Experience with the 2010 earthquake and modern contraceptive use in Haiti

Mai Do, M.D., Dr.P.H.

Department of Global Health Systems and Development

Tulane University School of Public Health and Tropical Medicine

INTRODUCTION

In January 2010, a massive earthquake struck Haiti, killing approximately a quarter million people, injuring 300,000, and destroyed the homes and business of another million people (Kent, 2010). Even before the earthquake, Haiti had already been ranked among the poorest countries, with one of the worst HIV epidemics, high birth rates, and high infant mortality. The rate of contraceptive use has not changed substantially since 2000: in 2005-2006, only one in four Haitian women of reproductive age was using an average method of contraception (Kent, 2010).

Disasters, natural or manmade, and subsequent poverty and hardship have been a subject of much research in both the U.S. and the developing world. Several studies have linked experience with disasters and reproductive health outcomes (Carballo, Hernandez, Schneider, & Welle, 2005; Cohan & Cole, 2002; Finlay, 2009; Frankenberg, 1998). It is often found that fertility goes up and family planning (FP) use goes down, hypothetically as families want to have more children due to increased mortality after a disaster. Evidence has also suggested that women may have difficulties accessing FP methods although the need for them may be increased post-disaster. Meanwhile, disaster-related stress may lead to comfort seeking behaviors, including unprotected sex (Nour, 2011); some women may also be coerced into sexual activities for security and survival reasons (Hynes & Cardozo, 2000; Thornton & Voigt, 2007). Therefore, it is important to assess the impact of disasters on contraceptive practice as it has implications for disaster response programs. In this study, we use nationally representative data to examine the impacts of a recent earthquake (2010) on modern FP use among Haitian couples.

METHODS

Data

Data come from the latest Demographic and Health Survey (DHS) conducted in 2012 in Haiti. Multi-stage sampling design was used to obtain a sample representative of 12 regions, including the metropolitan area and refugee camps. All women aged 15-49 living in the selected households were invited to participate in the survey, resulting in a sample of 14,287 women of reproductive age. Household and individual questionnaires were administered to selected households and eligible women during face-to-face interviews. For the purpose of this analysis, we limit the sample to women currently married or living with a partner (i.e. women in union), resulting in a sample of 7,849 women.

Measures

The outcome of interest is current use of modern FP methods, which comes from information collected from individual women selected for the survey via the Individual Questionnaire. Women were asked if they were using any method of contraception, and if so, what the method was. A binary variable indicates whether a woman was using a modern method of contraception at the time of the survey.

In this survey, questions were asked about the household's experience with the earthquake that happened in January 2010, and its consequences. These questions were included in a module on Consequences of the Earthquake. Each household was asked if they experienced damages to the house that they were living in at the time of the earthquake, and if so, whether the house was completely destroyed. A dichotomous variable indicating whether the house sustained any damages due to the earthquake was used as the main independent variable.

A number of individual-level factors, including women's empowerment, fertility, and exposure to FP information, were also included in the analysis since they may have influence on FP practice. Factors related to women's empowerment included a binary indicator of whether the respondent was in a polygamous marriage, and three binary variables indicating whether the respondent had any say in decision making about their own health care, how to spend their partner's earnings (i.e. household economy), and family visits (i.e. social life). A woman was said to participate in decision making if she made decisions on these matters on her own or jointly with her partner.

Fertility related factors included whether the couple had given any childbirth since the earthquake and whether the respondent reported wanting to have more children. Both factors were hypothesized to be negatively associated with FP practice. Three variables indicated the respondent's exposure to FP information. The first one, exposure to FP messages in the media in the last few months, was a summative score of three binary indicators of exposure to FP messages in the newspapers, on TV, and on the radio. The second indicator was whether the respondent was visited by a FP outreach worker in the last 12 months; and the third was whether the respondent was told about FP at a health facility in the last 12 months, those who did not visit a facility or was not told about FP at a facility were coded as no.

Finally, a series of individual and household socio-economic characteristics were controlled for. They included: rural/urban residence, women's age, women's and partner's education levels, women's employment status, religion, household wealth and poverty. Household wealth was based on the wealth index, constructed by DHS based on the ownership of a number of household items, and materials of the house's walls, roof, and floor. The composite index was categorized into quintiles of household wealth. Questions on household's

experience with poverty came from a module on Famine and Cholera. To measure current poverty, we use two categorical variables that indicate whether the family had no food to eat and whether the family went to bed hungry in the last four weeks. Responses to both questions include no (meaning the family did not experience poverty or did not go to bed hungry in the last four weeks), sometimes, and often.

