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RISK FACTORS ASSOCIATED WITH
FALLS DURING PREGNANCY

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ABSTRACT

Background: Though falls are a major source of trauma during pregnancy, the prevalence rate of these occurrences is unknown. A population based cohort study to determine risk factors related to falls during pregnancy including injury and medical attention was conducted.

Methods: Birth certificate data identified women 20 years of age or older who delivered a child within the previous eight weeks. Data were collected via phone, internet, and mail surveys.

Three outcomes were investigated: a fall during pregnancy, a serious fall during pregnancy, and a fall at work during pregnancy. Adjusted odds ratios and confidence intervals were calculated.

Results: Of the 3997 participants, 1070 fell at least once (26.8%) and 272 (6.8%) experienced a serious fall during pregnancy. Younger women aged 20-24 had a higher odds ratio for fall of 1.9 (95% confidence interval of 1.4, 2.7). In addition, women with higher risk for fall were those who were less educated, had no permanent partner, cared for toddlers, or had gestational diabetes. Of the women who fell, women with vision or balance problems prior to pregnancy were more likely to experience a serious fall and college graduates were less likely to experience a serious fall. Falls associated with feeling ill or those occurring after 2:30 p.m. were more likely to result in serious falls. The majority of falls (78.7%) were associated with stairs, uneven or slippery floors, hurrying, or carrying an object or child. Of the 2847 employed women, 26.6% (757) fell during their pregnancy and 6.3% (179) fell at work. Occupations with the highest rate of work falls were service and teaching/childcare. Walking on slippery floors, hurrying, or carrying an object occurred in 66.3% of work falls.

Conclusions: Over one in four women fall during pregnancy, a rate comparable with the elderly. Guidelines for counseling obstetric patients are recommended. The service industry

should be evaluated for risk reduction. Pregnant workers should be counseled on reducing factors which contribute to falls.

Keywords: fall, injury, pregnancy, birth certificates

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CHAPTER 1: INTRODUCTION

BACKGROUND

Falls during pregnancy

Falls during pregnancy are a common cause of injury. It is estimated accidental injury occurs in 6-7% of all pregnancies and that falls are the most common cause of minor injury during pregnancy.¹⁻⁴ A study of 85 pregnant women who suffered trauma demonstrated that 25.9% (22/85) of the trauma injuries were a result of falls with 12 of the 22 injuries due to falling from the same level and 10 from a height.⁵ In a retrospective review of medical records, the incidence of trauma in the third trimester was found to be 24 per 1000 deliveries (328 /13,416).⁶ Of the 328 women, 84 met the criteria for major abdominal trauma (incidence of 0.62/1000). Falls (39%) were the most common trauma, followed by motor vehicle accidents (35%), and assaults (26%). In an analysis of 53 instances of trauma during pregnancy, 24.5% (13) were from falls, and one of these thirteen was associated with a fetal death.⁷ In a review of 103 cases of blunt abdominal trauma during pregnancy, falls were the cause of 29% of the maternal injuries.⁸ In a 1997 review article, it was estimated that approximately 17% of all trauma during pregnancy results from falls.⁹ In another study, fractures and sprains accounted for 25% of injuries causing hospitalization in pregnant women.¹⁰ In addition to fractures and sprains/strains, more serious injury can result from a fall including head injuries, rupture of internal organs (particularly the spleen), placental separation, rupture of the uterus and membranes, pelvic fracture, and occasionally fetal injuries and death.^{3,7,11,12} A fall during pregnancy is most likely to result in maternal rather than fetal injury and death, but the gravid uterus and its contents, especially in

late pregnancy, are susceptible to even noncatastrophic trauma because the uterus is rather immobile and extends beyond the pelvic confines.⁸

Physiology of Pregnancy, Balance, and Falls

Physiological changes occur during pregnancy that may increase the risk of fall and injury. On the average, during pregnancy, the woman will gain 24 pounds.¹³ The majority of mass gained during pregnancy is retained in the trunk region, attributable to the weight of the products of conception (fetus, membranes, and amniotic fluid) and the hypertrophy of the uterus and breasts.^{13,14} During the first trimester, the average gain is only 2 pounds, with an average gain of 22 pounds during the second and third trimesters.^{13,15} The increase in weight of the uterus changes from an organ weighing 70 g to approximately 1200 g.¹⁶ The uterus grows in length from the fundus to cervix from 7 cm to 35 cm in the full-term pregnant women.¹⁷ The volume capacity of the uterus increases 500 to 1000 times, containing as much as 10 liters or more by the end of the pregnancy.^{13,17} This enlargement of the uterus is not symmetrical. By the end of the third month, the uterus is too large to remain wholly within the pelvis and as it contacts the abdominal wall, displacing internal organs, it rises and rotates to a longitudinal axis corresponding to an extension of the axis of the pelvic inlet.¹³

During the gestational period, other physiologic changes to the ligaments and joints may affect balance. Ligaments of the sacroiliac joints and pubic symphysis soften, leading to a 3-4 mm separation of the joints, which may cause a instability and unsteadiness.¹⁶ Decreased kinesthetic sensation and diminished coordination result from laxity in both ligaments and joints and from an increase in interstitial fluid.¹⁸ Increased pronation of the foot, joint laxity of the first metatarsophalangeal joint, and mobility of the midtarsal joint is observed in pregnant women and

may influence the mechanical loading by the lower extremities and back.¹⁴ The changes in foot mobility also may affect the postural adjustment strategies utilized during pregnancy, and may cause risk for loss of balance.¹⁴ During pregnancy, women experience a change in foot mechanics and demonstrate a change in gait pattern with different load distribution on their feet.¹⁹ These changes are likely due to an 8.5% increase in foot volume that occurs between 13 and 35 weeks of gestation (due to increased accumulation of interstitial fluid and fat in the foot), increased joint laxity in the foot, and increased weight gain overall.¹⁹

The protruding abdomen and loosening of pelvic ligaments causes a woman's center of gravity to shift and results in progressive lordosis of the spine.^{16,19} A woman's center of gravity shifts inferiorly and posteriorly towards the lumbar spine due to the enlarging uterus.¹⁸ During the advanced stages of pregnancy, the abdominal muscles are lengthened, which may reduce their effectiveness for postural adjustments and back support¹⁴. Flexion of the neck, downward movement of the shoulders and resulting increased traction on the ulnar and median nerves, may cause decreased ability to protect the abdomen from a fall.¹⁶ Biomechanical changes also occur during pregnancy that may increase the risk of fall and injury and have been described by McNitt-Gray.¹⁴ The mass gain centered in the trunk region will have the greatest influence on the mechanical loading experienced during pregnancy.¹⁴ At 20 weeks the uterus begins to protrude from the pelvis limiting the range of hip joint motion. This reduction is expected to contribute to changes in the joint kinetics of controlling the additional mass acquired in the trunk region.

