

# Travel in Pregnancy: The Impact of Zika

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## Abstract

**OBJECTIVE:** The purpose of our study was to examine current travel patterns and behaviors of pregnant women. **METHODS:** We developed a questionnaire adapted from a publication by Kingman and Economides to examine the travel behavior of women during pregnancy in a suburban community. **RESULTS:** A convenience sample of 102 patients completed the travel questionnaire. Forty-six (45.1%) traveled during the current pregnancy. Thirty-one (30.4%) traveled more than once. A total of 257 trips were taken by the participants: 113 (43.9%) trips were taken in the first trimester, 87 (33.8%) in the second and 59 (22.9%) in the third trimester. Trip length ranged from 2-90 days with a mean of 11 days. Reasons for travel included: 193 (75.1%) for leisure, 37 (14.4%) work related, 10 (3.9%) trips for emergencies, and 3 (0.4%) trips for relocation. Eighteen women (17.6%) traveled internationally. One (1.0%) woman was hospitalized while traveling. Manner of travel was as follows: car 167 (65.0%), plane 67 (26.1%), train 13 (5.1) %, bus 10 (3.9%) and none by boat. Nineteen (41.3%) women sought travel advice. Thirteen (68.4%) asked for advice from a doctor, 2 (10.5%) from a nurse, 2 (10.5%) from family and/or friends, 1 (5.3%) from the Internet and 1 (5.3%) from a travel book. Seventeen (37%), traveled without suitable insurance. **DISCUSSION:** Travel rates during pregnancy have remained surprisingly stable over the past 60 years. Almost 50% of our cohort traveled during pregnancy, and the majority did not seek advice prior to travel. In light of new infectious disease threats, obstetric practice and advice needs reassessment. The majority of travel during pregnancy remains optional. Improved patient education and consultations prior to travel could decrease health risks.

## Keywords

Travel, Pregnancy, Zika

## 1. Introduction

The modern obstetric patient is mobile. Within hours, a pregnant woman and

her fetus can be transported almost anywhere in the world. While travel in pregnancy is generally considered safe, not all destinations are. The recent Ebola and Zika viral outbreaks serve as a stark reminder. While Ebola was largely limited to Africa, Zika's spread to the United States and effect on the fetus sparked an entirely new chapter in travel medicine. The current epidemic of the Zika virus was first reported in Brazil in April 2015 and by early 2016 the World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern [1]. The Centers for Disease Control and Prevention (CDC) recommended that all pregnant women consider postponing travel to 76 countries where viral transmission is ongoing [2]. Several popular vacation destinations were included in the list of areas to avoid, and almost overnight, routine travel became something to fear for pregnant women and their partners as sexual transmission has now been documented as well [3] [4].

Women were suddenly asking their prenatal care providers about travel during pregnancy. While information regarding travel and pregnancy is easily found on the Internet, the scientific evidence is limited with few peer-reviewed publications available. The purpose of our study was to examine current travel patterns and behaviors of pregnant women and compare this with prior studies.

## 2. Methods

A literature search utilizing the search terms "travel and pregnancy" and a PubMed search for "travel patterns in pregnancy" were performed. Given the heterogeneity of the available studies we defined travel as an overnight stay away from home that took the patient away from her obstetric provider. Pregnant women receiving prenatal care at our center were invited to participate at their convenience. After 36 weeks of gestation, participating subjects responded to a questionnaire about their travel experience during the current pregnancy. The questionnaire was adapted from a publication by Kingman and Economides and used with the authors' permission [5]. Demographic information was obtained. Questions were asked about trimester of travel, route of travel, duration of stay, purpose of travel, destination (international or domestic) and any medical or obstetrical complications experienced during travel.

Descriptive statistics were used to compare the cohorts. Frequency and percentage were used to summarize the discrete variables. Chi-square test was used to compare the proportions between groups. A *p*-value of or less than 0.05 was used to indicate statistical significance. An online application was used for data analysis [6].

Given the new public health concerns facing pregnant women and those planning pregnancy we chose to examine the travel behavior of women during pregnancy in our suburban New Jersey population and compare this behavior with prior studies. This study was approved by the Meridian Health Institutional Review Board (IRB).

