



## Original article

## Who Uses a Midwife for Prenatal Care and for Birth in the United States? A Secondary Analysis of Listening to Mothers III

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### A B S T R A C T

**Background:** Although midwife care is slowly but consistently increasing in the United States, not much is known regarding women who use a midwife. Our objectives were to compare the sociodemographic and health history characteristics, and the quality of patient–provider communication, between women who used a midwife and those who used a physician for prenatal care and/or birth.

**Methods:** We performed a cross-sectional analysis of the nationally representative Listening to Mothers III survey. We report descriptive findings using weighted proportions and means with standard deviations. We used the two one-sided tests procedure to assess the equivalence of women who used midwives and those who used physicians.

**Results:** Nearly 13% of women used a midwife for prenatal care or as a birth attendant. Women who used a midwife for prenatal care were similar to women who used a physician in most sociodemographic and health history characteristics, as well as their patient–provider communication scores, with the exception of the percentage of White (61.7 ± 5.0 [midwives], 54.3 ± 1.5 [physicians]) and married women (68.7 ± 4.9 [midwives], 60.6 ± 1.5 [physicians]). Women who used a midwife as a birth attendant were similar to women who used a physician as a birth attendant in most characteristics, with the exception of age over 35 years (7.5 ± 1.6 [midwives], 15.7 ± 1.1 [physicians]) and Special Supplemental Nutrition Program for Women, Infants, and Children support (56.8 ± 4.9 [midwives], 50.0 ± 1.6 [physicians]).

**Conclusions:** Women who use midwives are similar to those who use physicians and our findings do not confirm the common perception that midwife patients are a self-selected group of wealthier, more educated women.

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Births in the United States are far more costly than births in other high-income countries ([International Federation of Health Plans, 2013](#)). A crucial difference between the United States and other comparable countries is the use of midwives to provide prenatal and birth care. In the United States, the overwhelming majority of prenatal and birth care is provided by physicians ([Martin, Hamilton, Osterman, Curtin, & Mathews, 2015](#)), whereas in many other high-income countries midwives provide the

majority of such care, particularly for healthy women with uncomplicated pregnancies ([Emons & Luiten, 2001](#)). Since 1975, the percentage of midwife-attended births in the United States has slowly but consistently increased, from less than 1% in 1975 to almost 8% in 2013 ([Martin et al., 2009, 2015](#)). Midwives may be a favorable alternative to physicians; studies from outside the United States have found that midwives provide comparable or better outcomes among low-risk women, at lower costs, than do physicians ([National Collaborating Centre for Women's and Children's Health, 2014](#); [Sandall, Soltani, Gates, Shennan, & Devane, 2016](#)). Because the health care system in the United States differs tremendously from those in other countries, understanding more about the state of midwife care in the United States is important.

Studies of midwife-attended birth outcomes in the United States are scarce. A few studies have found that outcomes of

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midwife-attended, low-risk births are comparable with or better than those of physician-attended, low-risk births (Johantgen et al., 2012). A common perception among the U.S. public is that wealthy, educated women choose midwives (Pergament, 2012). This can lead to the assumption that any favorable outcomes among midwife births are due to self-selection of wealthier and more educated women into midwife care. However, no evidence supports the public perception that midwife patients are wealthier or more educated than physician patients. Several studies have found differences between women who use midwives and women who use physicians in the United States in terms of patient perceptions and attitudes (Callister, 1995; Chute, 1985; Galotti, Pierce, Reimer, & Luckner, 2000; Howell-White, 1997). Three studies assessed differences in sociodemographic characteristics (Galotti et al., 2000; Kozhimannil, Attanasio, Yang, Avery, & Declercq, 2015; Stewart, 1998), two of which found no differences (Galotti et al., 2000; Kozhimannil et al., 2015), and the other found that women with Medicaid were more likely to use midwives for delivery compared with women with private insurance (Stewart, 1998).

In addition to potential differences in sociodemographic characteristics, we do not know whether the quality of care is similar between midwives and physicians in the United States. The Donabedian model, a framework for evaluating quality of health care, includes three main categories: structure of care, care processes, and outcomes of care (Donabedian, 1988). Care processes are made up of two distinct aspects: technical care, which refers to the appropriateness and necessity of the care provided, and interpersonal care, which refers to the interaction between health care professionals and their patients (Campbell, Roland, & Buetow, 2000). Although all aspects of quality are important, interpersonal care processes emerge as being most essential to quality with regard to prenatal care because they play a role in moderating adverse outcomes, and promoting women's involvement in their own care (Sword et al., 2012). The most influential factor on patient assessment of quality of prenatal care is the degree to which women perceive their communication with their provider to be patient centered (Heatley, Watson, Gallois, & Miller, 2015). Women whose prenatal care was provided by a midwife have reported better communication with their provider compared with those who were cared for by other types of providers (Kozhimannil et al., 2015). To date, no studies have assessed an overall measure of patient-provider communication between midwives and physicians.

