**ORIGINAL RESEARCH ARTICLE**

# Factors Associated with Unmet Need for Modern Contraception in Post-Conflict Liberia

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## Abstract

We examined the association between intimate partner violence and unmet need for modern contraception in post-conflict Liberia. This is a secondary analysis of data collected using the Priorities for Local AIDS Control Efforts (PLACE) method. Data from 499 sexually experienced young women (aged 14-25) in Montserrado County, Liberia were examined. Intimate partner violence (55.7%), unintended pregnancy (83.2%), and abortion (45.3%) were pervasive in the study population. An estimated 35.9% of respondents had an unmet need for modern contraception. However, multivariate logistic regression results did not reveal an association between intimate partner violence and unmet need (OR 1.11; 95% CI 0.70-1.75). Among covariates examined, only contraceptive use at sexual debut (26.1%) was significantly associated with unmet need (OR 0.27; 95% CI 0.14-0.52). Liberian youth need information about and access to modern contraceptive methods besides condoms. Interventions to identify and treat victims of violence are also needed. *Afr J Reprod Health 2014; 18[2]: 58-67).*

**Key words**: Intimate partner violence, unintended pregnancy, abortion, unmet need for contraception, adolescents, Liberia

## Résumé

Nous avons étudié l'association entre la violence du partenaire intime et le besoin non satisfait de la contraception mo derne au Liberia de post- conflit. Il s'agit d'une analyse secondaire des données recueillies à travers la méthode des priorités pour les efforts locaux du contrôle du SIDA (PELCS). Nous avons étudié les données de 499 jeunes femmes (âgées de 14-25) dans le comté de Montserrado, Libéria, qui étaient sexuellement expérimentées. La violence du partenaire intime (55,7, les grossesses non désirées (83,2 %) et l'avortement (45,3 %) étaient très communs dans la population étudiée. On estime que 35,9 % des répondants ont un besoin non satisfait de la contraception moderne. Cependant, les résultats multivariés de la régression logistique n'ont pas révélé une association entre la violence du partenaire intime et les besoins non satisfaits (OR 1,11, IC 95% 0,70 à 1,75). Parmi les co-variables examinées, seule l'utilisation des contraceptifs au premier rapport sexuel (26,1%) était significativement associée à des besoins non satisfaits (OR 0,27, IC 95% 0,14 au 0,52). La jeunesse libérienne a besoin d'informations sur l'accès aux méthodes contraceptives modernes à part les préservatifs. Les interventions qui visent à identifier et à traiter les victimes de violence sont également nécessaires. *Afr J Reprod Health 2014; 18[2]: 58-67).*

**Mots clés**: violence conjugale, grossesses non désirées, avortement, besoins non satisfaits en matière de la contraception, adolescents, Libéria

## Introduction

Global efforts to meet the Millennium Development Goals (MDGs) have focused on increasing access and use of modern contraceptive methods as a cross-cutting strategy for the achievement of all eight MDGs[1]. Among women in developing countries, a total of 222 million are estimated to have an unmet need for modern contraception in 2012[2]. Meeting the contraceptive needs of these women could prevent 54 million unintended pregnancies and 26 million abortions[2]. Additionally, it could avert 79,000 maternal deaths and 1.1 million infant deaths[2]. Modern contraceptive use has also been identified as an important HIV prevention strategy, as it averts unintended pregnancies among HIV positive women[3].

The unmet need for modern contraception is high in Liberia, resulting in high percentages of unintended pregnancy. The 2007 Liberia Demographic and Health Survey (LDHS) reported that 30.2% of all women have an unmet need for contraception[4]. Higher estimates are seen among young married women ages 15-19 (40.4%) and ages 20-24 (42.6%). Subsequently, the total fertility rate (TFR) in Liberia is estimated to be approximately 5 children per woman; a third of all births are reported to be unintended[4].