The loosening of the connective tissues in the pelvis, feet, and knees, in combination with the changes in mechanical loading may produce serious mechanical consequences and these changes cause continually readjustment of her body alignment and balance.^{13,14} Thus, falls may result from fatigue, fainting spells, protuberant abdomen, enlarging uterus, unsteadiness caused by looseness of the pelvic joints, possible pain and neuromuscular dysfunction and vascular occlusion from pelvic pressure, alterations in gait and balance, and a generalized decrease in neuromuscular control.^{1,6,7,18,20-22} Affected are both the pregnant woman's maneuverability as well as her ability to react to approaching dangers.^{4,7} These changes may not only increase the risk of a fall but also increase the likelihood of ligament strains and bony trauma, such as ankle or wrist fractures during a fall.¹⁸ The gravida grows clumsier as pregnancy progresses, as indicated by the increasing incidence of minor trauma per trimester - 8.8%, 39.6%, and 51.8%, respectively.^{21,23} To further complicate the hazards of falls during pregnancy, women frequently change the type of shoe and heel heights, irrespective of their body changes which further threatens their stability. As a result of these physiologic changes, she is at greatest risk for fall and injury during her pregnancy than at any other time until her elderly years.

Work and Falls

In 1994, the three industries with the number of nonfatal occupational injuries and illnesses (reported in thousands) involving days away from work differed by gender; for women these were service (303.2), wholesale/retail trade (171.6) and transportation and public utilities (149.2), and for men these were manufacturing (430.8), retail trade (220.3) and construction (213.3).²⁴ Women demonstrated elevated relative risks of occupational injuries and illnesses relative to the proportion of all hours worked for operators, fabricators and laborers (RR=1.9)

and the service occupations (RR=1.8). Hence, much of what we currently know about falls and injuries is limited to jobs where men are more heavily represented such as in manufacturing and construction; yet little information is known about the hazards related to falls in the service industries and wholesale and retail trade where women are heavily represented. A study in Great Britain and Sweden showed that among working women, slips, trips and falls (STF) accounted for 73% of reported major injuries.²⁵ In a sub-analysis using a case- referent design, the significant risk factor included age, working in service occupations, not wearing glasses, and the use of medications.²⁵

PRELIMINARY RESEARCH

Prior to starting this research study, we conducted two pilot studies. First, a one-page survey was mailed to female personnel at the University of Cincinnati (UC). The purpose of the study was to gather baseline statistics and information regarding possible risk factors for falls to pregnant workers. The 695 subjects were employed primarily in teaching, office, clerical, and other administrative support activities at UC. This pilot investigation demonstrated the following: 1) the rate of falls for women during pregnancy is as high as one in five; 2) for office workers, approximately 3% of these falls will occur at work; 3) those women falling at work are more than twice as likely to report an injury requiring medical attention; and 4) the risk factors related to falls in the workplace are different from those occurring elsewhere.

In addition to the above study, we conducted a longitudinal pilot study to investigate postural stability during pregnancy. Ten pregnant women were recruited during their first or second trimester and followed through pregnancy to postpartum. The goal was to collect three postural sway measurements – at enrollment (first or second trimester), third trimester, and at 6-12 weeks

postpartum. The results demonstrated increased sway – indicative of poorer postural stability – with increased gestation and at 6-10 weeks postpartum. This decrease in postural stability may indicate a susceptibility of fall and injury for pregnant women, especially when performing activities that impose relatively higher demands on central nervous system processing of postural balance such as work tasks.

SIGNIFICANCE

Overall, 70.3% percent of mothers 20 years of age and older report employment during their pregnancy; 88.1% reported employment with their first child, 67.2% with their second and 51.4% with the third or later child²⁴. The National Bureau Of Labor Statistics 1996 report showed that falls accounted for approximately 21% of all non-fatal injuries in the workplace and 81.1% of these non fatal injuries occurred to working men and women in their reproductive years between age 16 and 44²⁶. Of a total of 330,913 yearly non-fatal falls, 39% (n=131,751) occur to women²⁴. There are no statistics, however, related to falls occurring to pregnant workers even though women represent approximately 43.2% of the civilian labor force or 56.6 million workers²⁴. The estimated cost of falls occurring during pregnancy is high. Women, on the average, earn approximately \$96/day and, using a median number of days off work of seven for the 131,751 non-fatal falls to women, the cost just in lost wages is \$88.5 million per year^{24,27,28}. Add to these lost wages, compensation claims and medical costs then the added cost for falls to women may be better estimated between \$100 to \$150 million per year. Thus, for the employer, prevention of falls will result in decreased cost due to less sick leave, lower workers' compensation cost, and lowering of the indirect costs of coverage and lost production. For the woman worker, reducing the number of falls during pregnancy will prevent lost wages, decrease

medical expenses and, most importantly, reduce the psychological harm and emotional burden related to the fall and injuries for both her and her offspring. The Bureau of Labor Statistics for 1996 indicated that the high risk industries for falls to be service (26%) followed by retail trade 20%²⁸. Unfortunately, these data do not distinguish between genders, and no data can be found regarding falls and injuries resulting from falls for the pregnant employee. This lack of information for such a large susceptible subpopulation further highlights the need for the proposed study.