The objectives of our study were to compare the socio-demographic and health history characteristics as well as the quality of patient-provider communication between women who used a midwife compared with those using a physician for prenatal care and/or as a birth attendant. We hypothesized that women who used midwives for prenatal care or birth did not differ from women who used physicians.

## Materials and Methods

### Data Source

Our analysis was based on the Listening to Mothers III (LTM III) Survey (Harris Interactive, Inc., 2013), which was conducted from July 2011 to June 2012, by The Harris Interactive. The deidentified LTM III dataset is publicly available (Harris Interactive, Inc., 2013). LTM III is a nationally representative, cross-sectional U.S. survey of 2,400 women, aimed at

understanding the experiences and perspectives of childbearing women. The design of LTM III is described in detail elsewhere (Declercq, Sakala, Corry, Applebaum, & Herrlich, 2014). Briefly, potential respondents were drawn from four online panels. An email with a link to the survey invited a sample of women from the various panels to participate. Women were screened for eligibility after proceeding to the survey website, and those who met the eligibility requirements were able to continue to the survey. Women were eligible to participate if they were between 18 and 45 years of age, had given birth between July 1, 2011, and June 30, 2012, in a U.S. hospital to a singleton infant, were able to respond to a survey in English, and that child was still living at the time the survey was conducted. Respondents could choose whether to complete the entire questionnaire in one session, which took about 30 minutes to complete, or in multiple sessions. The data were weighted by key demographic variables, as well as by a propensity score, intended to reflect a respondent's propensity to be online. The survey was designed to be representative of the national population of women giving birth in 2011 and 2012, with the following exclusions: teens younger than 18 and mothers older than 45 years, mothers who had given birth outside of a hospital, women with twin or higher order births and with babies who had died, and women who do not speak English as a primary or secondary language. The LTM III population was found to be comparable with the national population of mothers with singleton hospital births in terms of race/ethnicity, mother's age, parity, education, and mode of birth. This secondary analysis of LTM III data was reviewed and found to be exempt by The Ohio State University's Institutional Review Board.

### Variables of Interest

We used a cross-sectional analysis of the survey data to compare characteristics of women who used midwives for 1) prenatal care or 2) as a birth attendant with those who used a physician for these types of care, respectively. We classified women as using a midwife for prenatal care based on their response to the following question: "Once you became pregnant, which type of caregiver was most directly involved with providing your prenatal care?" We excluded women who reported that they used a professional other than a physician or midwife, such as nurse who is not a midwife or a physician assistant, for prenatal care ( $n = 63$ ). We classified women as using a midwife as a birth attendant based on their response to the following question: "Which type of caregiver was the person who primarily attended the birth of your baby?" We excluded women who were missing a response to this question ( $n = 47$ ) as well as women who reported that they used a professional other than a physician or midwife ( $n = 147$ ).

Additional variables of interest included sociodemographic characteristics, health history characteristics, and score for interpersonal quality of care. Sociodemographic characteristics included age over 35 years (yes vs. no), race ethnicity (non-Hispanic White vs. other), relationship status (married vs. not married), highest educational level attained (college graduate or higher vs. less than college), poverty level (>200% federal poverty level vs. ≤200% poverty level), Medicaid coverage (yes vs. no), and receiving The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) support (yes vs. no). Health history variables included whether this was the woman's first birth (yes vs. no); whether the woman had pre-pregnancy hypertension, based on her report of having used

drugs for high blood pressure during the month before conception (yes vs. no); whether the woman had prepregnancy depression, based on her report of having used drugs for depression during the month before conception (yes vs. no); whether the woman had prepregnancy diabetes; based on her report of having ever been told before her pregnancy that she had type 1 or type 2 diabetes (yes vs. no), and whether the woman reported being told she had gestational diabetes (yes vs. no).

We created a composite measure to assess the patient–provider communication aspect of the interpersonal care processes, based on three evaluative questions regarding aspects of care (how often did you experience...?), with answers ranging from 1 (never) to 4 (always). The evaluative questions provided information regarding women's perception of the quality of patient–provider communication they received (provider spent enough time with you, provider answered all of your questions to your satisfaction, and provider encouraged you to talk about your health questions or concerns). We created one composite measure using the three items (Cronbach's alpha = 0.85).