Analysis

Household and individual data are combined to examine associations between women's use of modern contraceptives and household experience with the earthquake and poverty among women in union. Descriptive analyses are conducted to assess variations in the use of modern contraceptives by woman's characteristics, including socio-demographic characteristics and those related to FP. The latter includes exposure to FP messages on mass media (including newspapers, radio, and TV), visits by a FP fieldworker in the last 12 months, and whether a woman was told about FP during a visit to a health facility in the last 12 months. Multivariate logistic regressions are implemented to assess the influence of household's experience with the earthquake and poverty on woman's modern contraceptive use, controlling for socio-demographic characteristics and factors related to FP promotion efforts.

RESULTS

Table 1 shows that FP practice was not very common among this sample of Haitian women: just less than one third of women in union were using a method of modern contraception at the time of the survey. Among modern contraceptive users, injectables were the most popular method, used by nearly two-thirds of all users (results not shown). They were followed by

condoms (16.5% of all users) and pills (9% of all users). There were no statistically significant differences in specific method prevalence between levels of house damages due to the earthquake. Nearly two in five households sustained damages to their houses due to the 2010 earthquake; the majority of these houses were not completely destroyed, but 10.4% of the total households in the sample sustained total destruction of their houses.

Table 1 about here

Sample distribution

The first column of Table 2 shows the distribution of the sample across individual socio-economic characteristics and factors related to fertility and FP program. More than half (56%) of women in the sample were living in rural areas. Most of them were between 20 and 39 years of age. The majority of the women (60%) did not have more than primary education; education levels of partners were just slightly higher. More than half (54%) of the women were employed at the time of the survey. Poverty was common: nearly two-thirds of the households had no foods at some point in the last four weeks, a similar portion had gone to bed hungry at least once in the last four weeks.

Polygamy was not uncommon – nearly 30% of the women in the sample were in a polygamous marriage; yet the majority of them reported that they did have some say in decision making related to their own health care, on how to spend their partner's earnings, and on family visits. For example, as many as 85% of the women reported that they made decisions about family visits either on their own or together with their partner. About one-third of the women had given birth in the two years since the earthquake and a significant proportion (43%) wanted to have additional children.

Exposure to FP information was not very high: on average the women in this sample had heard FP messages on only one type of media. Less than one in ten (8.5%) was visited by a FP worker in the last 12 months. About a quarter had been told about FP at a health facility that they visited in the last 12 months.

Unadjusted associations between modern FP use and household's experience with the earthquake and other factors

Column 2 of Table 2 indicates a significant variation in the proportion of women using modern contraceptives between households that did and did not sustain damages due to the earthquake: 32.39% of women who did not have any damages to their houses were practicing modern contraceptives, compared to 28.73% of those who did ($p<.01$). Several other significant variations in modern contraceptive use were seen by women's characteristics, including age, education, employment status, household wealth, religion, and partner's education.

Among women's decision making related factors, women's participation in decision making about how to spend their partner's earnings seemed positively associated with modern FP use: the proportion of modern contraceptive use was higher among those had some say in this type of decision making than those who did not (32.24% vs. 28.93%, $p<.05$). On the other hand, it was surprising to find that FP practice was more common among those who did not participate in decision making regarding their own health than among those who did (33.10% vs. 30.18%, $p<.05$).

While no differences were found between women who had given birth within the two years since the earthquake and those who had not, FP practice was significantly lower among those who reported wanting more children (27.25%) compared to others (33.45%, $p<.001$).

Being visited by a FP worker and told about FP at a health clinic were both associated with a higher proportion of modern contraceptive use ($p<.001$ in both cases). Exposure to FP messages in the media did not seem to make a difference to FP practice.

Table 2 about here

Adjusted influences of experience with the earthquake on modern FP use

The last column of Table 2 shows the adjusted associations between modern FP use with damages due to the earthquake, poverty, and other individual factors. The findings indicate that women in households that sustained earthquake damages were about 20% less likely than others to be currently using a modern method of contraception ($p<.01$). When house damages were further categorized to houses that were damaged but not completely destroyed and houses that were completely destroyed, there was no significant difference in FP practice by the severity of damages (not shown).

Figure 1 shows significant marginal effects of the earthquake damages on current use of modern contraceptive methods. Among households with no damages due to the earthquake, the predicted probability of modern FP use among women in union was 32.62%. Among households with any damages, this predicted probability dropped to 28.38%. When the level of damages was further categorized into two groups, one could see similar effects: only 28.75% of women in households with damages but that were not destroyed were predicted to be using modern contraceptives. Among women whose houses were completely destroyed due to the earthquake, the predicted probability was somewhat lower at 27.39%.