### 3. Results

A review of the literature identified less than 50 peer reviewed articles about travel and pregnancy and most of these studies focused on air travel and/or thromboembolism, and one compared self-reported travel distance to GPS data [7].

Beach (1947) examined the subject of travel in pregnancy to determine the dangers [8]. Travel was defined as a trip of greater than 100 miles. He studied 681 women at the Chicago Lying-In Hospital over a period of 2.5 months after their deliveries. He reported that 309 of 681 (45.4%) patients had traveled. He wrote, "The greatest part of the traveling was done by automobile and train, very little by bus." Three patients went on boat trips. Less than 1% of travel was by plane.

Guilbeau *et al.* (1953) wrote, "Most obstetricians have little occasion to observe the effects of travel on their patients, since the general population as a whole is more or less static, and parents are usually settled permanently by the time a pregnancy is considered" [9]. They identified 1917 women who traveled a minimum of 300 miles during pregnancy between 1951-1953 and received care at two Air Force Hospitals in Alabama and Mississippi. Of this cohort, 1526 (79.6%) traveled by automobile, 244 (12.8%) by train, and 147 (7.7%) by airplane.

Freeman *et al.* (2004) asked the question "Does air travel affect pregnancy outcome?" [10]. They studied 222 women over a 6 month period in the District of Columbia. One hundred eighteen (53.2%) flew at least once during pregnancy. No adverse outcomes were noted in pregnancies reaching 20 weeks gestation.

Chibber (2006) conducted a retrospective analysis of air travel in 992 of Saudi Arabian women and reported that 546 (55.0%) traveled by plane at least once during pregnancy [11]. Their data suggested a three week shorter gestation in those women who traveled via airplane.

In our current survey, 102 pregnant women agreed to participate. Their mean and median age was 28 with a range of 17 - 44 years. Parity ranged from 0 to 8 with a median of 1 (**Table 1**). Forty-six (45.1%) women reported traveling during the current pregnancy. Thirty-one (30.4%) traveled more than once. A total of 257 trips were taken by the participants: 113 (43.9%) trips were taken in the first trimester, 87 (33.8%) in the second and 59 (22.9%) in the third trimester (**Table 2**). Mean trip length ranged from 2 - 90 days with a mean of 11 days. Reasons for travel were as follows: 193 (75.1%) for vacation and visiting family, 37 (14.4%) trips related to work, 10 (3.9%) trips were for emergencies, and 3 (0.4%) trips involved relocation. Eighteen women (17.6%) traveled outside the United States. One (1.0%) woman was hospitalized for preterm labor (and discharged undelivered) while traveling. Manner of travel was as follows: car 167 (65.0%), plane 67 (26.1%), train 13 (5.1%), bus 10 (3.9%) and none by boat. Nineteen (41.3%) women sought travel advice. Of those, thirteen (68.4%) asked for advice from a doctor, 2 (10.5%) from a nurse, 2 (10.5%) from family and/or friends, 1 (5.3%) from the Internet and 1 (5.3%) from a travel book. A disturbing number of women, 17 (37%), traveled without suitable insurance. A comparison of travel by cohort is seen in **Table 3**.

**Table 1.** Patient demographics.

	Mean	Range
Age (Years)	28.2	17 - 44
Gravidity	3.2	1 - 12
Parity	1.8	0 - 8
Commute (miles)	17.9	0 - 100
Commute (minutes)	41.9	0 - 300
Length of travel (days)	9.6	2 - 90

**Table 2.** Travel by trimester.

	Patients who Travelled (n = 102)	Trips taken (n = 257)
1st Trimester	34.3%	43.9% (113)
2nd Trimester	30.0%	33.8% (87)
3rd Trimester	21.0%	22.9% (59)

**Table 3.** Comparison of cohorts.

Author	Year	Travel During Pregnancy	Percent	<i>p</i> -value
Beach	1947	309/681	45.4%	0.96
Freeman	2004	118/222	53.2%	0.18
Chibber	2006	546/992	55.0%	0.06
Curcio <i>et al.</i>	2016	46/102	45.1%	-