Unintended pregnancy (including mistimed and unwanted pregnancy) has been found to be associated with adverse maternal and infant health outcomes, including low birth weight, reduced breastfeeding, child abuse and neglect[5]. Many unintended pregnancies end in abortion. In countries where abortion is illegal, the procedure is conducted without requisite skilled training and/or equipment, resulting in unsafe abortions[6]. An estimated 19 million of these unsafe abortions occur each year, contributing to over 68,000 maternal fatalities (13% of all maternal deaths), and a loss of over 5 million disability adjusted life years (DALYs)[6]. Access to and use of contraception has been shown to prevent subsequent unintended pregnancies and abortions[7]. However, women face a host of barriers to effective contraception including contraceptive method unavailability, lack of information about various contraceptive methods, fear of side effects, perceived infertility, fear of social condemnation for method use, and perceived partner opposition, including intimate partner violence[8,9].

Worldwide, many studies have shown that women who experience violence are at higher risk for unintended pregnancy[5,10,11]. However, studies that have examined the relationship between contraceptive use and intimate partner violence (IPV) have yielded mixed results. In some studies, IPV was inversely associated with contraceptive use[12-15]. Women in these studies reported a perceived inability to negotiate sexual behavior and contraceptive use with abusive partners[14]. In other studies, a positive relationship was found[16,17]. Researchers have hypothesized that violence victims were more likely, in these scenarios, to use contraception because they feared bringing children into violent relationships and/or wanted to protect themselves from potential HIV acquisition[17].

In post-conflict Liberia, violence against women is pervasive[18,19]. The 2007 LDHS, reported that 23% of young women aged 15-19 had experienced physical violence in the 12 months prior to the survey; for 20-24 year olds, this estimate is as high as 30%[4]. The 2007 LDHS reports on sexual violence are restricted to lifetime experience for young women, with 13% of young women (15-24) reporting they have ever experienced sexual violence[4]. Reports from cross-sectional studies conducted among Liberian adolescents reveal similar findings with 12% of 15-19 year olds having ever experienced forced sex[20]. Similarly, a study conducted among in-school adolescents revealed that 13% of females reported experiencing forced sex in the 12 months prior to the survey[21].

Very little published data exist about the sexual and reproductive health of Liberian youth. However, as donor organizations consider dedicating funds to the development of post-conflict Liberia, it is critical that they be aware of the needs of young people. To our knowledge, no study has investigated the relationship between IPV and reproductive health outcomes, such as unintended pregnancy and unmet need for contraception, among young, Liberian women. Understanding if a relationship between violence and reproductive health exists will be key as health services, including family planning services, are established in Liberia. Information gained from this study will serve to more effectively tailor contraceptive counseling messages for young women. Moreover, results shared with the Ministry of Health and other stakeholders will determine whether and how the health sector can engage in efforts to combat violence against women in Liberia, and could lead to the integration of gender based violence screening, counseling and treatment in routine health services for women. We believe results from this study could also inform programming efforts in other post-conflict settings where violence remains high and thwarts stabilization efforts. Therefore, we analyzed data among Liberian women (aged 14-25) sampled from venues where high-risk behaviors were reported to document their

experiences with IPV and reproductive health outcomes, and the potential relationship between the two.

## Method

### Study Design

Data for this study were collected in Montserrado County, Liberia using the Priorities for Local AIDS Control Efforts (PLACE) methodology, which targets areas where young people are likely to meet and engage in HIV risk behaviors. Details about the methodology are available in the analysis of the primary manuscript from this study[22]. In brief, the PLACE methodology is a rapid assessment tool that consists of five steps, including 1) the engagement of local stakeholders to determine priority risk areas, 2) interviews with community informants to identify venues where adolescents meet to engage in risk behaviors, 3) verification of venues identified by community informants, 4) behavioral surveys with the target population at selected venues, and 5) dissemination of results[23]. Ethical approval for this study was obtained from the FHI 360 Protection for Human Subjects Committee (PHSC) and the Liberian Institute for Biomedical Research.

