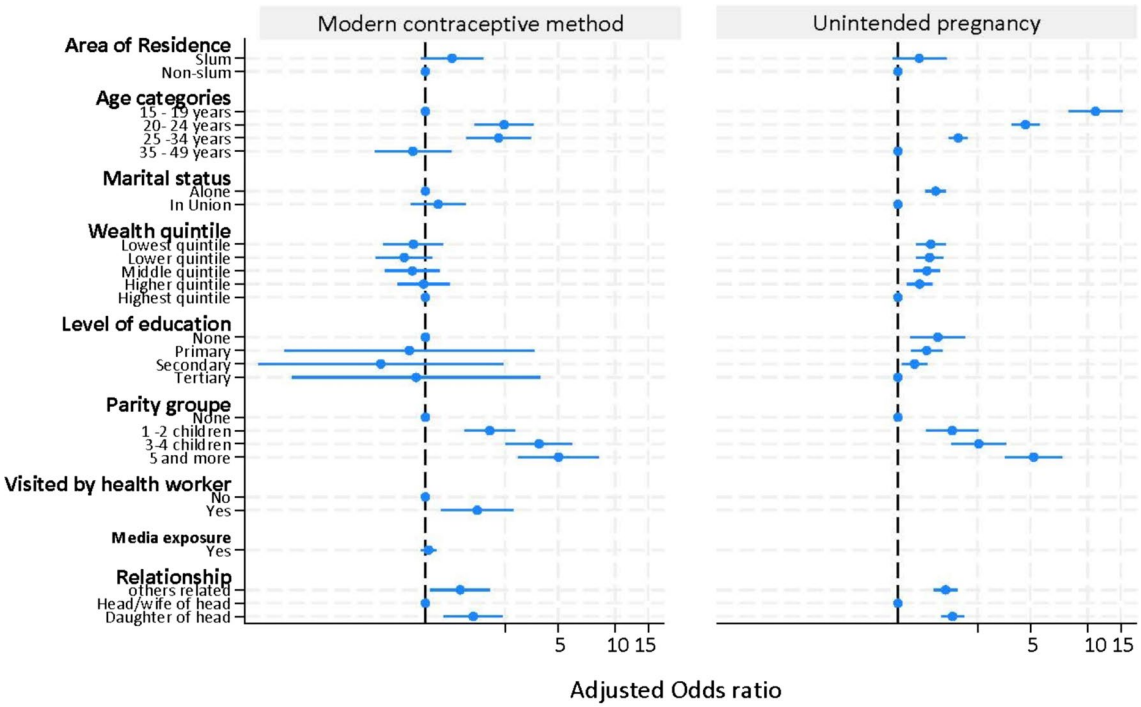


Fig. 5 Predictive diagram showing associated factors of MCM, unintended pregnancy and their adjusted odds ratio

Slum-focused and CHW-mediated FP programs were developed to address the difficulty of serving informal neighborhoods by informal providers. These providers are generally not subject to regulations and deliver low-quality services at a higher price than government services [22]. Because most contraceptive programs are government-run, the urban poor, particularly those living in slums, are the subgroup most susceptible to disruptions in public contraceptive services.

Between 2015 and 2020, women aged 15–49 living in slums used more modern contraceptive methods compared to those living non-slums who used more traditional methods. These results are comparable to those found in Kenya by Ochako et al. in 2016, showing that women living non-slums used a little more than half traditional methods (52.1%) compared to 16% in slums and those living in slums more than short-term methods (34.3%) compared to 28.1% in non-slums [23].

In relation to parity, the present study showed that women who reported having at least one child were likely to use a modern contraceptive method and that modern contraceptive use increased with the number of children. These findings are similar to those from Uganda, which found that contraceptive use increased with parity, where women used contraceptives to limit birth when they reached the desired family size [24]. The average family size in the DRC is at least six children, which could explain the impact of the number of children born on the use or not of contraceptives and would make parity a powerful indicator of the use of contraceptives [12]. Contraceptive use in Kinshasa can also be explained by disparities in fertility and parity preferences. The level of motivation of multiparous women to use modern contraceptives to avoid another pregnancy is higher than that of nulliparous women, because they are more likely to have achieved the desired family size. On the other hand, if nulliparous women view side effects of contraception as a risk to their future fertility, they might avoid using modern contraceptives.

