# The Physical Accessibility of Health Facilities Strongly Affects Haitian Women's Use of Prenatal, Delivery Care

In rural Haiti, the physical accessibility of maternal health services is an important predictor of use, even when individual characteristics are taken into account.[1] According to an analysis of data from the 2000 Haiti Demographic and Health Survey (DHS), births in neighborhoods linked to the nearest urban center by an unpaved road or a path were less likely to involve four or more prenatal visits than were those in neighborhoods with a paved road (odds ratios, 0.3–0.4). Compared with births to women living within five kilometers of a hospital, births to women living 30 kilometers or more from a hospital were less likely to be attended or to take place in a health facility (0.2 and 0.3, respectively).

In Haiti, the poorest country in the Western Hemisphere, political instability, economic decline and deterioration of the road system since the early 1990s have led to sharp reductions in maternal health services throughout the country. Even though programs run by nongovernmental organizations have filled some of the gaps, women in rural Haiti rarely deliver with the help of trained medical personnel. Studies on the use of maternal health services have tended to examine only factors related to the mother, with little consideration of the health infrastructure—a matter of particular importance in developing countries. Because increasing the numbers of women seen by health professionals and at facilities during pregnancy and childbirth is key to improving the health of mothers and their babies, researchers examined the association between physical access to health facilities and use of prenatal and delivery services.

Data on women's characteristics came from the women's questionnaire of the 2000 DHS, in which 10,519 women aged 15–49 provided information on the source, content and number of prenatal care visits; timing of the first prenatal care visit; and place of and assistance at delivery for every birth in the preceding five years. The analyses were restricted to the 4,533 births to rural women for which complete information was available. The researchers also used data from the DHS community questionnaire, which asked key informants questions on road conditions in their neighborhoods, topography, availability of public transportation, and distance to the nearest urban areas and health facilities. Informants were asked the travel time to each health facility identified, whether it was public or private, and what services it provided. Chi-square analysis and multilevel logistic regression were used to identify associations between individual- and community-level characteristics and four maternal care outcomes: initiation of prenatal care in the first trimester, receipt of at least four prenatal visits, attendance at delivery by a trained health worker and delivery in a health facility.

Half of the births were to women who lived in mountainous areas; for four in 10, the road to the nearest urban center was unpaved and in bad condition. The majority of births (84%) occurred in neighborhoods that did not have a prenatal care provider; however, 81% of the births occurred within five kilometers of a health center that provided such care. The distance to the nearest hospital was 30 kilometers or more for 44% of births, and the majority of the births (71%) were to mothers who had no means of transportation. The average birth occurred in neighborhoods where 35% of households were in the lowest quintile of household wealth. Thirty-nine percent of births were to women who were in the lowest wealth quintile, and half were to women who had had no education.

Overall, mothers received prenatal care in the first trimester for 24% of births; for 23% of births, the mothers had four or more prenatal visits. One in 10 births were attended by trained personnel; a similar proportion occurred in a medical facility. Although the levels of maternal care–seeking behavior were low in general, bivariate analyses revealed significant variations related to accessibility. Receipt of four or more prenatal visits, delivery assistance by a trained health worker and delivery at a facility were all more common in nonmountainous areas and in neighborhoods with a health facility within five kilometers than in mountainous and more remote areas. As the distance from a hospital increased, the likelihood of an attended delivery and of an institutional delivery decreased. For example, the proportion of births occurring in a medical facility ranged from 25% for women living within five kilometers of a hospital to 7% for women who lived 30 kilometers or more from a hospital. Road conditions also were associated with variations in use—in neighborhoods linked to an urban center by a paved road, births were more likely to involve early prenatal care, four or more prenatal visits, attended delivery and delivery at a medical facility than births in neighborhoods with unpaved roads or paths linking them to urban areas. Attendance at delivery by trained medical personnel was more common in neighborhoods with a prenatal care provider than in those without.