#### Data Analysis

We report descriptive findings using weighted proportions and means with standard deviations. To test our hypothesis that women who used midwives for prenatal care and as a birth attendant did not differ from women who used a physician, we used equivalence testing to compare the two groups, using the two one-sided test procedure (Barker, Rolka, Rolka, & Brown, 2001). To test for equivalence, we constructed  $(1 - 2\alpha)$  100% CIs for the difference between the two groups and  $\alpha = 0.05$  to test for statistical significance for all analyses. A detailed rationale for the choice of  $(1 - 2\alpha)$  100% CI, instead of  $(1 - \alpha)$  100% CI, appears elsewhere (Barker et al., 2001; Kirkwood & Westlake, 1981; Schuirmann, 1987). Briefly, using a  $(1 - \alpha)$  100% CI, with  $\alpha = 0.05$ , would be excessively conservative given that the probability that the interval falls within the  $\pm\Delta$  limits when the difference in means is  $\Delta$ , can be shown to be  $< \frac{1}{2}\alpha$ , or 0.025. If we use this small  $\alpha$  to construct our CI, we would increase our  $\beta$ , thereby increasing the likelihood of accepting our null hypothesis when the null hypothesis is false. In other words, we would increase our chances of declaring characteristics that are actually equivalent as being inequivalent. If instead we use a  $(1 - 2\alpha)$  100% CI (in our case, 90% CI), then the probability of accepting the borderline case is less than 0.05 (Rani & Pargal, 2004).

To determine the interval within which to consider the two groups to be equal, we performed an extensive literature review before our analyses, to assess whether the two one-sided test method had been used in previous studies of maternity care, and if so what interval was used. No existing studies have used the two one-sided test method in the context of maternity care. A recent review paper found that the magnitude of the association between many of the sociodemographic factors and poor birth outcomes was a relative risk of between 1.1 and 1.5. Therefore, we used an interval of 10% to compare the proportions of each characteristic between women who used a midwife and those who used a physician, because a difference of this magnitude would be substantial enough to have clinical relevance. The groups were considered equivalent if the constructed 90% interval around the point estimate of the proportion is contained within the range of  $-10\%$  to  $+10\%$ . We provide CIs and estimates of the differences to fully describe the magnitude of the estimated equivalence of the two groups.

The interval used for comparing the patient–provider communication score for the two groups was  $(-0.3$  to  $0.3)$ . This composite measure was created using three distinct questions, with four possible values for each. Therefore, a difference of 0.3 would indicate a mean difference of at least 1 point in at least one factor of the composite measure.

As a sensitivity analysis, we compared women who used a midwife for both prenatal care and as a birth attendant with women who used a physician for both prenatal care and as a birth attendant. This analysis was limited to women who used either a midwife or a physician for both prenatal care and as a birth attendant ( $n = 2,162$ ).

Analyses were performed using STATA software (release 12; Stata, StataCorp, College Station, TX). Sample weights were used in all analyses and STATA survey commands were used to account for the complex survey sample design.

## Results

After applying the survey weights, almost 13% of women in the population used a midwife either for prenatal care or as a birth attendant. A total of 10.7% of women reported using a midwife as their primary birth attendant, and 8.4% of women reported using a midwife as their prenatal care provider only. A smaller fraction, 6.4%, reported using a midwife as both a prenatal care provider and a birth attendant (Table 1).

#### Prenatal Care Provider

Women who used a midwife for prenatal care and women who used a physician for prenatal care were similar in most of the sociodemographic characteristics assessed (Table 2). Specifically, the two groups were equivalent in the proportion of women aged 35 years and over, who had graduated from college, who were at 200% of the poverty level or below, who had Medicaid coverage, and who received WIC support. However, a higher proportion of women who used a midwife for prenatal care were non-Hispanic White and married compared with women who used a physician for prenatal care (Figure 1 A).

All of the health history characteristics assessed (proportions experiencing their first birth, who had prepregnancy diabetes, prepregnancy hypertension, prepregnancy depression, and those who had been diagnosed with gestational diabetes) were equivalent between the two groups (Table 2 and Figure 1 B).

The patient–provider communication score among women who used a midwife for prenatal care was  $3.33 \pm 1.44$ , whereas among women who used a physician for prenatal care the score was  $3.28 \pm 1.11$ . These findings provide evidence for equivalence within our a priori chosen definition of no difference (Table 2).