PURPOSE, HYPOTHESES, AND SPECIFIC AIMS

The overall purpose of this study was to determine the prevalence rates of falls for the pregnant worker, to identify risk factors related to falls, and to evaluate the risk factors leading to medical injuries to the mother and fetus as a result of falls occurring at the workplace compared to elsewhere. There were two study hypotheses: 1. The rate of falls among those in health service and wholesale and retail trade compared to all other occupational sectors will be significantly higher. 2. The rate and severity of medical injuries will be significantly greater for those pregnant women falling while on the job compared to those falling elsewhere. In order to test these hypotheses, the following four specific aims were proposed prior to the study:

1. Identify from birth certificates a cohort of women who had delivered within four to six weeks in Hamilton County.
2. Collect information related to falls and injuries occurring during pregnancy using telephone interviews and internet and mailed questionnaires, regarding employment risk factors (such as shoe wear, job tasks, job stress, lighting conditions, condition of floors or

walking surfaces), and non-employment risk factors (such as weight gain and previous pregnancies).

3. Identify the occupations with the highest rate of falls and associated medical injuries.
4. Determine the occupational and non-occupational factors related to falls and maternal/fetal injuries resulting from falls.

LOCATION OF STUDY POPULATION

The subject population was identified from births occurring to adult women (age 20 or over) in Hamilton County, Ohio over a six month period from December 1, 1999 through June 1, 2000. Hamilton County includes births in 49 political jurisdictions with a total population for the county at 866,228.²⁹ The population of Hamilton County is characterized by 76% Caucasian, 22% African-Americans, and 2% other.²⁹ The community is stable with only a three to four percent in and out migration. In 1993 the median Hamilton County household income was \$33,357.²⁹ Hamilton County has comparable demographic characteristics to the nation as the estimated 1997 median national household income was \$37,000.²⁹ The estimated national racial distribution in 1998 was 72.2% Caucasian, 12.1% African Americans, and 15.2% other.³⁰ The age distribution of the mothers giving birth in Hamilton County versus the nation for 1996 are also comparable as follows: 19 years or younger, 14.5% versus 12.9%; 20-24 years, 21.8% versus 24.4%; 25-29 years 27.2% versus 27.5%; 30-34 years, 24.4% versus 23.1%; 35-39 years 10.3% versus 10.3%; 40 years and older, 2.3% versus 1.8%.^{30,31} The birth rate for the nation was 14.7 per 1000 total population³¹, and for Hamilton County it was 14.1.⁵⁴

COMMUNITY PARTNERSHIP

During this study, the research team worked closely with members of the scientific community and Hamilton County public health officials to ensure the success of the study and its execution. Ms. Kathy Lordo, the Director of Community Health Information Services, Hamilton County General Health District, was a consultant for this project and provided considerable input into the design of this project in terms of access to birth certificate data. During the study's execution, she served as a resource for facilitating data access and flow. In addition, a Scientific and Community Fall Advisory Board (SCFAB) was established and assisted in study oversight and providing a framework to fulfill the long term goal of this study, i.e., the reduction of falls and injuries during pregnancy. In order to facilitate this long term goal, members of the medical community and public officials need to be part of the process from the beginning. The SCFAB provided insight into design issues, questionnaire development, and review of results in order to begin long term community planning for fall reduction.

The Hamilton County General Health District has an ongoing injury surveillance program that began in 1994. The Hamilton County Injury Surveillance System is a partnership of all hospitals in Hamilton County, and the surveillance system reports on the most severe injuries, those resulting in emergency room visits, hospitalization, or death. Mr. Timothy Ingram, Health Commissioner, was instrumental in assisting with access to the birth certificate database. Two representatives of the Injury Surveillance System (Ingram and Luchette) were members of the advisory board, along with an occupational medicine physician (Freeman), and an obstetrician who specializes in high risk pregnancy (Miodovnik). The members were as follows: Timothy Ingram, Health Commissioner for the Hamilton County General Health District, Ohio; Fred Luchette, M.D., at the time of the study was Chairman of the Hamilton County Injury

Surveillance Medical Advisory Board and previous Associate Professor of Surgery, Division of Trauma/Critical Care, University of Cincinnati at the time of the study; Andrew Freeman, M.D., M.S., Assistant Professor of Occupational Medicine; Menachem Miodovnik, M.D., at the time of the study was Professor of Obstetrics and Gynecology, University of Cincinnati; Lawrence Fine, M.D., M.P.H., at the time of the study was Deputy Director of the National Institute for Occupational Safety and Health, located in Hamilton County, Ohio.

OVERVIEW OF THIS DISSERTATION

I have chosen to write two papers for submission for publication for this dissertation. However, because this is a dissertation, the tables included are more detailed than a submission would warrant or allow. Prior to submission for peer review, these tables will be condensed based on journal guidelines.

The first paper (Chapter 2) emphasizes risk factors for all 3997 women. The second (Chapter 3) paper focuses on the 2847 employed women and examines factors that may increase falls in the work place.

IRB APPROVAL

University of Cincinnati IRB approval was obtained prior to starting this study (protocol no. 99-05-18-01-EE).

ABBREVIATIONS

The following abbreviations are used throughout this dissertation.

Odds ratio (OR)

Adjusted odds ratio (aOR)

95% CI (95% confidence interval)

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CHAPER 2: FALLS DURING PREGNANCY: AN UNRECOGNIZED PUBLIC HEALTH PROBLEM

During pregnancy, falls are the most common cause of minor injury and cause 17-39% of trauma associated with emergency department visits and hospital admissions, second only to motor vehicle accidents.¹⁻¹¹ Falls during pregnancy may result in injury to the mother including fractures, sprains/strains, head injury, rupture of internal organs, placental separation, rupture of the uterus and membranes, and occasionally maternal or fetal death.^{3,10,12-14} The overall rate, risk factors, and characteristics of falls during pregnancy in the general population are unknown, however, making prevention difficult. To address these gaps, a population based cohort study of new mothers who had recently given birth was undertaken.