In the multivariate analyses, which included all individual-level controls, living in a mountainous region was associated with lower odds of assisted delivery and of institutional delivery, but not of early prenatal care or of making four or more prenatal visits; conversely, poor road conditions were associated with lower odds of early prenatal care and of making four or more prenatal visits, but not of assisted delivery or of delivery in a medical institution. The odds that a delivery was attended by a health professional and the odds that it occurred in a medical facility were reduced if the mother lived in a mountainous region (odds ratios, 0.6 and 0.5, respectively). Early receipt of prenatal care and receipt of four or more prenatal visits were each less likely in neighborhoods with poor road conditions than in those with paved roads (0.5–0.6 and 0.3–0.5, respectively). Neighborhood poverty was negatively associated with early prenatal care, four or more prenatal visits, medical attendance at delivery and institutional delivery (0.9 for all four outcomes).

The researchers conclude that although decreasing the distance women have to travel to obtain maternal health services will in turn increase the use of such services, "investments in community infrastructure, including road transportation networks, will also be required

if barriers to the accessibility of service are to be effectively reduced." Any attempt to increase maternal care–seeking behavior in rural Haiti will "require resources to be targeted at the most impoverished areas and development of strategies for reaching those not yet reached."
—*L. Melhado*

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## In South Africa, Young Men With Sexual Risk Factors Are More Likely to Commit Rape

In rural South Africa, the odds of having raped a nonpartner or a partner are elevated among men who have physically abused a girlfriend, engaged in transactional sex or had six or more lifetime consensual partners.[1] According to data collected during a study of an HIV intervention program, the odds that a young man would rape a partner or a nonpartner rose with the number of adverse events he experienced during childhood. Moreover, the risk of nonpartner rape increased with socioeconomic status and was elevated among those who had ever used drugs or belonged to a gang.

In 2002–2003, 1,370 men aged 15–26 were recruited from village schools in Eastern Cape Province for an HIV prevention program. Participants agreed to complete questionnaires administered by same-sex interviewers, be tested for HIV periodically over two years and participate in a behavioral intervention. Data for this analysis came from the baseline questionnaire, which collected information on participants' demographic characteristics, childhood experiences, social behavior and sexual history. Men were asked about their perpetration of sexual violence against nonpartners and partners. The definition of rape included coercing a woman to have sex through threats as well as through physical force, and encompassed vaginal, anal and oral sex. Men were categorized as having raped a nonpartner if they reported having ever forced a woman who was not their girlfriend to have sex. This category also included men who had engaged in gang rape or "streamlining," a practice in which several men rape a friend's girlfriend, often as punishment or a form of male bonding. The researchers conducted multivariate logistic regressions to identify significant predictors of each type of rape.

Overall, 13% of the men reported having raped a nonpartner only, 5% had raped an intimate partner only and 4% had raped both an intimate partner and a nonpartner. Men's mean age at first rape was 17. On average, those who reported nonpartner rape scored higher than other participants on a scale measuring socioeconomic status, and a higher proportion had mothers with some secondary schooling (80% vs. 64%). Men who had raped a nonpartner tended to score higher than their peers on a scale measuring adverse childhood experiences, and lower on a scale assessing their ability to resist peer pressure to have sex. Heavy drinking, ever having used drugs and ever having been in a gang were more common among men who had raped a nonpartner (15–52%) than among those who had not (5–36%). The same was true of physical violence toward an intimate partner, transactional sex and having had six or more lifetime consensual partners (15–48% vs. 5–23%). Men who had raped a nonpartner tended to score lower than other participants on a scale that evaluated communication skills in their current relationship. Similar patterns emerged when men who reported having raped an intimate partner were compared with those who did not.