**Table 1**

Type of Main Prenatal Care Provider by Type of Main Birth Attendant, 2012, Weighted Proportions (Unweighted  $n = 2,162$ )

Main Prenatal Care Provider	Main Birth Attendant (%)		
	Midwife	Physician	Total
Midwife	6.4	2.0	8.4
Physician	4.3	87.3	92.1
Total	10.7	89.3	100.0

**Table 2**  
Assessing Equivalences in Sociodemographic Characteristics\*

	Main Prenatal Care Provider		90% CI From Equivalence Testing $\Delta = 10\%$ <sup>†</sup>
	Midwife (Unweighted $n = 193$ ), Proportion (SE)	Physician (Unweighted $n = 2,144$ ), Proportion (SE)	
<b>Sociodemographic characteristics</b>			
Age $\geq 35$ years	10.3 (2.2)	15.8 (1.0)	<b>−9.0 to −1.3</b>
Non-Hispanic White	61.7 (5.0)	54.3 (1.5)	1.4–13.4
Married	68.7 (4.9)	60.6 (1.5)	2.3–13.9
College graduate or higher	31.2 (4.1)	29.6 (1.2)	<b>−4.0 to 7.4</b>
$\leq 200\%$ federal poverty level	40.3 (5.3)	36.8 (1.5)	<b>−2.5 to 9.6</b>
Medicaid coverage	33.9 (5.0)	37.0 (1.5)	<b>−8.9 to 2.8</b>
WIC support	49.4 (5.2)	50.5 (1.5)	<b>−7.3 to 5.0</b>
<b>Health history characteristics</b>			
First birth	29.6 (4.4)	33.0 (1.3)	<b>−9.0 to 2.3</b>
Prepregnancy diabetes	9.4 (4.1)	9.0 (0.9)	<b>−3.2 to 4.0</b>
Prepregnancy hypertension	5.4 (3.0)	8.1 (0.8)	<b>−5.5 to 0.2</b>
Prepregnancy depression	10.4 (3.8)	12.8 (1.1)	<b>−6.2 to 1.4</b>
Gestational diabetes	8.5 (3.4)	11.5 (1.0)	<b>−6.5 to 0.5</b>
<b>Patient–provider communication measures</b>			
Provider spent enough time with patient	3.26 $\pm$ 1.58	3.19 $\pm$ 1.20	<b>−0.08 to 0.22</b>
Provider answered all patient questions	3.36 $\pm$ 1.51	3.39 $\pm$ 1.22	<b>−0.18 to 0.13</b>
Provider encouraged patient to talk about all health concerns	3.36 $\pm$ 1.67	3.26 $\pm$ 1.31	<b>−0.07 to 0.26</b>
Patient–provider communication score <sup>‡</sup> (mean $\pm$ SD)	3.33 $\pm$ 1.44	3.28 $\pm$ 1.11	<b>−0.09 to 0.19</b>

Abbreviations: SD, standard deviation; SE, standard error; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

\* Weighted proportions ( $n = 202$ ; unweighted  $n = 2,337$ ).

<sup>†</sup> The 90% CI for the difference in proportions between women who use midwives for prenatal care and women who do not use midwives for prenatal care. Equivalent characteristics are indicated in bold. Groups are equivalent for a given characteristic if (point estimate of proportion<sub>midwife PNC</sub> – point estimate of proportion<sub>physician PNC</sub>)  $\pm$  1.645 (standard deviation<sub>midwife PNC</sub><sup>2</sup> + standard deviation<sub>physician PNC</sub><sup>2</sup>)<sup>0.5</sup> is contained within the range of  $-10\%$  and  $+10\%$ .

<sup>‡</sup> A composite measure to assess interpersonal care processes, based on three questions regarding aspects of care; the interval used for comparing the interpersonal care score, was  $(-0.30, 0.30)$ .

### Birth Attendant

Few differences in sociodemographic characteristics by type of birth attendant emerged (Table 3). A smaller proportion of women who used a midwife as a birth attendant were aged 35 years and over, and a greater proportion received WIC support compared with women who used a physician as a birth attendant. All of the health history characteristics that we assessed were equivalent between those who used a midwife as a birth attendant and those who used a physician (Figures 2 A, B).