METHODS

Subject identification and data collection

Women were considered eligible if they had delivered within eight weeks at a hospital located in Hamilton County, lived in Ohio, Kentucky, or Indiana, and were at least 20 years old. Public record birth certificate data from December 1999 through July 2000 identified 6217 eligible women who were mailed a letter describing the study and asking them to complete a telephone or internet survey. Names and addresses were matched to telephone numbers for 2810 (45.2%) women. Telephone interviewing began five days after initial letters were sent and at least eight attempts on different days and times were made to contact subjects.

Women who completed the 15 minute phone or internet survey received five dollars. Those not responding were then sent a letter and a four page mail survey including a novel two dollar bill. After this mailing, in two week intervals, a reminder postcard was sent followed by a letter including another mail survey. Finally, non respondents received a two question postcard, and phone calls were made to those with phone numbers. This study was approved by the University of Cincinnati Institutional Review Board and informed consent obtained.

Outcome definitions

Two primary outcomes were analyzed, fall and serious fall during pregnancy. To determine if a fall had occurred during pregnancy, subjects were asked “During this last pregnancy, did you experience any loss of balance, resulting in a fall where some part of your body -- other than your feet -- touched the ground?” For participants with multiple falls, the most severe was analyzed defined by requiring medical attention or resulting in injury or restricted activity. Injuries included bruise, cut, sprain/strain, broken bone, turned ankle, or other. For multiple falls without medical attention, injury, or restricted activity (n=22), one was randomly selected. A serious fall was defined as a fall that resulted in either maternal injury or premature labor or delivery and either medical attention (including a physician visit, an emergency room visit, or hospital admission) or restricted activity of at least two days. Attempts were made to validate medical attention by requesting authorization to review medical records regarding the fall.

Questionnaire

A fall and injury survey was developed with questions selected from other instruments¹⁵⁻¹⁷ and received outside review from recognized injury experts. All instruments were pilot tested and silent monitoring was performed on 20% of phone interviewing conducted

by experienced trained interviewers. The phone and internet surveys were identical but the mail survey was a subset of questions. Predisposing factors evaluated on all instruments included maternal age, race, presence of a permanent partner, problem with balance or vision prior to pregnancy, diagnosis of diabetes (mellitus and gestational), and employment status during pregnancy. Additional predisposing factors collected only from phone and internet participants included maternal height, weight gain during pregnancy, number of toddlers age three and under cared for during pregnancy, exercise patterns prior to pregnancy, number of previous live births, desire to become pregnant, and the baby's weight and gestational age at delivery.

Situational factors of falls included month of gestation at the time of the fall, location, and whether the fall was associated with a slippery floor, uneven or sloped ground, bathtub/shower, stairs, ladder, curb, van, car, elevator, escalator, machinery, or a cluttered or poorly lit area. To estimate how many falls were the result of domestic violence, participants were asked if they had been purposefully struck, pushed, or knocked over. Shoewear at the time of the fall was ascertained including heel height and if the shoes were slick, worn, loose, or backless. Time of day and events occurring at the time of the fall were recorded for phone and internet participants including body actions, obstruction of view, and being more tired than usual. In addition, acute illness (including hypoglycemia, dizzy, and extreme vomiting or diarrhea) the day of the fall and consumption of medications, caffeine, nicotine, alcohol, or illegal drugs within eight hours prior to the fall were recorded for phone and internet participants.

For those women who fell, situational factors were grouped into two separate dichotomous variables that were used in the multivariable analysis of serious fall. The first variable measured the presence/absence of environmental hazards including falls associated with stairs without handrails, slippery or uneven floors, cluttered areas, or poor lighting. The second

measured the presence/absence of factors that pose a danger when safety is not implemented including falls associated with stairs with rails, ladders, bathtubs or showers, escalators, and elevators.

Data Management and Analysis

Telephone and internet data were entered directly into computer files. Mail survey data were computer entered using 100% keystroke double entry with 10% comparison against hardcopy. Responses were standardized and coded and a system of checks and compare programs were applied as quality control measures.

Descriptive statistics examined the distribution of each variable. Univariate analyses using chi square, unadjusted odds ratios, and 95% confidence intervals determined variables marginally associated with fall and serious fall. Mantel-Haenzel chi square evaluated significant trends for ordinal categorical variables. Correlations among covariates were determined and cluster analysis was carried out to assess associations among subsets of variables to aid in data reduction. Because the phone and internet surveys provided more information, separate logistic regression models were obtained for the 2145 phone and internet participants and the 1852 mail participants. Model building proceeded by first entering variables at least marginally associated ($p < .25$) with the outcome; those significant at $p < .05$ were retained for the final model.

Assumption of linearity was assessed and evidence of confounding and effect modification were examined by association between dependent and independent variables through stratified and logistic regression analyses.

Fall status was available for all participants. The percents of missing data for each independent variable were less than five percent and evenly distributed across methods, except for race, which was missing in 4.0%, 2.0%, and 6.7% of the telephone, internet, and mail

datasets, respectively. Imputation of missing data was done prior to analyses by supplying the mean or mode value for continuous or dichotomous factors, respectively. Missing values for race were replaced by a predicted value that was most probable by using the SPLUS function TRANSCAN¹⁸. All statistical analyses were performed using SAS (Cary, North Carolina), version 8.1 and SPLUS 2000.

RESULTS

Of the 6217 eligible women, 3997 (64.3%) participated (resulting in 1639 phone, 506 internet, and 1852 mail completions), 144 (2.3%) refused, 151 (2.4%) had no viable address or phone number, and 1925 (31.0%) did not respond. The 2220 non participants were characterized by birth certificate data analysis as being younger ($p<.0001$) and more likely to have given birth at a public hospital ($p<.0001$) compared to the 3997 participants.

The average age of the participants was 29.9 years; 83.4% were Caucasian and 51.8% had graduated from college (Table 1). Of the 3997 total subjects, 26.8% reported falling during pregnancy and 6.8% had a serious fall. Of the 1070 women who fell, 35.4% had two or more falls. The fall rate for those responding by telephone (23.6%) differed significantly ($p<.01$) from those responding by internet and mail surveys with fall rates of 28.9% and 29.0%, respectively. There were 380 non participants who agreed to answer two questions about falls; 30.8% reported falling during pregnancy.