### *Participants*

A total of 1,119 youth (548 males and 571 females) were surveyed in Montserrado County in 2011 as part of the primary study. Participants were eligible for the primary study if they were between the ages of 14 and 25, lived in Montserrado County, and provided verbal informed consent. For these analyses, we restricted the study sample to young women aged 14 – 25 years old who reported they had ever had sexual intercourse (N=499).

### *Measures*

The two outcome variables of interest were unintended pregnancy and unmet need for contraception. Young women who reported their last or current pregnancy was unwanted or mistimed were defined as having an unintended pregnancy[5]. Several steps were taken to define women with an unmet need for contraception. First, we included non-pregnant young women who were sexually active (within the last four weeks), did not self-report as infecund (infertile), did not desire to have a child for at least two years or until after a major life event (such as marriage), and did not use a modern contraceptive method at last sex. Young women who were undecided about whether they wanted a/another child and were not currently using modern contraception were also considered to have an unmet need for contraception. And finally, young women who were pregnant at the time of the survey were also defined as having an unmet need for modern contraception if they reported their current pregnancy was unwanted or mistimed. We considered modern methods of contraception only: oral contraceptive pills, injectable and implanted contraceptives, intra-uterine devices, and male and female condoms. This definition is consistent with that used by the Demographic and Health Survey (DHS)[24].

However, for comparison purposes only, we later calculated unmet need for modern contraception in a non-traditional way: we defined self-reported condom users as having an unmet need for contraception, rather than a met need (see Figure 1). The rationale for this comparison was based on the known fact that the effectiveness of condom use as a form of contraception (or prevention of sexually transmitted diseases) is based on consistent and correct use, and yet several studies suggest self-reported condom use is potentially unreliable[25,26].

The main independent variable for this study is IPV. To assess IPV we used questions consistent with the revised conflict tactics scale (CTS) which asks the following: Does/did your last partner ever do any of the following things to you: a) Push you, shake you, or throw something at you? b) Slap you? c) Twist your arm or pull your hair? d) Kick you, drag you, or beat you up? e) Try to choke you or burn you on purpose? g) Threaten to attack you with a knife, gun or other weapon[27]. Young women who answered 'yes' to any of these sub-questions were categorized as having experienced any physical violence from a current or past sexual

partner. Similar to other studies, we also assessed levels of violence by subdividing violence experiences into moderate (pushed, slapped, twisted arm) and severe (kick/drag, choke/burn, and threaten with weapon)[28]. Young women were identified as having experienced sexual violence if they reported they had been forced against their will to have sex at any point in the past 12 months. However, because of the high correlation among these measures, we used a summary variable 'any violence' for the purpose of our association analysis. The variable 'any violence' includes any recent physical or any sexual violence.

Covariates included age (14-19 years and 20-25 years), level of education (none or some primary, completed primary, some secondary, completed secondary or more), living arrangement (alone versus with others), pregnancy experiences (never been pregnant, pregnant once, or pregnant more than once), early sexual debut, defined as sexual intercourse at or before the age of 15 (yes, no), multiple sexual partners in the last 4 weeks (yes, no), income generation in the last 4 weeks (yes, no), use of contraception at sexual debut (yes, no), daily use of alcohol (yes, no) and ever use of drugs, defined as ever use of cocaine, heroin, or opium (yes, no).