## 4. Discussion

Travel information for women during pregnancy and their healthcare providers is readily available from American College of Obstetricians [12] [13] [14], the CDC [15] and Gynecologists, the Center for Disease Control and the Royal College of Obstetricians and Gynaecologists [16]. There are recommendations regarding immunizations for women who travel during pregnancy [17] [18] [19]. There are articles looking at the risks to pregnant women by travel type such as thromboembolic disease [20] and radiation exposure while flying [21] [22]. Certain travel behaviors such as wilderness travel [23], scuba diving [24], and the impact of altitude [25] have been examined. Specific pregnancy conditions such as placental abruption [26] [27], preterm delivery [28], and labor far from home [29] have also been studied. Recommendations exist regarding air [30] and sea travel [31].

Despite the extensive literature on the effects of travel on pregnancy, there has been little study of the frequency and extent of travel in women during pregnancy. The recent Ebola and Zika viral outbreaks have complicated the issue of travel for everyone. The obstetric provider must be able to answer travel questions which have become an important part of prenatal care in response to the

spread of Zika virus across the hemisphere. Thus, our goal was to study the travel patterns and behavior of women during pregnancy and compare these to prior studies with the hope of improving obstetric advice and counselling prior to travel.

Travel in pregnancy appears to have remained surprisingly stable over the past 60 years. About half of pregnant women travel and most travels are uncomplicated. However, travel to certain geographies may increase the risk of infectious disease, especially during pregnancy. We have seen an increase in risk from serious endemic outbreaks across the globe including Ebola virus, Zika virus, Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome Coronavirus (MERS-CoV), Dengue virus, Chikungunya virus, Asian influenza virus and a multitude of other viral, bacterial, and parasitic protozoal pathogens.

Couples planning a pregnancy will need to be counselled on both the risks of travel and any potential threat or hazard that waits at their destination. A complete medical history must now include travel history for the patient and partner and perhaps other family members as well.

The high prevalence of travel in our study (45.1%) is consistent with the findings of Beach, Freeman *et al.*, and Chibber *et al.* (**Table 3**). Comparison of these studies suggests that the rate of travel during pregnancy has remained stable since the 1940s. In our cohort, the majority of travel during pregnancy was for leisure. This is consistent with the general pattern of American travel overall [32]. Travel occurred in all trimesters. As expected, travel during the third trimester was less prevalent and of shorter duration. Many women made multiple trips during pregnancy and most traveled via automobile and airplane. Complications were rare.

The most concerning finding in the current study was that almost 60% of women traveling during pregnancy did not seek advice prior to travel, although, almost 80% of those who did receive advice, did so from their obstetric provider or nurse, which is encouraging. The majority of travel during pregnancy remains optional, involving family visits or vacation, for which a pre-trip consultation could significantly impact the health risks to the mother and baby.

We recommend:

- 1) Patients be asked early in prenatal care about any travel plans during pregnancy.
- 2) Discuss safe travel practices as part of routine prenatal education.
- 3) Medical records should be readily available to all patients (as illness while traveling is not predictable).
- 4) Healthcare providers be familiar with CDC travel warnings so they can advise women who plan to travel and provide up to date information and links to appropriate websites.
- 5) Patients notify their obstetric providers if they become ill during travel.
- 6) Patients notify their obstetric provider of an upcoming office visit due to illness. Offices need to be prepared for these illness visits in order to provide for a safe office environment for all patients. Use of designated waiting rooms and

examination rooms may help limit the exposure and spread of communicable disease in the office setting.

7) Providing information and links to websites to patients planning long distance travel in which prolonged periods of immobilization are anticipated.

In summary, travel during pregnancy has been common for decades however, only recently have new infectious threats triggered a reassessment of obstetric practice and advice. The changing global environment now mandates that we look at the evolving infectious and non-infectious risks of travel. In the near future, the safety of autonomous vehicles, underwater and space travel will need to be examined thoroughly as the modern cohort of women continues to travel during pregnancy and ventures further and further away from home and their obstetric providers.

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