Characteristics of falls and serious falls are shown in Table 2. Of the 1070 women who fell, 630 (58.9%) experienced an injury, 210 (19.6%) received medical attention; of those having medical attention, 46.2% reported an emergency room or hospital admission while 7.6% reported premature labor or delivery. In addition, of these 1070 women, 192 (17.9%) called their physician but did not progress to visit a physician (data not shown). As shown in Table 3, the most common environmental characteristics of falls were related to stairs (39.2%), slippery surfaces (33.4%), hurrying (30.2%), and carrying an object or child (28.7%). Overall, at least one of these four characteristics occurred in 78.7% of falls. There was a much larger proportion of serious versus non serious falls reporting poor lighting, 46.4% versus 17.1%, and feeling ill on the day of the fall, 28.9% versus 17.1%, respectively. Of those falling on stairs, 55.2% reported

not using available handrails (data not shown). Of the 720 women wearing shoes at the time of the fall, 31.0% reported their shoes were loose, backless, or slick and 15% were wearing a shoe with a heel height at least one inch or greater (data not shown). The leading factor of indoor versus outdoor falls was walking on stairs (52.1%) compared to walking on uneven or slippery ground (48.8% and 45.9%, respectively). Most falls (55.3%) occurred during gestational months five through seven (Figure 1).

Risk factors for Fall

In order to investigate predisposing risk factors for fall during pregnancy, a number of candidate variables were investigated. Bivariate associations between predisposing risk factors and outcome of fall during pregnancy were investigated by using chi square and calculating crude odds ratios using logistic regression. Crude odds ratios are shown in Table 4.

Regression modeling showed that significant factors ($p < .05$) for fall among phone and internet were age, race, diabetes, number of toddlers cared for, and survey method (Table 5). Women aged 20-24 had a higher odds ratio of 1.9 (95% confidence interval of 1.4, 2.7). Odds ratios for African Americans at 1.0 (95% confidence interval 0.7, 1.5) were similar to Caucasians (reference group). However, the odds ratio was protective for a combined category of other race including Hispanic, Asian, Pacific Islanders, and American Indians at 0.3 (95% confidence interval 0.2, 0.8). Fall risk factors those responding by mail were lack of a permanent partner and being less educated (Table 5) with odds ratios and 95% confidence intervals of 3.1 (95% confidence interval 2.3, 4.2) and 2.0 (95% confidence interval 1.6, 2.6), respectively.

Risk factors for serious fall

An analogous process was performed in order to investigate predisposing risk factors associated with outcome of serious fall during pregnancy for phone and internet and mail separately. Crude odds ratios are shown in Table 6.

Regression modeling showed that, of those falling, college graduates were less likely to experience a serious fall (Table 7). Among the 533 phone and internet participants who fell, falls associated with feeling ill and falls occurring after 2:30 in the afternoon were more likely to result in a serious fall with adjusted odds ratios and 95% confidence intervals of 2.2 (1.3, 3.7) and 2.0 (1.2, 3.1), respectively. Of the 537 mail participants who fell, those reporting a problem with vision or balance prior to pregnancy were more likely to experience a serious fall with adjusted odds ratio of 2.6 (95% confidence intervals of 1.2, 5.7). In addition, falls associated with lack of safety were more likely to result in a serious fall with adjusted odds ratio of 1.7 (95% confidence intervals of 1.1, 2.5).

Validity & reliability

Validation of injury with medical attention was performed for the 216 subjects who received medical attention including a visit to physician, visit to an emergency room, hospital admission, or fetal monitoring. To verify injury and medical attention, informed consent was requested from subjects to review the medical record concerning the fall. Of these 216 women who sought medical attention, 30 (13.9%) provided informed consent, 17 (7.9%) refused authorization to review their medical record, 11 (5.1%) were unable to be contacted (determined by returned mail), and 150 (69.4%) did not respond. An additional validation procedure was performed for those subjects who visited the emergency or were admitted to the hospital by linking data (using participants' date of birth) with the Hamilton County Health District Injury

Surveillance System. In order to be included in this injury database, the participant must have had a Hamilton County billing address at the time of the fall. Of the 98 women who visited the emergency room or were admitted to the hospital, 64 had county addresses on birth certificate data. Of these 64 women, 16 (25%) linked with the county database to confirm emergency room visit or hospital admission, 4 (6.2%) had missing date of birth information and 44 (68.8%) were not linked using date of birth information. In summary, of the 216 women who received medical attention beyond a phone call to the physician, 44 (20.4%) were validated: two by both medical record and county database link; 14 by county injury database link; and 28 by medical record review.

A test retest reliability assessment for fall and falls with injury was completed on 415 (10.4%) of the 3997 participants. Kappa values were excellent for fall ($k=.85$) and good for any injury ($k=.58$), with percent agreement of 92.8% and 84.6%, respectively. Of the 210 women who obtained medical attention due to a fall, 30 (14.3%) provided written authorization to review their medical record, 17 (8.1%) refused authorization, 11 (5.2%) were unable to be contacted by mail or phone, and 152 (72.4%) did not respond to our requests. Of those authorizing medical record review, all were validated.

In order to assess potential nonparticipation bias, four areas were examined. First, demographics and fall rates were compared from early to late responders among the 3997 participants (Table 8). Phone and internet participants are considered early responders, followed by first mailing, and the last responders are second mailing participants. In theory, the late responders are most representative of non-responders. Late responders had lower education, were less likely to have a permanent partner, and more likely to be African American than early responders. Employment rate remained relatively constant although late responders were more

likely to be employed in high risk occupations. Outcome rates (fall and serious fall) were lowest for the first responders and highest for the first mailing.

Second, a non-response survey was conducted in which the fall rate of 30.8% for non-participants (117/380) was slightly higher than the fall rate of 26.8% among participants (1070/3971), indicating potential underestimate of falls in our population.

Third, birth certificate data we had received from the county and city for all 6217 eligible women was analyzed to compare demographics of the 3997 participants to the 2220 non-participants including maternal age, paternal age and birth hospital (Table 9). All factors were significantly different ($p < .0001$) between non-participants and participants. Non-participants and their partners (indicated on the birth certificate) were, on average, two years younger than participants and participation from the private hospital in town was significantly less than the non-private hospitals ($p < .0001$).