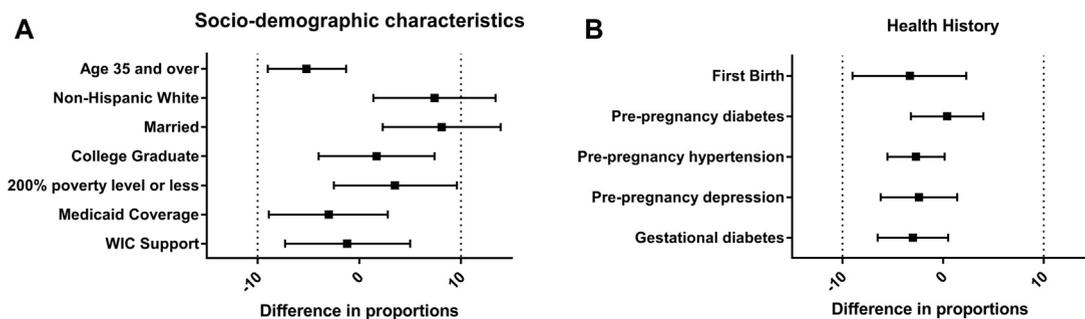
### Prenatal Care and Birth Attendant

When comparing women who used a midwife for both prenatal care and as a birth attendant with women who used a physician for both, additional factors emerged as no longer being equivalent. A smaller proportion of women who used a midwife

for both prenatal care and as a birth attendant were aged 35 years or over, had Medicaid insurance, and had gestational diabetes compared with women who used a physician for both prenatal care and as a birth attendant. A greater proportion of women who used a midwife for both prenatal care and as a birth attendant were non-Hispanic White, married, and had a college degree compared with women who used a physician for both prenatal care and as a birth attendant (Table 4).

### Discussion

Nearly 13% of women in our study had used a midwife as either their main prenatal care provider or as their birth attendant. As we hypothesized, women who used a midwife and women who used a physician for prenatal care were similar in their patient–provider communication aspect of the interpersonal care scores, as well as in most sociodemographic and



**Figure 1.** Equivalence testing of sociodemographic (A) and health history (B) characteristics, comparing women who used a midwife for prenatal care with women who used a physician for prenatal care, weighted analysis. Zero indicates no difference between midwife and physician patients, less than 0 indicates lower proportions among midwife group, and greater than 0 indicates higher proportions among midwife group. Variables that range within  $[-10, 10]$  are considered to be equivalent, variables that cross 10 or  $(-10)$  are considered not to be equivalent.

**Table 3**  
Assessing Equivalences in Sociodemographic Characteristics\*

	Main Birth Attendant		90% CI From Equivalence Testing $\Delta = 10\%$ <sup>†</sup>
	Midwife (n = 221), Proportion (SE)	Physician (n = 1,985), Proportion (SE)	
<b>Sociodemographic characteristics</b>			
Age $\geq$ 35 years	7.5 (1.6)	15.7 (1.1)	-11.4 to -5.0
Non-Hispanic White	55.8 (5.1)	55.0 (1.6)	<b>-5.0 to 6.6</b>
Married	58.4 (5.0)	61.7 (1.6)	<b>-9.0 to 2.4</b>
College graduate or higher	26.8 (3.5)	30.0 (1.2)	<b>-7.9 to 2.4</b>
$\leq$ 200% federal poverty level	34.7 (4.8)	37.5 (1.6)	<b>-8.4 to 2.7</b>
Medicaid coverage	34.8 (5.1)	36.3 (1.6)	<b>-7.0 to 4.1</b>
WIC support	56.8 (4.9)	50.0 (1.6)	1.0–12.6
<b>Health history characteristics</b>			
First birth	32.2 (4.5)	32.5 (1.4)	<b>-5.8 to 5.1</b>
Prepregnancy diabetes	12.6 (4.0)	8.1 (0.9)	<b>0.7–8.3</b>
Prepregnancy hypertension	7.5 (3.2)	7.4 (0.8)	<b>-3.0 to 3.2</b>
Prepregnancy depression	16.5 (4.3)	12.1 (1.1)	<b>0.1–8.7</b>
Gestational diabetes	6.5 (2.6)	12.0 (1.0)	<b>-8.6 to -2.6</b>

Abbreviations: SD, standard deviation; SE, standard error; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

\* Weighted proportions (unweighted n = 2,206).