In one logistic regression model—which included only demographic and social variables—men's odds of reporting nonpartner rape rose with socioeconomic status and number of adverse childhood experiences, and were associated with mother's receipt of secondary schooling, heavy drinking, ever having used drugs and ever having been in a gang (odds ratios, 1.2–2.3). Resistance to peer pressure to have sex was negatively associated with men's odds of having raped a nonpartner (0.7). When sexual risk factors were added to the model, all of these relationships retained statistical significance, except for the link between nonpartner rape and heavy drinking. Moreover, men who had ever engaged in transactional sex or been physically violent toward an intimate partner were significantly more likely than other participants to have raped a nonpartner (1.6 and 1.9, respectively). The odds of nonpartner rape were significantly higher among men who reported multiple lifetime consensual partners than among those who did not (5.0–17.1).

In another model that excluded sexual risk factors, men's odds of having raped an intimate partner increased with the number of adverse childhood events they had experienced (odds ratio, 1.4), and were associated with mother's attendance of high school and respondent's abuse of alcohol (1.8 and 2.0, respectively). When sexual risk factors were included in the model, mother's education and alcohol abuse were no longer significant; the strongest predictors of intimate partner rape were number of adverse childhood experiences, transactional sex, physical violence toward a partner and multiple lifetime consensual partners (1.3–4.3). Men who had lived with neither parent for most of their childhood had significantly decreased odds of having raped an intimate partner (0.6).

The authors note that the way in which participants were recruited limits the generalizability of their findings. Because certain factors were linked to both types of rape, the authors suggest that "some underlying dynamics...are largely the same." Yet, they maintain, the relationship between socioeconomic status and nonpartner rape may indicate that "having an exaggerated sense of sexual entitlement and enacting fantasies of power were particularly important in these cases." According to the authors, "prevention of rape needs to start in childhood and in homes," and "male peer associations...may also be appropriate points of entry for rape prevention activities." Their findings, they conclude, support "comprehensive prevention strategies that jointly address HIV risk, gender-based violence and misogynistic constructions of masculinity."—*R. MacLean*

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## In Low-Resource Settings, Misoprostol Can Reduce Risk Of Postpartum Hemorrhage

In a randomized, controlled trial in rural India, women who took oral misoprostol after delivery were significantly less likely than those who took a placebo to develop acute or acute severe postpartum hemorrhage; in addition, their volume of postpartum blood loss was lower.[1] Compared with women taking the placebo, those taking misoprostol had relative risks of 0.5 for acute and 0.2 for acute severe postpartum hemorrhage. Mean total blood loss was 214 ml in the misoprostol group and 262 ml in the placebo group.

Postpartum hemorrhage causes a third of the world's maternal deaths, and nearly all of

these deaths occur in women who give birth at home or without a skilled attendant at delivery. In India, half of all births occur under these conditions; because the majority of Indian women are also anemic, they are at high risk for death from blood loss. Oxytocin, the drug most often used to prevent postpartum hemorrhage, cannot be used in much of India because it must be refrigerated and administered by trained medical personnel. Researchers conducted a large, randomized, placebo-controlled study to test the effectiveness of misoprostol, an inexpensive alternative, in preventing postpartum hemorrhage in rural communities where skilled medical care is unavailable. Misoprostol does not require refrigeration and can be taken orally.

The trial was conducted between September 2002 and December 2005 in Belgaum District of Karnataka State; the sample included more than 1,600 women drawn from 43 villages, in which more than half of deliveries occur at home or at village facilities with the help of auxiliary nurse midwives. Only women expecting an uncomplicated vaginal birth were eligible; reasons for exclusion included previous or planned cesarean birth, low hemoglobin levels, antepartum bleeding, hypertension and previous pregnancy complications. The remaining women were randomly assigned to receive either a single dose of 600 mcg of misoprostol (809) or a placebo (807) immediately after delivery.

Specially trained midwives administered the misoprostol and monitored participants for up to two hours, while measuring blood loss. Demographic, clinical and perinatal data were collected for both groups.

The mean age of all participants was 23, and the average time since their last pregnancy was 2.8 years. Twenty-nine percent had no other children, 60% had one or two other children, and 11% had three or more. Nearly two-thirds of the women were literate, and most reported having made three or more prenatal visits. Almost half gave birth at home; two in 10 had preterm deliveries, and one in 10 experienced perineal tears during delivery.