Fourth, participants were compared with vital statistics of all women at least 20 years of age in Hamilton County who had live births in 1999. Of all the women who had live births in Hamilton County in 1999, 27.7% were African American and 69.4% were Caucasian compared to our sample of 8.8% and 83.4%, respectively. Of all women who had live births in Hamilton County in 1999, 28.1% were aged 20-24 compared to 16.6% in our study sample. When analyzing the birth data by age and race, the least represented populations are African American women aged 20-24 (13% in the population compared to 3.4% in our sample) and 25-29 (7.6% in the population compared to 2.6% in our sample), and Caucasian women aged 20-24 (14.8% in the population compared to 11.6% in our sample).

DISCUSSION

These are the first results to investigate risk factors related to falls during pregnancy. Pregnancy is a period of high risk for falls with 26.8% of this population falling at least once. Falls caused 10.0% of pregnant women to obtain medical attention and 15.8% to sustain an injury.

Younger women demonstrated a higher odds ratio for fall. Recent findings suggest younger women are at higher risk for injury due to trauma during pregnancy.^{1, 19-21} Women who cared for toddlers were more likely to fall and this may be related to either activity or stress level. Support for these hypotheses comes from two sources. Number of toddlers demonstrated a significant trend of increasing fall rate with increasing number of toddlers ($p=.02$). Also, among the mail participants, women without permanent partners compared to those with permanent partners fell at twice the rate, 57.4% and 24.7%, respectively.

Falls due to reported physical violence were minimal; of the 1070 women who fell, only eight (0.7%) women reported their fall was associated with being "purposefully pushed or struck". Prevalence of violence during pregnancy has been shown to range from 0.9-20%.²² One explanation for this lower reporting of violence may be that women who were physically assaulted were more likely to be non respondents or did not report the violence.

Our data show that fall rates for pregnant women are similar to those of elderly persons living in the community, estimated at 25% for those 70 years of age and 35% for those over 75.²³ Fracture rates of 5% among those who fell are similar in our sample compared to the elderly.²⁴ The Hamilton County Injury Surveillance System is a local database containing all persons who visited an emergency room or were admitted to a hospital due to injury. Rates of emergency room visits due to a fall in our participants aged 20-24 were 4826 per 100,000 compared with

2337 for age matched women.²⁵ Hospital admission rates due to a fall are 9-28 times larger (depending on age) during pregnancy compared to all women aged 20-39 in the same county.²⁵ This observed difference may be due to a higher rate of serious falls in pregnant women or a tendency to admit them in order to verify fetal status; nonetheless, these events increase medical care costs.

Although obvious strengths of this study include the population based study design, there are some limitations such as recall and participation bias. To minimize recall bias, women were contacted within eight weeks of giving birth. We believe participation bias is also minimal for several reasons. Firstly, the fall rate among women who did not complete the full survey but did complete the non participant two question survey was 30.8% compared to the fall rate of 26.8% among participants, indicating a potential underestimate of falls during pregnancy. Secondly, fall rates did not decrease from the early responders (phone and internet) to the later responders (first and second mailing). Based on comparison with local vital statistics, women aged 20-24 may be proportionately underrepresented in our study. Given that recent findings indicate younger women are at highest risk for injury due to trauma, our results may underestimate falls and injury.

Further, because subjects were identified through birth certificates, falls resulting in fatalities to mother or child (estimated at 0.11 per 100,000 live births²⁰) are not available. Authorization to review medical records for validation of medical attention was limited and this has been shown to occur even in long term prospective studies where personal relationships have been established with participants due to privacy concerns.²⁹

Conclusions and recommendations for clinicians

The public health importance of loss of balance and falls during pregnancy is obvious as one in four women fell during pregnancy. It is vital to increase the medical community awareness of these preventable events, and to encourage counseling of obstetric patients in similar ways that elderly patients are counseled with regards to fall safety. The following guidelines are offered to help develop fall prevention programs. Women begin falling during the third gestational month with fall frequency rapidly accelerating during months four and five. High risk women are those who are younger, less educated, care for young children, have no permanent partner, or have gestational diabetes. Finally, women need to be counseled to be aware of situational and environmental risk factors including slippery floors, stairs, hurrying, poor lighting, and carrying objects or children. During pregnancy it may be wise to provide women with the same counseling regarding falls that the elderly receive.

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TABLE 1. Characteristics of Women who Fell and Those Who Did Not.*

	<u>FALL</u> (n=1070)	<u>NO FALL</u> (n=2927)	<u>TOTAL</u> (n=3997)
Mean age	29.40 ± 5.25	30.14 ± 5.06	29.94 ± 5.12
Race			
Caucasian	842 (78.7)	2493 (85.2)	3335 (83.4)
African American	88 (8.2)	264 (9.0)	352 (8.8)
Other	26 (2.4)	154 (5.3)	180 (4.5)
Refuse/missing	114 (10.7)	16 (0.5)	130 (3.3)
Education			
≤ high school education	354 (33.1)	658 (22.5)	1012 (25.3)
some college	242 (22.6)	666 (22.8)	908 (22.7)
college grad	473 (44.2)	1599 (54.6)	2072 (51.8)
refuse/missing	1 (0.09)	4 (0.1)	5 (0.1)
Employed during pregnancy	757 (70.7)	2090 (71.4)	2847 (71.2)
Permanent partner	910 (85.0)	2757 (94.2)	3667 (91.7)
Method			
Phone	387 (36.2)	1252 (42.8)	1639 (41.0)
Internet	146 (13.6)	359 (12.3)	506 (12.7)
Mail	537 (50.2)	1315 (44.9)	1852 (46.3)

* Data are presented as n (%) or mean ± standard deviation.

TABLE 2. Characteristics of Falls and Serious Falls including Injury, Medical Attention, and Situational Factors.