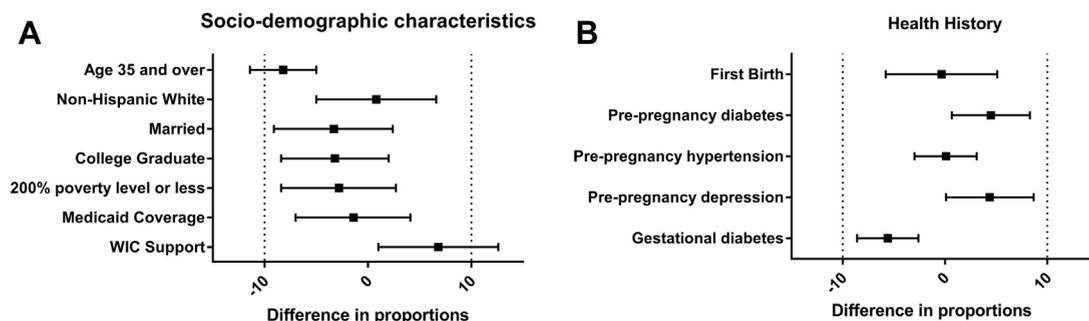
<sup>†</sup> The 90% CI for the difference in proportions between women who use midwives as birth attendants and women who use physicians as birth attendants. Characteristics that are equivalent are marked in bold. The groups are equivalent if (point estimate of proportion<sub>midwife birth</sub> - point estimate of proportion<sub>physician birth</sub>)  $\pm$  1.645(standard deviation<sub>midwife birth</sub><sup>2</sup> + standard deviation<sub>physician birth</sub><sup>2</sup>)<sup>0.5</sup> is contained within the range of -10% and +10%.

health history characteristics, with the exception of race/ethnicity and marital status. Likewise, women who used a midwife as a birth attendant were similar to women who used a physician as a birth attendant in most of the characteristics we assessed, with the exception of a smaller proportion of women over age 35, and a larger proportion of women receiving WIC support among midwife patients.

Most of the data available regarding the prevalence of midwife care in the United States come from vital statistics, which indicate that midwives attend 7.8% of all hospital births, which indicate that midwives attend 7.8% of all hospital births (Martin et al., 2015). We found that midwives attended 10.7% of births. This discrepancy most likely stems from the differences in the way birth attendant was classified in our study compared with vital statistics studies, which are based on birth certificate information. In birth certificates, the only available provider information is that of the final birth attendant. If a birth began with a midwife and was transferred to the care of a physician, the birth certificate will indicate a physician-attended birth. Our study allowed women to report who their main birth attendant was, thereby allowing women to identify a midwife, even in the case where the final birth attendant was a physician. This provides a different insight, which has not been available in prior studies, regarding the care provided throughout labor, rather

than information about the type of provider of the birth attendant. It is also possible that this discrepancy stems in part due to the fact that the survey excluded non-English speakers, as well as women without Internet access.

Women who used a midwife for both prenatal care and as a birth attendant received care consistent with the midwife-led continuity of care model, which describes receiving care from a known midwife during pregnancy, birth, and postpartum (Gray, Taylor, & Newton, 2016). This model of care has been found to lead to fewer interventions with comparable adverse outcomes (or better outcomes) for women and their infants compared with those of women who received other models of care (Begley et al., 2011; Sandall et al., 2016). We found that women in the United States who used a midwife at some point during their pregnancy did not necessarily use midwives for both prenatal care and as a birth attendant. Whereas 6.4% of women used a midwife for both prenatal care and as a birth attendant, 2.0% of women used a midwife for the former and then a physician for the latter. These women may have transferred from the care of a midwife to that of a physician before or during delivery owing to complications or owing to the woman's choice. Interestingly, 4.3% of women used a physician for prenatal care and a midwife as a birth attendant. It is unclear whether these women intended to deliver



**Figure 2.** Equivalence testing of sociodemographic (A) and health history (B) characteristics, comparing women who used a midwife as a birth attendant with women who used a physician as a birth attendant, weighted analysis. Zero indicates no difference between midwife and physician patients, less than 0 indicates lower proportions among midwife group, and greater than 0 indicates higher proportions among midwife group. Variables that range within [-10, 10] are considered to be equivalent, variables that cross 10 or (-10) are considered not to be equivalent.