Acute postpartum hemorrhage (loss of at least 500 ml of blood within two hours of delivery) occurred in 6.4% of women who had taken misoprostol and 12.0% of those who had received the placebo; compared with the placebo group, the intervention group had a relative risk of 0.5. The proportions of women in the two groups who had acute severe postpartum hemorrhage (loss of at least 1,000 ml of blood) were also significantly different: 0.2% and 1.2%, respectively; compared with the placebo group, the misoprostol group had a relative risk of 0.2. Significant differences were also found for total blood loss over the two-hour period: Women who took misoprostol had a mean loss of 214 ml, whereas those who took the placebo lost an average of 262 ml. The difference between the two groups in blood loss for the second hour was even greater for the 41 women who continued to bleed (183 ml vs. 343 ml). Furthermore, compared with women who took the placebo, those who took misoprostol were significantly less likely to require transfer to a higher-level facility (0.5% vs. 1.5%), a blood transfusion (0.1% vs. 0.9%) or surgical intervention (0.1% vs. 1.0%). Transient shivering and fever were more common among women taking misoprostol than among those taking the placebo, but there were no differences in the proportions experiencing nausea, vomiting or diarrhea.

According to the researchers, the study had some limitations. The sample was restricted to low-risk women; thus, the findings are not generalizable to women with high-risk pregnancies. In addition, midwives recruited later in the study may have been more experienced, and patients admitted later may have benefited from the general improvement in midwife training and monitoring that occurred during the study period. Overall, the researchers say, this trial demonstrated that oral misoprostol is "safe, effective, and inexpensive ($1.00 per 600 mcg dose) for women giving birth in low-resource settings, and is currently the only available pharmacological option for preventing postpartum haemorrhage and reducing postpartum blood loss in these communities."—*J. Thomas*

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## Levels of Intimate Partner Violence Vary Greatly According to Country and Rural or Urban Setting

The prevalence of intimate partner violence toward women varies greatly across settings, according to a 15-site study conducted in 10 countries (Bangladesh, Brazil, Ethiopia, Japan, Namibia, Peru, Samoa, Serbia and Montenegro, Thailand and Tanzania).[1] The proportion of ever-partnered women who reported ever having experienced either sexual or physical violence, or both, ranged from 15% in a Japanese city to 71% in an Ethiopian province. Sexual violence tended to be less prevalent than physical violence, but in most sites, between 30% and 56% of ever-partnered women had experienced both kinds of partner violence. In most settings, violence against women was more commonly perpetrated by an intimate partner than by anyone else.

The data come from a representative, household-based sample of 24,097 women aged 15–49 (18–49 in Japan). Two sites (one large city and one provincial area) were selected in Bangladesh, Brazil, Peru, Thailand and Tanzania, while a rural setting was chosen in Ethiopia and a large city was used in Japan, Namibia, and Serbia and Montenegro; women were sampled in all areas of Samoa.

The researchers interviewed each woman to determine her lifetime and current (within 12 months of the interview) experience with physical and sexual intimate partner violence. Moderate physical violence was defined as being pushed or slapped, while severe physical violence was defined as having experienced at least one of the following acts: being hit with a fist, beaten up, kicked, choked, intentionally burned or attacked with a weapon. Women were also asked about their partners' controlling behaviors, such as those that restrict women's mobility, social contact and access to health care, and about violence by nonpartner perpetrators.

The average age among ever-partnered women (those who had ever been married or lived with a male partner) was between 30 and 36 for all study sites. The proportion of ever-partnered women who had received no education varied widely from none in urban Japan to 85% in rural Ethiopia; the proportion who had had any postsecondary education ranged from fewer than 2% in provincial sites in Tanzania, Ethiopia and Bangladesh to 61% in urban Japan.