CHARACTERISTIC	FALL	SERIOUS FALL
Injury		
	<u>n (% of 630)</u>	<u>n (% of 268)</u>
Bruise	229 (36.3)	65 (24.3)
Cut	114 (18.1)	34 (12.7)
Turned ankle	72 (11.4)	20 (7.5)
Sprain/strain	157 (24.9)	112 (41.8)
Broken bone	23 (3.7)	21 (7.8)
Other	35 (5.6)	16 (6.0)
Premature labor or delivery due to fall		
	<u>n (% of 16)</u>	<u>n (% of 16)</u>
Premature labor	9 (56.3)	9 (56.3)
Premature delivery	7 (43.8)	7 (43.8)
Medical attention obtained		
	<u>n (% of 210)</u>	<u>n (% of 154)</u>
Visit to physician office	113 (53.8)	76 (49.4)
Emergency room visit	74 (35.2)	62 (40.3)
Hospital admission	23 (11.0)	16 (10.4)
Restricted activity		
	<u>n (% of 227)</u>	<u>n (% of 207)</u>
2-5 days	138 (60.8)	123 (59.4)
6-10 days	43 (18.9)	40 (19.3)
> 10 days	46 (20.3)	44 (21.3)
Situational factors		
	<u>n (% of 1070 or 533*)</u>	<u>n (% of 272 or 114*)</u>
Indoors	595 (55.6)	149 (54.8)
Stairs	419 (39.2)	111 (40.8)
Slippery floor	357 (33.4)	91 (33.4)
Snow	157 (14.7)	42 (15.4)
Water	153 (14.3)	38 (14.0)
Hurrying*	161 (30.2)	42 (36.8)
Carrying object or child*	153 (28.7)	38 (33.3)
Uneven/sloped	272 (25.4)	76 (27.9)
Feeling ill day of fall*	93 (17.4)	33 (28.9)
Poor lighting	182 (17.1)	53 (46.4)
Fell > 3 feet*	50 (9.4)	15 (13.2)
Cluttered area	75 (7.0)	23 (8.5)
Obstructed view*	57 (10.7)	16 (14.0)
Getting up/down*	33 (6.2)	2 (1.8)
Bathtubs	47 (4.4)	18 (6.6)
Pushed/struck by accident	43 (4.0)	13 (4.8)
Pushed/struck on purpose	8 (0.7)	5 (1.8)

Time of Day*†			
12:00 a.m. - 5:59 a.m.	16	(3.0)	2 (1.8)
6:00 a.m. - 11:59 a.m.	112	(21.0)	26 (22.8)
12:00 p.m. - 5:59 p.m.	190	(35.6)	40 (35.1)
6:00 p.m. - 11:59 p.m.	122	(22.9)	32 (28.1)

*These questions were in the phone and internet surveys only, therefore, the denominator is 533 for falls and 114 for serious falls.

†Data were missing regarding time of day for 93 falls.

TABLE 3: Environmental and Situational Factors of Indoor Falls and Outdoor Falls (n, %)

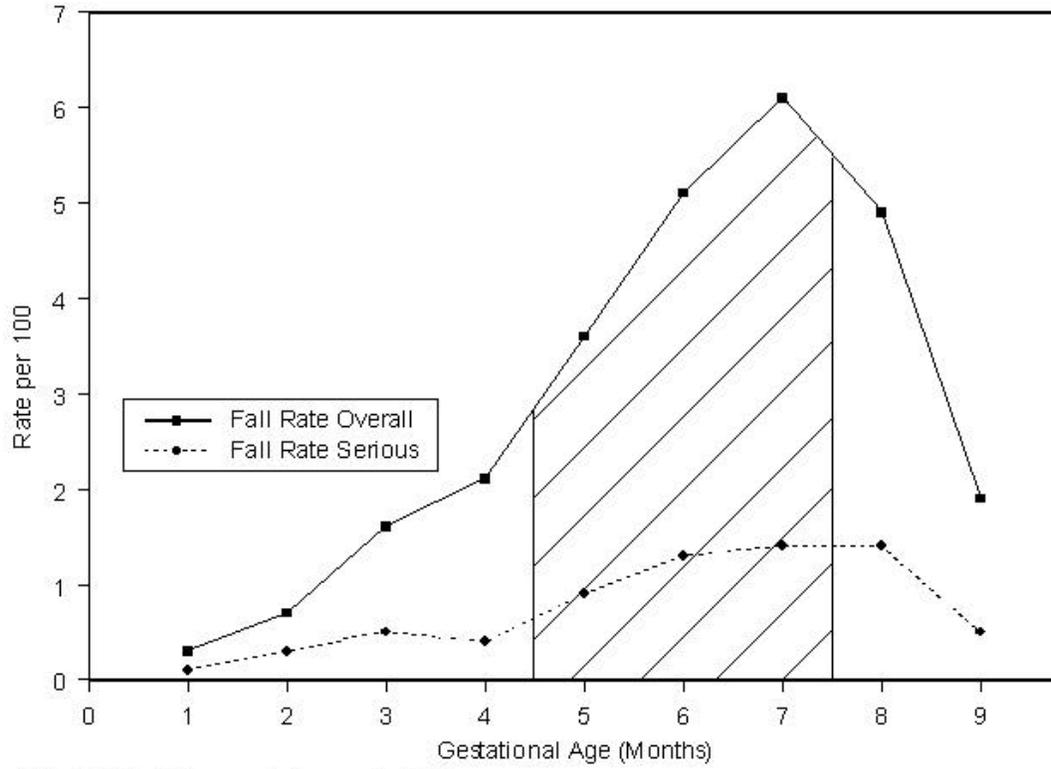
<u>Environmental Factors</u>	<u>Indoor Falls</u> (n=595)	<u>Outdoor Falls</u> (n=475)	<u>Total Falls</u> n=1070
Fell While Using Stairs	310 (52.1)	109 (23.0)	419 (39.2)
Fell off something	126 (40.8)	76 (33.9)	202 (37.9)
Body Movements at Time of Fall:			
Carrying an object or child*	88 (28.5)	65 (29.0)	153 (28.7)
Turning, reaching, or bending*	85 (27.5)	53 (23.7)	138 (25.9)
Pushing, pulling, or lifting*	14 (4.5)	12 (5.4)	26 (4.9)
Hurried pace*	95 (30.7)	66 (29.5)	161 (30.2)
Running*	7 (2.3)	8 (3.6)	15 (2.8)
Struck, pushed, or knocked over by accident	20 (3.4)	23 (4.8)	43 (4.0)
Struck, pushed, or knocked over on Purpose	7 (1.2)	1 (0.2)	8 (0.7)
Vision Problems:			
Obstructed View*	41 (13.3)	16 (7.1)	57 (10.7)
Poorly Lit	48 (8.0)	18 (3.8)	66 (6.2)
Dark Due to Evening or Early Morning Hours	56 (9.4)	80 (16.8)	136 (12.7)
Slippery floor surface overall	139 (23.4)	218 (45.9)	357 (33.4)
Slip on water	75 (12.6)	78 (16.4)	153 (14.3)
Slip on snow	7 (1.2)	150 (31.6)	157 (14.7)
Slip on other	66 (11.1)	23 (4.8)	89 (8.3)
Uneven/sloped	40 (6.7)	232 (48.8)	272 (25.4)
Cluttered	55 (4.2)	20 (9.2)	75 (7.0)