### *Data Analysis*

Analysis was conducted using STATA 10.1 statistical analysis software[29]. The significance of bivariate associations between IPV and covariates with unmet need for modern contraception was assessed using chi-square tests. To study the adjusted relationship between IPV and unmet need for contraception, we first fit a bivariate probit model[30] with the purpose of testing for the endogeneity of IPV in the prediction of unmet need. Two equations were estimated; the first one for the prediction of unmet need with IPV and other covariates. The second equation predicted IPV based on the covariates. The set of covariates were the same between both equations, except that alcohol and drug use were only included in the second equation, as they are considered to primarily relate to IPV. The correlation between the error terms of the two equations, as estimated with the rho coefficient, was small and not significant, indicating that endogeniety of IPV may not be a problem in our data. Based on this finding, and to simplify the presentation and the comparisons between the bivariate and multivariate analysis using odds ratios (OR), we fit a logistic regression model to assess the relationship between unmet need for modern contraception and IPV, controlling for potential confounders of unmet need for modern contraception. All analyses were adjusted for clustering effects as appropriate for the sampling design based on sampling participants from selected venues.

## Results

### *Participant Characteristics*

Participant characteristics are found in Table 1. The age of participants was evenly split between 14-19 year olds and 20-24 year olds. Slightly more young women reported some secondary education (31.7%), as compared to any other level of education, and about half (49.1%) did not have a job for which they were paid money in the last 4 weeks. The majority of participants reported risky sexual behaviors, including an early sexual debut (56.7%), no contraceptive use at sexual debut (73.4%), and multiple sexual partners in the last 4 weeks (81.4%).

### *Unmet need for contraception*

Using the traditional DHS definition, unmet need for contraception in our study population was 35.9% (95% CI: 30.0% - 42.2%). However, for comparison purposes only, when we classified young women who reported condom use at last sex as having an unmet need for contraception (rather than a met need), this percentage increased to 75.4%. (See Figure 1 for a breakdown of these two estimates.) Table 2 describes participant characteristics of women with and without an unmet need for contraception (using the traditional definition). For both age groups (14-19 and 20-25 year olds), there were roughly the same number of participants with an unmet need for contraception (51.9% and 48.1%, respectively),. However, more participants with an unmet need reported no

contraceptive use at sexual debut (87.8%), as compared with those who did not have an unmet need for contraception (69.5%).

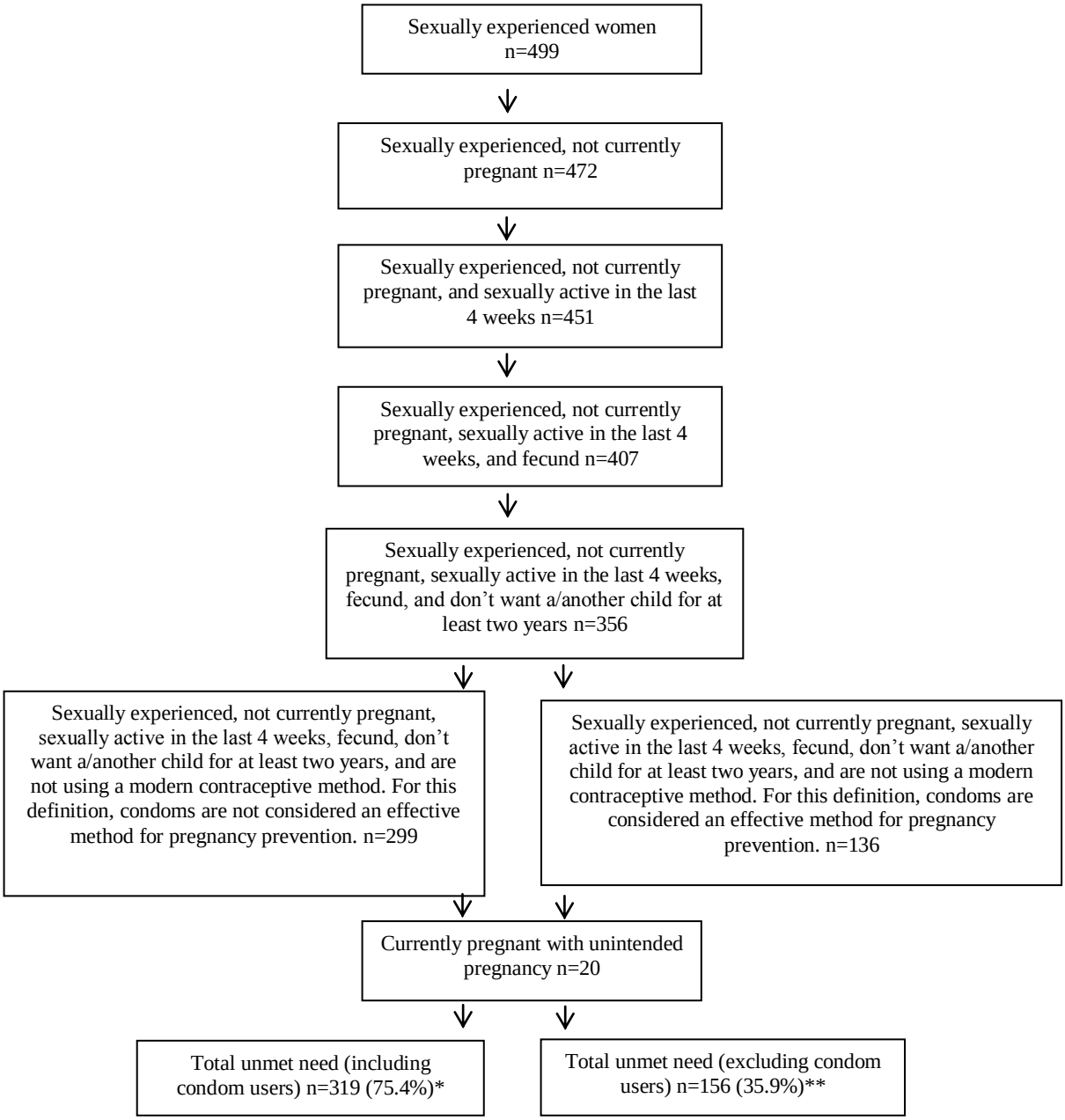
**Table 1:** Socio-demographic and sexual behavioral characteristics of study participants