In most study sites, the proportion of ever-partnered women who had ever experienced physical violence perpetrated by a male partner or ex-partner ranged from 13% in Japan to 61% in the Peruvian province, with most sites falling between 23% and 49%. The pro-

portion of all ever-partnered women who had ever experienced severe physical violence was lowest in Japan (4%) and highest in the Peruvian province (49%). The proportion who had experienced any physical abuse in the past 12 months ranged from 3% (city sites in Japan and Serbia and Montenegro) to 29% (rural Ethiopia).

Ever having experienced sexual violence by a partner or ex-partner was reported by 6% (city sites in Japan and Serbia and Montenegro) to 59% (rural Ethiopia) of ever-partnered women; in most sites, the proportion fell between 10% and 50%. Similarly, the lowest prevalence of sexual violence in the past 12 months was reported in Japan and Serbia and Montenegro (1%), while the highest current prevalence was in rural Ethiopia (44%). In most other sites, prevalence lay between 9% and 24%. The overall prevalence of ever-partnered women who had experienced intimate partner violence—physical, sexual or both—ranged from 15% in Japan to 71% in rural Ethiopia, with most sites between 29% and 62%. In most settings, between 15% and 34% of women reported having experienced one or both types of violence in the previous year. Using a multivariate analysis, the researchers found that differences by site in the prevalence of either type of violence were not explained by variations in age, partnership status or educational attainment.

A bivariate analysis shows that the experience of male partners' controlling behavior e.g., keeping the respondent from seeing friends, restricting contact with her family of origin, insisting on knowing where she was at all times or expressing suspicions that she was unfaithful, was associated with the experience of violence in all sites. Among women who had ever experienced intimate partner violence, the proportion who had also experienced controlling behaviors ranged between 44% in Japan and 95% in urban Tanzania.

In nine of the 15 settings, the majority of women reported that intimate partners alone were the perpetrators of any physical or sexual violence they had experienced since age 15; women reporting that nonpartners or both nonpartners and partners had abused them were in the minority. Only in Samoa—where both partner and nonpartner violence prevalence rates were high—was the trend reversed: More than half of women who had experienced physical or sexual violence experienced it at the hands of nonpartners alone.

The researchers note that although slight variations in response rates and sampling techniques could have influenced the results, they are unlikely to account for the much lower prevalence of domestic violence found in industrialized areas (Japan and Serbia and Montenegro) than in less developed areas. The researchers state that the wide range of the findings "within and between settings highlights that this violence is not inevitable, and must be addressed" with further research on risk and protective factors for domestic violence and possible public health interventions at the individual and structural levels.—*H. Ball*


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## Positive Attitudes Toward Condom Use Do Not Mean Safer Sex Among Youth

Adolescents who have sex with casual partners tend to have riskier attitudes toward condom use than those who have only main partners, according to a survey of sexually active adolescents in three U.S. cities.[1] However, risky sexual behavior is not limited to casual relationships: Respondents had used condoms in fewer than half of their reported sexual encounters, regardless of partner type.

The data come from a study of adolescents aged 15–21 in Atlanta, Providence and Miami. Primary care clinic patients and adolescents contacted through various outreach strategies were included if they had had heterosexual vaginal or anal intercourse in the past 90 days, had not given birth within that time period, were not pregnant or HIV-positive, and were not trying to become pregnant. The 1,316 participants were, on average, 18.2 years old; 43% were male, and 57% female. Forty-nine percent of participants were black, 23% white, 8% of another race and 20% multiracial; 24% were Hispanic.

The researchers collected information on participants' demographic characteristics, unprotected sexual behavior, drug and alcohol use, and attitudes toward and perceptions about condom use. For all analyses, participants were classified by whether they had had sex only with main partners (defined as people with whom they had an ongoing relationship) in the past 90 days or they had had sex with at least one casual partner (someone they did not classify as a main partner). Adolescents in the latter group may also have had sex with a main partner, but were asked about behavior with casual partners only.