Figure 1 about here

Associations between modern FP use and other factors

The last column of Table 2 also indicates that modern FP use among women in union was associated with several other individual characteristics. For example, women aged 20-24 and 25-29 were about 50% more likely than the 15-19 year olds to be using a modern method of contraception ($p<.05$). On the other hand, women aged 45-49 were much less likely than the youngest counterparts to report doing so (OR=.39; $p<.001$). Women who were employed at the time of the survey were more likely than those unemployed to practice modern FP (OR=1.26; $p<.001$). Compared to Catholic women, Protestants were less likely to be using modern contraception (OR=.82; $p<.01$).

Both of the fertility related factors were significantly associated with modern FP use. If a woman had given birth since the earthquake, she had a 30% lower chance of using modern contraceptives ($p<.001$). Reported desire to have more children was also associated with nearly 50% reduction in a woman's likelihood of using modern contraceptives, holding everything else constant ($p<.001$).

Among women's empowerment factors, as expected, women's participation in household economy decision making was associated with an increased likelihood of using a modern method of contraception (OR=1.21; $p<.01$). Surprisingly, if a woman had some say in decision making about their own health care, she would be less likely than others who did not have any say in this matter to be using modern contraceptives (OR=.84, $p<.05$). Decision making in social life was not associated with modern contraceptive use.

Access to FP services and information, as measured by visits by a FP worker and being told about FP at a health center, was significantly related to modern FP use. In fact, they were the two strongest predictors of the outcome. If a woman was told about FP at a health facility in the

last 12 months, she was nearly twice as likely as someone who was not told about FP to report using modern contraceptives at the time of the survey (OR=1.80, p<.001). In addition, visits by a FP health worker was associated with an increased odds of practicing modern contraception (OR=1.43, p<.01). Exposure to FP information in the media was not found associated with the outcome.

Interactions between the earthquake damages and factors related to fertility and FP programs

Interaction terms were added to the equation to test the hypotheses that factors related to fertility and FP programs may have differential effects on modern FP use among households that sustained earthquake damages, compared to those that did not. Table 3 shows results of the two models where interaction terms were added, while controlling for the same factors as in Table 2. Results indicate no evidence of differential effects of fertility behavior and desire, as well as access to FP services and information, on current contraceptive behavior. Household damages due to the earthquake, as well as factors related to fertility and FP programs, remained significantly associated to the outcome as discussed in Table 2.

Table 3 about here

DISCUSSIONS

This study examines how post-disaster contraceptive behavior is influenced by experience with a recent earthquake in Haiti. Among this study sample, the earthquake in 2010 left nearly two in five women with at least some damages to their house, 10% of the sample had

their house completely destroyed. Modern contraceptive use among women in union were not very common: at the time of the survey in 2012, only 31% of the women in the sample were using a method of contraception. The analysis found that the earthquake experience was associated with contraceptive use behavior: women who experienced house damage due to the earthquake were significantly less likely to be using a modern contraceptive, compared to those who did not experience house damages. This effect is independent of fertility behavior and desire, and access to FP information and services. A possible explanation is the many competing demands for women at home, with family, child caring, and financial security, all of which make contraception a low priority compared to others. Such a low priority placed on birth control has been reported in the U.S. after Hurricane Katrina struck the Gulf Coast in 2005 (Kissinger, Schmidt, Sanders, & Liddon, 2007). In Haiti, a previous study also pointed to expanded familial duties, less support, and fewer resources for women, coupled with increased responsibility of caring for children and the elderly, as reasons for negative consequences of the 2010 earthquake on maternal health (Nour, 2011). Occupied by all these responsibilities and worries, even with readyaccess to FP services, women may also simply forget to take contraceptive pills, use condoms, or go to a clinic to get injectables or an IUD. It is therefore important that health professionals and FP workers are aware of disaster related stress and despair in order to help women access contraceptives and use them effectively.