| Characteristics | Study population<br>Total N = 499<br>Number (%) |
|---|---|
| **Age** | |
| 14-19 | 245 (49.1) |
| 20-25 | 254 (50.9) |
| **Education** | |
| None or some primary | 123 (24.7) |
| Completed primary | 108 (21.6) |
| Some secondary | 158 (31.7) |
| Completed secondary or more | 106 (21.2) |
| **Income generation last 4 weeks** | |
| No | 254 (50.9) |
| Yes | 245 (49.1) |
| **Ever been pregnant** | |
| No | 231 (46.3) |
| Yes | 268 (53.7) |
| **Early sexual debut (age 15 or younger)** | |
| No | 216 (43.3) |
| Yes | 283 (56.7) |
| **Contraceptive use at sexual debut** | |
| No | 366 (73.4) |
| Yes | 130 (26.1) |
| **Multiple sex partners last 4 weeks** | |
| No | 93 (18.6) |
| Yes | 406 (81.4) |
| **Sexual violence** | |
| No | 422 (84.2) |
| Yes | 77 (15.4) |
| **Any physical violence** | |
| No | 236 (46.7) |
| Yes | 263 (52.7) |
| **Any violence (IPV)** | |
| No | 218 (43.7) |
| Yes | 278 (55.7) |
| **Daily alcohol use** | |
| No | 369 (74.0) |
| Yes | 126 (25.2) |
| **Drug use ever** | |
| No | 399 (80.0) |
| Yes | 81 (16.2) |