Some 35% of adolescents in the study reported having had at least one casual sex partner. These adolescents had had an average of 3.2 sex partners in the past 90 days, compared with 1.3 partners among those in the main partner group. Only participants' gender and living arrangements were associated with partner type: Males made up 61% of adolescents with casual partners and only 34% of those with main partners; and the proportion of adolescents living with their partner was twice as high among those with a main partner as among those with a casual one (21% vs. 10%).

In bivariate analyses, adolescents who had had sex with casual partners had used marijuana or alcohol significantly more often in the past 30 days than had adolescents who had had sex with main partners. Those with casual partners also harbored riskier attitudes toward condom use than those with main partners, according to scales that measured how adolescents felt about using condoms; their perception of how their casual partners would react if they suggested using condoms; their perception of their partners' STI status; and their perception of peer attitudes toward abstinence, sexual activity and condom use.

Adolescents in the casual partner group had used condoms during a significantly greater proportion of sex acts in the past 90 days than had those in the main partner group, though levels of use were low in both groups (47% and 37%, respectively). According to results of a multiple linear regression analysis, among adolescents in the main partner group, being older and living with a partner were negatively associated with the proportion of sex acts that were protected, while using alcohol or marijuana, having positive attitudes toward condoms and perceiving that main partners would react positively toward condoms were associated with using condoms in a higher proportion of sex acts. Among participants in the casual partner group, being male and using drugs other than marijuana were negatively associated with condom use; perceptions that a main partner would react positively toward condom use predicted a higher proportion of sex acts protected by a condom.

The average number of unprotected sex acts was 18.9 among those with main partners and 21.5 among those who had had casual partners.

In a multiple linear regression analysis, living with a partner and using drugs other than marijuana were positively associated with the number of unprotected sex acts among adolescents with main partners. Unexpectedly, less risky attitudes toward condoms and perceptions of positive reactions toward condoms among main partners were also positively associated with unprotected sex acts among those in the main partner group. Among adolescents with casual partners, only living with a partner bore a significant (positive) relationship to unprotected sex.

The researchers point out that the frequency of condom use these adolescents reported with either partner type was not sufficient to prevent the spread of STIs. Furthermore, although the perception of main partners' attitudes about condoms was associated with behavior among participants in the main partner group, there was no apparent link among participants in the casual partner group between their perceptions and their behaviors with casual partners. The researchers encourage clinicians to emphasize the importance of condom use with "all partners regardless of the patient's feelings about the partner, the sense of commitment, or the length of relationship." They also note that their definitions of "main" and "casual" partners may not have captured important aspects of adolescents' relationships. Thus, they suggest that future research "continue to explore the definitions of partner type" in order to fully illuminate the association between risk behaviors and relationship type.—*H. Ball*

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## In the Absence of Syphilis, Anemia Causes the Majority Of Stillbirths in Tanzania

In a sample of pregnant Tanzanian women including both women who had been screened and treated for syphilis and a control group of uninfected women, 3% experienced a stillbirth, and 4–12% of those having live births delivered prematurely or delivered infants with a low birth weight or intrauterine growth retardation.[1] Maternal factors associated with elevated risks of one or more of these adverse birth outcomes included shorter stature, untreated bacterial vaginosis, and malaria and anemia, among others. Between 20% and 34% of the adverse birth outcomes were attributable to maternal or placental malaria (or both), and fully 63% of stillbirths were attributable to maternal anemia.

The study, which took place in Mwanza city, had the primary aim of assessing the effectiveness of antenatal screening for and treatment of syphilis. Women visiting the city's main antenatal clinic during 1997–2000 were eligible if they were pregnant with an apparently healthy single fetus, did not have diabetes or hypertension, and had not had vaginal bleeding during their pregnancy. Women with serological evidence of syphilis were recruited; for each of them, two women without syphilis were chosen. They provided information about their social and demographic characteristics, obstetric history and symptoms of reproductive tract infections (RTIs). Blood, vaginal, cervical and urine specimens were collected for RTI testing, and women with positive results were offered 1treatment. In addition, all women were given iron and folate supplements and chloroquine (an antimalarial drug). At delivery, blood was collected to test for HIV and maternal malaria and anemia, and the placenta was examined microscopically for placental malaria. Birth outcomes were recorded at delivery.