The finding is consistent with much of previous research on post-disaster contraceptive behavior in both developing and developed countries, which have attributed the lower use of modern contraceptives at least in part to the lack of access to FP services after a disaster (Djafri, 2011; Hapsari, Nisman, Lusmilasari, Siswishanto, & Matsuo, 2009; Kissinger et al., 2007; Leyser-Whalen, Rahman, & Berenson, 2011; Westhoff et al., 2008). This argument is partially

supported with our data: our measures of access to the FP program had positive and significant associations with modern contraceptive use, indicating that providing women with supplies of FP services, either at their regular clinics or a new clinic near the new settlement area, was important for women to practice contraception. In addition, women may also not know about contraceptive supply sources, so that information from FP workers and health professionals could potentially increase contraceptive uptake and continued use among the post-disaster population. This potential effect has been reported elsewhere (Westhoff et al., 2008). On the other hand, our data did not show differential effects of access to the FP program between those who experienced house damages and those who did not. In other words, providing access to the FP program may not be sufficient to meet the need for FP services among the post-disaster population. One should be cautioned, though, that our measures are crude measures of access to FP information and services. It is not possible to know in this study what kind of information was given to the women by FP field workers or health workers at clinics, nor is it possible to know what methods were available to this population. Leyser-Whalen et al. (2011) reported that after Hurricane Ike struck the Texas Gulf Coast in 2008, the group that reported the most difficulty accessing contraception were using injectables, suggesting timing of appointment for resupply might be a barrier.

Fertility behaviors – both post-earthquake childbirth and desire for more children - were found to have a negative association with modern contraceptive use. A significant proportion of women in the sample had given birth within two years since the earthquake, suggesting that there might be a desire for couples to have more children post-disaster. The finding underlines the importance of recognizing fertility and contraceptive needs of couples post-disasters in planning disaster response programs.

The finding that post-disaster contraceptive behavior was lower among women who experienced disaster consequences is of great importance for FP programs. Studies have shown that post-disaster population and those who lacked access to FP were also those who reported higher frequency of unprotected sex (Leyser-Whalen et al., 2011). Unfortunately, reproductive health services are often overlooked in post-disaster responses (Barnett, 1995; Djafri, Chongsuvivatwong, & Geater, 2013; Hynes, Sheik, Wilson, & Spiegel, 2002). Prevention of unintended pregnancy, along with prevention of sexually transmitted diseases, therefore, must be at the forefront of disaster recovery efforts. Disaster planning and recovery management should include a component in which staff members are trained to recognize women's needs and barriers to accessing FP services and to serve as FP coordinators. Such trainings should also recognize the roles of women as the main caregivers to their families post-disaster, so that disaster response programs can target women who suffer disaster consequences effectively.

With regard to specific method use, Haitian contraceptive users were using a mix of injectables, condoms and pills. Injectables have been suggested by several experts as an optimal method of contraception in a post-disaster setting because of their effectiveness and duration of use, among others (Ellington et al., 2013; Nour, 2011). Pills and condoms are also preferred methods to use during a disaster, particularly as condoms can also provide protection against STDs. However, careful attention will need to be paid to storage and delivery to ensure re-supply among this potentially mobile population. In the long-term, plans should be made to facilitate informed choice of contraceptive methods.

An unexpected finding is that women who had some say in decision making about their health care were less likely than those who did not have any say to practice modern contraception. This finding is inconsistent with previous research on women's empowerment and

FP use (Corroon et al., 2014; Do & Kurimoto, 2012; Govindasamy & Malhotra, 1996; Mason & Smith, 2000; Schuler & Hashemi, 1994; Wang & Chiou, 2008). It is possible that FP use, like health care, is considered a women's domain; as such, men are less expected to contribute to decision making. Qualitative research may be necessary to assess whether there is indeed a negative association between this dimension of women's empowerment and modern contraceptive use. It is also possible that this is not a good measure of women's empowerment in the Haitian context, i.e. women's participation in their health care decision making does not necessarily reflect their overall status in the couple dynamics. Qualitative research would also provide insight for the development of culturally appropriate measures of women's empowerment in this setting.

A limitation of this study is the cross-sectional nature of the data, which limits our ability to draw causality conclusions. The fact that the earthquake occurred in early 2010, more than two years before the survey, is helpful in establishing temporality. However, since the duration of use or non-use of contraceptives is not examined, there is still a possibility that FP practice may have begun before the earthquake. This study is also limited to women currently married or living with a partner. As a result, findings may not be generalizable to all women of reproductive age in Haiti.

CONCLUSIONS

The study contributes to the body of literature on the impact of disasters on contraceptive behavior. The findings highlight the possible negative impact of the 2010 earthquake in Haiti on access and use of modern contraceptives, as well as potentially increased demand for children

post-disaster. They underline the importance of taking fertility and contraception needs of couples into consideration in planning disaster response strategies.

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Table 1. Damages due to the 2010 earthquake and current use of modern contraceptives among Haitian households.

	%
Current use of modern contraceptives	30.98
House damages due to the earthquake	
No	61.51
Yes	38.49
Yes, but not destroyed	28.09
Yes, completely destroyed	10.40
N	**7,849**

Table 2. Factors influencing current use of modern contraceptives among women in union, Haiti.