**Table 4**  
Sociodemographic and Obstetric Characteristics, 2012\*

	Main Prenatal Care Provider and Main Birth attendant				90% CI From Equivalence Testing; Comparing Women Who Used a Midwife for Prenatal Care and Birth and Women Who Used a Physician for Prenatal Care and Birth $\Delta = 10\%$ <sup>†</sup>
	Midwife as Prenatal Care Provider and Birth Attendant (Unweighted $n = 149$ ), Proportion (SE)	Midwife as Prenatal Care Provider and Physician as Birth Attendant (Unweighted $n = 40$ ), Proportion (SE)	Physician as Prenatal Care Provider and Midwife as Birth Attendant (Unweighted $n = 70$ ), Proportion (SE)	Physician as Prenatal Care Provider and Birth Attendant (Unweighted $n = 1,903$ ), Proportion (SE)	
<b>Sociodemographic characteristics</b>					
Age $\geq 35$ years	10.2 (2.5)	9.9 (4.6)	4.1 (1.6)	16.1 (1.1)	–10.2 to –1.6
Non-Hispanic White	64.5 (5.6)	55.1 (10.8)	45.2 (8.8)	55.2 (1.6)	2.5–15.9
Married	66.7 (5.8)	75.4 (8.6)	50.7 (9.0)	61.7 (1.6)	–1.5 to 11.7
College graduate or higher	34.2 (5.0)	22.3 (7.0)	17.9 (4.6)	30.4 (1.3)	–2.8 to 10.5
$\leq 200\%$ federal poverty level	39.2 (6.0)	44.4 (11.3)	25.1 (6.9)	36.9 (1.6)	<b>–4.5 to 9.1</b>
Medicaid coverage	30.8 (5.7)	42.5 (10.9)	37.8 (9.1)	35.9 (1.6)	–11.6 to 1.4
WIC support	47.5 (6.0)	53.2 (10.9)	67.1 (8.3)	49.6 (1.6)	<b>–9.1 to 5.0</b>
<b>Health history characteristics</b>					
First birth	28.8 (5.0)	32.0 (9.6)	31.6 (7.6)	32.5 (1.4)	<b>–10.0 to 2.7</b>
Prepregnancy diabetes	12.1 (5.4)	0.4 (0.4)	14.5 (6.6)	8.2 (0.9)	<b>–4.7 to 2.0</b>
Prepregnancy hypertension	6.1 (3.9)	2.4 (1.8)	10.3 (5.9)	7.4 (0.8)	<b>–2.8 to 4.7</b>
Prepregnancy depression	12.3 (4.9)	3.7 (3.7)	24.0 (8.1)	12.2 (1.1)	<b>–0.6 to 8.4</b>
Gestational diabetes	2.6 (1.0)	27.1 (11.5)	12.8 (6.2)	11.8 (1.0)	–11.6 to –6.7
Interpersonal Care score (mean $\pm$ SD)	3.35 $\pm$ 1.58	3.30 $\pm$ 0.98	2.97 $\pm$ 1.32	3.31 $\pm$ 1.06	<b>–0.12 to 0.19</b>

Abbreviations: SD, standard deviation; SE, standard error; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

\* Weighted proportions (unweighted  $n = 2,162$ ).

<sup>†</sup> 90% confidence interval for the difference in proportions between women who use midwives as prenatal care providers and birth attendants and women who use physicians as prenatal care providers and birth attendants. Characteristics that are equivalent are marked in bold. The groups are equivalent if (point estimate of  $\text{proportion}_{\text{midwife}} - \text{point estimate of proportion}_{\text{physician}} \pm 1.645 (\text{standard deviation}_{\text{midwife}} + \text{standard deviation}_{\text{physician}})^{0.5}$ ) is contained within the range of  $-10\%$  and  $+10\%$ .

with a midwife, whether they delivered with a midwife who happened to be on call, or whether the physician and midwife worked together within one clinic. These findings highlight the need for distinct assessments of women who use a midwife for prenatal care and women who use a midwife as a birth attendant, because women who used a midwife as a birth attendant did not necessarily use a midwife for prenatal care. To date, many studies have focused on birth attendant provider type when comparing birth outcomes of “midwife births” (Davis, Riedmann, Sapiro, Minogue, & Kazer, 1994; Declercq, 2015; Sze, Ciarleglio, & Hobbs, 2008), and our study highlights the importance of understanding the detailed nuances of each group of women, with their unique progression of care.

There are two common opposing public perceptions regarding women who choose midwives as birth attendants. One perception is that women who are wealthy and highly educated choose to use a midwife more often than lower income, less educated women (Pergament, 2012). The opposite perception is that as midwives provide less costly care, it must be lower quality care, and, therefore, midwife care is an option that is used mainly for women who cannot afford the care of an expert (DeJoy, 2010). However, few studies have assessed whether women who use midwives differ from those who use physicians. One small study of 88 women found that women who choose midwives do not differ from women who use other care providers in terms of their education, income, experience with childbirth, age, religious affiliation, or birth order (Galotti et al., 2000). In contrast, a larger study using birth certificate data found that women with Medicaid were 3.5 times more likely to use a certified nurse-midwife compared with those with private insurance (Stewart, 1998). This study has limitations: first, the data come from a single state and may not reflect national trends, and second, the data are from 1990, and may not reflect the current state of

midwife care. A previous analysis of the LTM III survey data assessed differences in several sociodemographic characteristics between women who used a midwife for prenatal care and those who used other providers and did not find differences in the variables that they assessed (Kozhimannil et al., 2015). However, this analysis did not assess differences in health history characteristics and did not compare characteristics by birth attendant type. In addition, our study was the first to assess multiple socioeconomic variables, including education level, poverty level, Medicaid coverage, and WIC support. It is important to note that our study did not differentiate between women who chose to use a midwife and women who were assigned a midwife.