**Table 2:** Unmet need for contraception* by participant characteristics

| Characteristics | Unmet need for contraception<br>Yes<br>n=156<br>(35.9%) | <br>No<br>n=279<br>(64.1%) |
|---|---|---|
| **Age** | | |
| 14-19 | 81 (51.9) | 140 (50.2) |
| 20-25 | 45 (48.1) | 139 (49.8) |
| **Education** | | |
| None or some primary | 37 (23.7) | 59 (21.2) |
| Completed primary | 39 (25.0) | 60 (21.5) |
| Some secondary | 42 (26.9) | 99 (35.5) |
| Completed secondary or more | 38 (24.4) | 59 (21.2) |
| **Income generation last 4 weeks** | | |
| No | 71 (45.5) | 146 (52.3) |
| Yes | 85 (54.5) | 133 (47.7) |
| **Ever been pregnant** | | |
| No | 59 (37.8) | 139 (49.8) |
| Yes | 97 (62.2) | 140 (50.2) |
| **Early sexual debut (age 15 or younger)** | | |
| No | 74 (47.4) | 120 (43.0) |
| Yes | 82 (52.6) | 159 (57.0) |
| **Contraceptive use at sexual debut** | | |
| No | 137 (87.8) | 194 (69.5) |
| Yes | 17 (10.9) | 85 (30.5) |
| **Multiple sex partners last 4 weeks** | | |
| No | 28 (17.9) | 54 (19.4) |
| Yes | 128 (82.1) | 225 (80.7) |
| **Sexual violence** | | |
| No | 125 (80.1) | 236 (84.6) |
| Yes | 31 (19.9) | 43 (15.4) |
| **Any physical violence** | | |
| No | 75 (48.1) | 143 (51.3) |
| Yes | 81 (51.9) | 135 (48.4) |
| **Any violence (IPV)** | | |
| No | 69 (44.2) | 134 (48.0) |
| Yes | 87 (55.8) | 144 (51.6) |
| **Daily alcohol use** | | |
| No | 130 (83.3) | 197 (70.6) |
| Yes | 26 (16.7) | 80 (28.7) |
| **Drug Use Ever** | | |
| No | 124 (79.5) | 230 (82.4) |
| Yes | 27 (17.3) | 43 (15.4) |

*For unmet need, a total of 64 women did not provide enough information to assess their contraceptive need. They are, therefore, excluded from this study population.




* When condom users are defined as having an unmet need for contraception, there were 76 women who did not provide sufficient information to assess their unmet or met need for contraception. These women were therefore dropped from the calculation, resulting in an altered unmet need percentage.
**When condom users are not defined as having an unmet need, there are a total of 64 women who are dropped for the same reason. This process also resulted in an altered unmet need percentage.

**Figure 1:** Unmet need variable creation

Participants were encouraged to report all forms of current contraceptive use. Use of male condoms to prevent pregnancy at last sex was mentioned by 198 study participants (Table 3). Oral contraceptive pills were the second most commonly mentioned form of contraceptive use by study participants, with 38 young women reporting current use. The use of longer acting

methods was low; only 21 young women reported current use of injectables and only 1 participant reported current use of implants. No participants reported use of an intrauterine device, or male or female sterilization.

**Table 3:** Current contraceptive use*

| Contraceptive method | Number mentioned** |
|---|---|
| Injectable / Depo-Provera | 21 |
| Implant | 1 |
| Pill | 38 |
| Male condom | 198 |
| Female condom | 13 |
| Emergency contraception | 1 |
| Rhythm method | 4 |
| Withdrawal | 38 |

*Current contraceptive use determined by self-reported method use at last sex.
**Multiple responses were allowed.

In the bivariate analysis shown in Table 4, young women who reported they had been pregnant before had increased odds of having an unmet need for contraception, compared to those who have not been pregnant before (OR: 1.63; 95% C.I: 1.09-2.43). However, young women who reported contraceptive use at sexual debut had lower odds of having a current unmet need for contraception than those who did not report contraceptive use at sexual debut (OR: 0.28; 95% C.I: 0.16-0.50). Bivariate associations with the remaining factors were not found to be significant.