At the time of enrollment, the 1,536 women included in main analyses had an average age of about 24 years, and 86% were married. Their mean gestational age was about 25 weeks, and only 18% of women had received antenatal care before 20 weeks. Thirty percent had candidiasis, 30% bacterial vaginosis and 21% trichomoniasis, while smaller proportions had chlamydia (7%) or gonorrhea (2%). At the time of delivery, 65% of women had anemia, and substantial proportions had malarial parasites in their blood (10%) or placenta (39%). In addition, 12% were infected with HIV.

Overall, 18% of women had an adverse birth outcome. For 3%, pregnancy ended in stillbirth (fetal death after 22 weeks of gestation) or intrauterine fetal death (fetal death at or before 22 weeks of gestation). In multivariate analysis, women shorter than 156 cm in height had elevated odds of these outcomes relative to their taller counterparts (odds ratio, 2.6). In addition, compared with other women, women who had experienced a stillbirth before had a sharply elevated likelihood of these outcomes (7.5), and anemic women had a higher likelihood than their nonanemic peers (3.7).

Among women who had live births, 12% delivered prematurely (before 37 weeks of gestation). Women had elevated odds of this outcome if they were 16 or older at sexual debut than if they were younger (odds ratios, 2.0–2.2). The risk was also higher among women who had untreated bacterial vaginosis than among their uninfected counterparts (2.9), and among women who had malaria in their blood at delivery relative to those who did not (3.2).

Slightly more than 8% of women with live births gave birth to an infant with low birth weight (less than 2,500 g). The odds of this outcome were lower among women of Sukuma ethnicity than among women of other ethnicities (odds ratio, 0.6), among women who worked outside the home than among their counterparts who did not (0.3–0.5) and among women who had treated or untreated chlamydia than among their uninfected counterparts (0.2–0.3). In contrast, women were more likely to deliver an infant with low birth weight if they were shorter (1.8) and markedly more so if they had malaria in their blood at delivery (5.4).

About 4% of women with full-term live births delivered an infant who had intrauterine growth retardation (a low birth weight when born at or after 37 weeks of gestation). Women's odds of this outcome were elevated if they were shorter (odds ratio, 1.9), if their infant was female (2.1) and if they had malaria in their blood at delivery (2.8).

In a final set of analyses, sizable minorities of births with outcomes of prematurity (14%), low birth weight (25%) or intrauterine growth retardation (17%) were attributable to maternal malaria. Between 20% and 34% of the four types of adverse birth outcomes individually could be attributed to malaria (maternal, placental or both), and the value was 22% when these outcomes were combined. In addition, almost two-thirds of stillbirths (63%) and nearly a quarter of all adverse birth outcomes combined (23%) were attributable to maternal anemia. In contrast, the proportions attributable to maternal HIV infection were not significant and amounted to only 0–5%.

Discussing the findings, the researchers note that with the exception of untreated bacterial vaginosis, RTIs—although common—were not risk factors for adverse birth outcomes in a setting where clinicians tested for and treated these infections. In addition, they point out, when RTIs (including syphilis) were treated, anemia and malaria became the predominant preventable causes of such outcomes. They speculate that poor adherence to iron supplementation and resistance to chloroquine may explain why some women in the study still

had anemia and malaria (which also contributes to anemia), and they note that more effective antimalarial regimens could have a potentially large benefit for birth outcomes in such populations. "Providing reproductive health services that include treatment of RTIs and prevention of malaria and maternal anaemia to reduce adverse birth outcomes remains a priority," the researchers conclude. *—S. London*

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## Combined Hormone Therapy After Menopause Does Not Raise Cervical Cancer Risk

Postmenopausal women who take hormones combining estrogen and progestin have cellular abnormalities detected in the cervix more frequently than nonusers of hormone therapy do, but the risk of precancerous lesions and cervical cancer does not differ between users and nonusers, according to a report based on six years of data from the Women's Health Initiative.[1] Unmarried women, particularly those who are sexually active, have a significantly elevated risk of developing precancerous abnormalities or cervical cancer.