In relation to the trend in the prevalence of unintended pregnancies, the study showed that more than half of women (54.2%) were exposed to unintended pregnancies. There are variabilities in the prevalence of unintended pregnancies in slums and non-slums; and although there is a decrease in the prevalence of unintended pregnancies in slums, which fell from 69 to 56% between 2018 and 2020, this prevalence still remains high compared to non-slums (47%).

In bivariate analysis, our results showed that women living in slums reported approximately twice as many unintended pregnancies as those living outside slums. But after adjusting for sociodemographic characteristics in multivariate analysis, the fact that a woman living in the slums did not have a direct effect on unintended pregnancy. This is consistent with the study carried out in Kenya which found that unintended pregnancy does not vary significantly between slum and non-slum neighborhoods [25]. This would probably be due to the classification of formal or informal neighborhoods using UN-Habitat which may not be applicable in all countries, because each country has its own unique context. As we indicated above, there are slums in the very center of the urban environment where we have several pockets of slums which could be the particularity of Kinshasa and differ from the slums of other countries which are more on the peripheries. Research also shows that the measure of unintended pregnancy has limitations as women tend to revise the status of their pregnancy intention (wantedness of pregnancy) after birth [26]. Additional study would be useful to better differentiate unintended pregnancies by integrating the conditional and non-conditional unintended pregnancy approach [27]. While events (unintended pregnancies) are measured retrospectively, the denominator is a mix of prospective (pregnancy intentions at the time of survey) and retrospective (past pregnancy intentions for women who are pregnant or postpartum at the time of survey) measures [27].

Recent efforts in Kinshasa have diminished the disparity between women residing in vulnerable neighborhoods (slums) and those in non-vulnerable areas, thereby enhancing equitable access. However, these initiatives must persist to enhance the regularity of contraceptive utilization in order to diminish the prevalence of unintended pregnancies.

Family planning programs may use interactions with prenatal, delivery, and post-delivery care systems to identify women with unintended pregnancies, providing them with information and resources to enhance postpartum contraceptive use through highly effective methods.

This study had a limitation of not being able to determine the causal link because the analyzes used cross-sectional data. However, this study is important because it allows us to understand the disparities that exist between women residing in the slums and those residing outside the slums in terms of unintended pregnancies and the use of contraceptives over the years. The strength of this study is the use of a large sample size and the control of the influence of confounding factors between the dependent variable and the potential associated factors by multivariate analysis.

5 Conclusion

The study findings suggested heterogeneity in modern contraceptive use in Kinshasa, with a surprisingly higher contraceptive prevalence in slums than non-slums. There is variability in the prevalence of unintended pregnancies in slums and outside slums. Although, there is a decrease in the prevalence of unintended pregnancies in slums, the prevalence still remains high compared to non-slums. Our study shows that the magnitude of unintended pregnancy is high in both slum and non-slum settings in Kinshasa with no significant differences, warranting the need for improving access to family planning for women in slums and non-slum areas.

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Data availability Data are available by request at pmadata.org. The data used for this publication and the DO file can be made available to the corresponding author upon reasonable request.

Declarations

Ethics approvals and content to participate The authors confirm that the research was performed in accordance with the declaration of Helsinki. The PMA project received approval from the Institutional Review Boards (IRB) at the Johns Hopkins University (IRB no.: 00009677) and the Kinshasa School of Public Health (KSPH) (ESP/CEI/030B/2019). The primary study obtained written informed consent from the study participants before the questionnaires were administered. Interviews were conducted in a private location around the home, and participants were identified using unique identification numbers to ensure confidentiality of participant information. Permission to download and use PMA data was granted by the principal investigator of PMA in the DRC.

Competing interests The authors declare no competing interests.

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