When adjusting for all factors, the multivariate analysis found contraceptive use at sexual debut the only independent variable to be significantly associated with an unmet need for modern contraception. Young women who reported having used contraceptives at sexual debut were less likely to have an unmet need for contraception compared to those who reported not report using contraceptives at sexual debut (OR: 0.27; 95% C.I: 0.14-0.52). Further bivariate analysis of contraceptive use at first sex by various socio-demographics (age, education, income generation, living situation, etc.) failed to elucidate distinguishing characteristics of those who used contraceptives at first sex (data not shown).

**Table 4:** Bivariate and multivariate associations with unmet need for modern contraception

| Characteristics | Bivariate OR (95% CI) | Multivariate† OR (95% CI) |
|---|---|---|
| **Age** | | |
| 14-19 | 1.00 | 1.00 |
| 20-25 | 0.93 (0.63-1.38) | 0.75 (0.45-1.26) |
| **Education** | | |
| None or some primary | 1.00 | 1.00 |
| Completed primary | 1.03 (0.58-1.84) | 0.97 (0.51-1.85) |
| Some secondary | 0.68 (0.39-1.17) | 0.60 (0.33-1.07) |
| Completed secondary or more | 1.03 (0.58-1.83) | 0.87 (0.48-1.63) |
| **Income generation last 4 weeks** | | |
| No | 1.00 | 1.00 |
| Yes | 1.31 (0.89-1.95) | 1.49 (0.85-2.60) |
| **Ever been pregnant** | | |
| No | 1.00 | 1.00 |
| Yes | 1.63 (1.09-2.43)** | 1.59 (0.89-2.81) |
| **Early sexual debut** | | |
| No | 1.00 | 1.00 |
| Yes | 0.84 (0.56-1.24) | 0.71 (0.41-1.24) |
| **Contraceptive use at sexual debut** | | |
| No | 1.00 | 1.00 |
| Yes | 0.28 (0.16-0.50)*** | 0.27 (0.14-0.52)*** |
| **Multiple sex partners last 4 weeks** | | |
| No | 1.00 | 1.00 |
| Yes | 1.02 (0.61-1.70) | 1.02 (0.55-1.89) |
| **Any violence** | | |
| No | 1.00 | 1.00 |
| Yes | 1.17 (0.79-1.74) | 1.11 (0.70-1.75) |

*p<0.1
** p<0.05
*** p<0.001
†All variables were added to the multivariate model.

### *Unintended Pregnancy*

The prevalence of unintended current or last pregnancy and the outcome of the last pregnancy are found in Table 5. Among young women who were currently or had ever been pregnant before

(n=268), 83.2% reported their current or last pregnancy was unintended. The percentages were higher for 15-19 year olds (87.4%) than for 20-25 year olds (80.6%). Among those who had ever been pregnant before (n=256), 45.3% reported aborting their last pregnancy. Similar to results for unintended pregnancy, abortion was higher among 15-19 year olds (52.0%) than among the 20-25 year olds (41.3%). Given the high prevalence of both unintended pregnancy and IPV in our study population, we were unable to perform multivariate analysis as originally planned.

**Table 5:** Prevalence of unintended current or last pregnancy among those ever pregnant (currently or previously), and last pregnancy outcomes among previously pregnant women

| | **Age 14-25 n (%)** | **Age 14-19 n (%)** | **Age 20-25 n (%)** |
|---|---|---|---|
| **Among those ever pregnant** | **268** | **103** | **165** |
| Unintended current or last pregnancy | 223 (83.2) | 90 (87.4) | 133 (80.6) |
| **Among those previously pregnant** | **256** | **96** | **160** |
| Aborted last pregnancy | 116 (45.3) | 50 (52.1) | 66 (41.3) |
| Miscarried last pregnancy | 36 (14.1) | 12 (12.5) | 24 (15.0) |
| Delivered live birth | 102 (39.8) | 33 (34.4) | 69 (43.1) |

Percentages may not add up to 100% due to minimal missing values for the two variables (2.6% and 0.8%, respectively).