The Women's Health Initiative enrolled nearly 200,000 postmenopausal women aged 50–79 in 1993–1998, of whom about 17,000 participated in a clinical trial of oral estrogen plus progestin. To be eligible for participation in the hormone trial, a woman had to have a uterus; have no history of breast, endometrial or nonmelanoma skin cancer; and have no history of other cancers within the past 10 years. Women who had ever had invasive cervical cancer were excluded from the analysis of cervical cytologic abnormalities. Participants who had a Pap smear at baseline or in the previous year that detected no abnormalities or only low-grade lesions (which are not precancerous) were randomly assigned to receive either combination hormone therapy or a placebo. The study protocol called for participants to have annual pelvic examinations including cervical smears; those with data at three and six years after enrollment (15,733 women) were included in the analysis.

At baseline, 98% of women had normal Pap smear results, and 2% had abnormalities (most of which were low-grade). On average, women with normal results were significantly older than others (63 vs. 62 years) and had a lower waist-to-hip ratio; they had experienced menarche at an earlier age and had first given birth at a later age. The two groups did not differ with respect to other characteristics that may be risk factors for cervical cancer. In both groups, the majority of women were white, were married (or living as married) and had had at least some postsecondary education. Three-quarters of women had never used hormone therapy, and fewer than one in 10 were using it when they entered the study. Half had never smoked, and one in 10 were current smokers; two-thirds reported that they drank alcohol, and half of these said that they had no more than one drink a week. The majority of women had given birth.

During follow-up, the annual incidence of any new cellular abnormality was significantly higher among women who had had an abnormal result at baseline (653 per 10,000 person-years) than among those who had not (146); the same was true for the incidence of high-grade (precancerous) lesions and cervical cancer. Women taking combined hormones had a significantly higher annual incidence of new abnormalities (179 per 10,000 person-years) than those in the placebo arm of the trial (130), and sexually active unmarried women had a higher incidence (20 per 10,000 person-years) than either unmarried women who were not sexually active (11) or married women (five).

After identifying characteristics that were significantly related at the univariate level with the risk of any abnormalities during the follow-up period, the researchers conducted multivariate analyses to determine which ones had independent associations. According to these calculations, the risk of abnormal cervical smear results was significantly elevated among unmarried sexually active women (hazard ratio, 1.4), women who had been younger than 30 at first birth (1.7) and users of hormone therapy (1.4).

Over the six years of follow-up, 54 women developed high-grade lesions or cervical cancer. Results of multivariate analyses identified only one significant predictor of this outcome: marital status and sexual activity. Unmarried women had a higher risk than married women of developing precancerous lesions or cancer; the elevation in risk was greater for those who were sexually active (hazard ratio, 3.5) than for those who were not (2.3). The researchers speculate that these findings reflect unmarried women's increased chances of having new sexual partners and being exposed to human papillomavirus. However, the study did not gather sufficient information about women's sexual history for a detailed examination of its relationship to the risk of high-grade abnormalities or cervical cancer.

The researchers point out that their results "are generalizable to postmenopausal women who have recently had a normal cervical smear or a smear with low-grade abnormalities, but they are not applicable to postmenopausal women who have never been screened or have not recently been screened." Despite the study's limitations, they conclude that "sexually active unmarried elderly women may benefit from continued cervical cancer screening." *—D. Hollander*

**REFERENCE**

1. Yasmeen S et al., Incidence of cervical cytological abnormalities with aging in the Women's Health Initiative, *Obstetrics & Gynecology,* 2006, 108(2):410–419.