	Distribution % or mean (s.e.)	**% use modern contraceptives**	**Multivariate model O.R. (s.e.)**
	(1)	**(2)**	**(3)**
House damages due to the earthquake			
No		32.39**	1.00
Yes		28.73	.81 (.05)**
Residence			
Rural	56.07	30.98	1.00
Urban	43.93	30.98	1.01 (.09)
Women's age			
15 – 19	5.18	23.73	1.00
20 – 24	16.01	33.67	1.45 (.26)*
25 – 29	20.74	36.63	1.49 (.26)*
30 – 34	18.85	35.66	1.27 (.23)
35 – 39	15.73	30.97	.98 (.18)
40 – 44	12.39	26.59	.72 (.14)†
45 – 49	11.10	16.90***	.39 (.08)***
Women's highest education level			
No education	22.12	27.57	1.00
Primary	38.64	31.25	1.00 (.09)
Secondary	34.32	32.91	1.17 (.13)
Higher	4.92	30.84*	1.36 (.30)
Currently employed			
No	46.11	28.88	1.00
Yes	53.89	32.78**	1.26 (.08)***
Household wealth			
Poorest (1^{st})	17.61	29.32	1.00
Poor	17.66	29.45	1.03 (.10)
Middle	20.20	34.25	1.18 (.13)
Rich	22.29	34.13	1.17 (.15)
Richest (5^{th})	22.25	27.39***	.84 (.12)
Having no foods in the last 4 weeks			
No	36.53	31.37	1.00
Sometimes	41.42	31.05	1.00 (.09)
Often	22.05	30.22	.93 (.11)
Going to bed hungry in the last 4 weeks			
No	37.33	31.97	1.00
Sometimes	45.49	30.61	.93 (.08)

	Distribution % or mean (s.e.)	% use modern contraceptives	Multivariate model O.R. (s.e.)
Often	17.18	29.84	.96 (.12)
Religion			
Catholic	42.49	32.79	1.00
Protestant	48.55	29.09	.82 (.05)**
None/others	8.95	32.66*	.99 (.12)
Partner's highest education level			
No education	18.81	27.53	1.00
Primary	33.07	31.43	1.09 (.10)
Secondary	38.68	32.68	1.12 (.12)
Higher	9.45	29.35*	1.02 (.18)
In a polygamous marriage			
No	71.07	31.68	1.00
Yes	28.93	29.27	.89 (.07)
Women had some say in decision making:			
… about their own health care			
No	27.54	33.10	1.00
Yes	72.46	30.18*	.84 (.06)*
… in how to spend their partner's earnings			
No	30.87	28.93	1.00
Yes	61.93	32.24*	1.21 (.08)**
… in family visits			
No	14.63	29.95	1.00
Yes	85.37	31.16	1.15 (.11)
Gave birth since earthquake			
No	65.37	31.06	1.00
Yes	34.63	30.83	.71 (.05)***
Wanted more children			
No	56.74	33.45	1.00
Yes	43.26	27.75***	.56 (.04)***
Exposure to FP messages in the media (range: 0-3)	.76 (.01)	--	.98 (.04)
Visited by a FP worker in the last 12 months			
No	91.47	29.83	1.00
Yes	8.53	43.32***	1.43 (.15)**

	Distribution % or mean (s.e.)	% use modern contraceptives	Multivariate model O.R. (s.e.)
Told about FP at a health facility in the last 12 months			
No	74.84	27.15	1.00
Yes	25.16	42.39***	1.80 (.13)***
N	7,849		
*p<.05; ** p<.01; *** p<.001.			

Table 3. Interactions between house damages and factors related to fertility and FP programs.

	Model 1 O.R. (s.e.)	**Model 2 O.R. (s.e.)**
House damages due to the earthquake		
No	1.00	1.00
Yes	.78 (.09)*	.81 (.07)*
Gave birth since earthquake	.72 (.06)***	
Wanted more children	.56 (.05)***	
House damages * Gave birth since earthquake	1.19 (.16)	
House damages * Wanted more children	.95 (.13)	
Visited by a FP worker in the last 12 months		1.55 (.20)**
Told about FP at a health facility in the last 12 months		1.77 (.15)***
House damages * Visited by FP worker		.81 (.18)
House damages * Told about FP at health facility		1.04 (.15)

Note: These models control for all other confounders.

Figure 1.

Figure 1. Effects of house damages due to the earthquake on current use of modern contraceptives among Haitian women in union