***IPV***

Slightly more than half of the young women in our sample reported having experienced IPV (55.7%; 95% CI 49.7-61.6%). The percentage of those who reported sexual violence by a current or last partner (15.4%) was lower than those who reported physical violence (52.7%).

## Discussion

We found high percentages of unmet need for modern contraception, unintended pregnancy, and IPV in our study population. Moreover, many young women reported using induced abortion to terminate their most recent pregnancy. We found no relationship between experiences with IPV and unmet need for contraception.

The percentage of women in our study population with an unmet need for contraception is similar to that reported in the 2007 LDHS (35.9% vs. 30.2%). However, given that a large percentage of our study participants relied on condoms to prevent pregnancy, and self-reported condom use is often over-reported, we believe that the percentage of women in our study population with an unmet need for contraception may actually be closer to 75.4%.

We found higher percentages of unintended pregnancy (83.2% compared to 33.2% for 15-19 year olds and 28.8% for 20-24 year olds), and higher percentages of violence (55.7 % vs. 38.6%) than found in the 2007 LDHS. We believe these data signal that using the PLACE method was successful in identifying youth at risk of HIV and unintended pregnancy. While we found no relationship between IPV and the unmet need for contraception, we believe this reflects that fact the IPV and unmet need for contraception are both commonplace among our study population.

Nearly half of the study participants who had been pregnant before reported their last pregnancies ended in induced abortion (45.3%). This figure is alarming, as self-reported use of induced abortion is often an under-estimate of the actual prevalence[31], particularly in countries such as Liberia, where abortion is illegal and unsafe.

Limitations to this study include the cross-sectional design, which makes it impossible for us to determine causal linkages between our variables. The potential for information bias is also a possibility given the sensitive nature of many of the questions we analyzed. And finally, the prevalence of widespread violence and unintended pregnancy, not witnessed in other studies, may have contributed to our inability to detect associations between variables.

## Conclusion

Our study population is in dire need of contraceptive services to curb unintended pregnancy and unsafe abortion among young women in Montserrado County.

To meet the contraceptive needs of young people would be to expand activities in the current National HIV/AIDS Framework to include the provision of accurate information on all modern contraceptive methods, rather than concentrating solely on condoms. Although HIV-focused, the Framework discusses the importance of enhancing health services, establishing youth-friendly centers, and identifying peer educators, all of which could simultaneously assist in reducing the burden of unintended pregnancy and abortion[18]. Efforts to promote contraceptive use should not only be targeted at youth who are sexually active, but must include those who have not yet initiated sexual activity. Targeting non-sexually active youth, may increase their potential to use modern contraceptive methods at sexual debut and beyond. These efforts should provide information about a range of modern methods with emphasis given to allaying fears of side effects, including potential effects on future fertility. The fear of contraceptive side effects and their impact on future fertility have been found to be common barriers to contraceptive use among young people[9]. In some areas, fears of contraceptive use are so pronounced that unsafe abortion has been found to be more appealing for young women[32].

Future studies should examine whether the association we found between contraceptive use at sexual debut and reduced reports of current unmet need is, in part, due to factors we were unable to measure. Such factors may include higher self-efficacy, greater personal stability, or greater social support among young women who used contraceptive methods at sexual debut. Additional qualitative research may also be useful for further understanding the circumstances of violence, unintended pregnancy and abortion among young women in Liberia, as well as the structural barriers and facilitators to contraceptive use among young women in post-conflict settings.

In this analysis, the definition of unmet need is consistent with that used by the DHS. Therefore, self-reported condom users are not defined as having an unmet need for modern contraception.

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## Contribution of Authors

For this study, Allison P. Pack and Mario Chen worked in collaboration with McCarraher on study conception and design. Sam Wambugu led efforts for all data collection activities. Pack, Chinelo Okigbo and Lisa Albert conducted data analysis. The first draft of the manuscript was written and prepared by Pack; however, all authors significantly contributed to, and have approved of, the final version.

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