Our finding that women who used a midwife for prenatal care did not differ in any of the measures of socioeconomic status from those who used a physician for prenatal care suggests that women who use midwives for prenatal care are not wealthier or more highly educated. However, when we assessed differences in socioeconomic factors between women who used a midwife as a birth attendant and those who used a physician, we found that, although there were no differences in poverty, education level, or Medicaid coverage, women who used a midwife as a birth attendant were more likely to report receiving WIC support. Because this difference is found only for WIC and not the other indicators of socioeconomic status that we assessed, this may stem from a difference in the care that women receive while on WIC rather than a difference in socioeconomic status specifically. When we compared women who used a midwife for both prenatal care and birth with women who used a physician for both prenatal care and birth, we found additional differences in sociodemographic characteristics, including race, marital status, college education, and Medicaid. This may indicate that there are some underlying differences between these two distinct groups of women that are masked when we categorize women based only

on their prenatal care provider or birth attendant. This finding further highlights the need for future research to distinguish between provider types during prenatal care and as birth attendants.

Finally, we assessed a measure of interpersonal aspects of prenatal care, which indicated how well providers communicated with their patients. A prior analysis of the LTM III survey data assessed aspects of the interpersonal quality of care individually and found that women who used a midwife for prenatal care had a lower odds of reporting not feeling encouraged to discuss their concerns (Kozhimannil et al., 2015). Our study builds on the previous work as our analysis combines multiple factors of interpersonal care into one composite measure, using a continuous score for each component included, to provide an overall patient-provider communication score. We found no differences between women who used midwives and those who used physicians for prenatal care, indicating that the perceived communication between providers and patients was similar with midwives and physicians. A study conducted in Canada found that women with low-risk pregnancies in the care of midwives had higher satisfaction scores compared with those in the care of physicians (Harvey, Rach, Stainton, Jarrell, & Brant, 2002). However, in that study, women who requested midwife care were recruited to the study, and assigned to either physician or midwife care. Thus, the lower satisfaction scores could have resulted from women's disappointment with being assigned to the physician group rather than the quality of the care received.

Our study strengths include the use of a nationally representative survey of postpartum women, and the availability of provider type classifications for prenatal care and the main birth attendant. Study limitations relate mainly to the use of secondary data, which limited the variables available. In addition, the use of a cross-sectional survey, administered at one time point after delivery could lead to recall bias. For most of the variables assessed, such as age, college education, and birth order, the likelihood of having recall bias are slight. A series of validation studies examined the accuracy of women's recall and reporting about pregnancy and childbirth for the survey, and they support the validity of data reported by mothers. Despite this validation, the variable that was most at risk of having recall bias was the interpersonal quality of care score. It is possible that women who experienced complications during their pregnancy may have remembered their prenatal care less favorably than women who had no complications during pregnancy. However, if recall bias did occur, we would expect it to be nondifferential as to provider type, because the biased reports would stem from all women who experienced complications during pregnancy, regardless of the type of provider they used. We do not have information regarding why 2.0% of women transferred from a midwife during prenatal care to using a physician as a birth attendant, and whether the transfer was due to medical complications or to women's choice. We also do not have additional information regarding why women transferred from a physician during prenatal care to a midwife as a birth attendant. Finally, the wording of the questions does not allow us to identify women whose care was transferred from a midwife to a physician (or vice versa) during the prenatal or the perinatal period. This information would be beneficial in helping to understand the process of care for women who use midwives for prenatal care.

#### Implications for Practice and/or Policy

Our findings provide the first step in attempting to assess whether midwife care should be incorporated more routinely in

the U.S. maternity health care system. Our study indicates that, on a national level, women who use midwives are similar to women who use physicians, and we do not find that women who use midwives are healthier and wealthier compared with women who use physicians. However, there may still be socio-demographic differences between women who use midwives versus physicians when assessing these factors at a clinic level. Future studies are necessary to determine whether birth outcomes differ by provider type, to determine whether midwifery care can be incorporated more commonly in the U.S. maternity health care system.

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