*Questions not included in the mail questionnaire (in the internet and phone surveys only), therefore the denominators are: 309 indoor fall and 224 outdoor falls (total n=533).

<u>Situational Factors</u>	<u>Indoor Falls</u> (n=595)	<u>Outdoor Falls</u> (n=475)	<u>Total Falls</u> (n=1070)
Fall Could have been Prevented	393 (66.0)	280 (59.0)	673 (62.9)
Tired/fatigued*	81 (26.2)	45 (20.1)	126 (23.6)
Felt faint/dizzy*	54 (17.5)	16 (7.1)	70 (13.1)
Consumed within 8 hours of fall:			
Coffee*	95 (30.7)	64 (28.6)	159 (29.8)
Tobacco*	24 (7.8)	14 (6.2)	38 (7.1)
Medication*	8 (2.6)	18 (8.0)	26 (4.9)
Wearing shoes			
Loose	37 (12.8)	47 (11.2)	84 (12.0)
Soles slick/worn	54 (18.8)	72 (16.7)	126 (17.5)
Backless	45 (15.6)	56 (13.0)	101 (14.0)
Heel height			
< 1"	241 (83.7)	354 (81.9)	595 (82.6)
≥ 1"	41 (14.2)	66 (15.3)	107 (14.9)
DK/missing	1 (0.3)	1 (0.2)	2 (0.3)

*Questions not included in the mail questionnaire (in the internet and phone surveys only), therefore the denominators are: 309 indoor fall and 224 outdoor falls (total n=533).

FIGURE 1: Rates by Gestational Age



Note: 55.3% of falls occur during months 5 - 7.

TABLE 4. Unadjusted Analyses for Fall Among Phone/Internet and Mail Participants.

VARIABLE	PHONE/INTERNET			MAIL		
	DID FALL (n=533)	DIDN'T FALL (n=1612)	OR (95% CI)*	DID FALL (n=537)	DIDN'T FALL (n=1315)	OR (95% CI)*
Permanent partner‡						
Yes	515	1549	1.0 (reference)	397	1211	1.0 (reference)
No	18	63	.86 (.50, 1.47)	140	104	4.11 (3.11, 5.42)
Education‡						
≤ high school	112	329	1.09 (.85, 1.40)	242	329	2.72 (2.15, 3.54)
some college/tech	122	329	1.18 (.93, 1.51)	121	341	1.32 (1.01, 1.72)
college grad	299	954	1.0 (reference)	174	645	1.0 (reference)
Age (years)†‡						
20-24	92	169	1.85 (1.32, 2.57)	135	537	1.30 (.95, 1.80)
25-29	146	432	1.15 (.86, 1.52)	165	432	.99 (.73, 1.34)
30-34	187	645	.99 (.73, 1.35)	149	389	.99 (.73, 1.35)
≥ 35	108	366	1.0 (reference)	88	227	1.0 (reference)
Employment†‡						
Not employed	152	476	1.0 (reference)	161	361	1.0 (reference)
Low risk occupation	304	959	.99 (.79, 1.24)	274	771	.80 (.63, 1.00)
High risk occupation	77	177	1.36 (.99, 1.88)	102	183	1.25 (.92, 1.70)
Race†‡						
Caucasian	483	1441	1.0 (reference)	359	1058	1.0 (reference)
African American	43	112	1.15 (.79, 1.65)	140	156	2.65 (2.04, 3.42)
Other	7	59	.35 (.16, .78)	38	101	1.11 (.75, 1.64)
Number of toddlers (children age three and under) cared for†				not in mail questionnaire		
0	240	804	1.0 (reference)			
1	229	646	1.35 (.98, 1.86)			
≥ 2	64	159	1.20 (.97, 1.47)			
Survey method†				not applicable to mail participants		
Phone	387	1252	1.0 (reference)			
Internet	146	360	1.31 (1.05, 1.64)			

* OR denotes unadjusted odds ratio, and CI confidence interval

†Factors with p<.20 included in the initial phone/internet model.

‡Factors with p<.20 included in the initial mail model.

Factors with p≥.20 for internet/phone included lack of a permanent partner, education, diabetes, problem with vision or balance prior to pregnancy, exercise prior to pregnancy, number of previous live deliveries, participant desire for baby at time of initial pregnancy, maternal weight gain, maternal height, or baby weight at delivery. Factors with p≥.20 for mail participants included diabetes and problem with vision or balance prior to pregnancy.

TABLE 5. Multivariable Analysis for Fall among Phone/Internet and Mail Participants.

VARIABLE	PHONE/INTERNET			MAIL		
	ALL (n) n=2145	FALL n (%) n=533 (24.8)	aOR (95% CI)*	ALL (n) n=1852	FALL n (%) n=537 (29.0)	aOR (95% CI)*
Age (years)†						
20-24	261	92 (35.3)	1.9 (1.4, 2.7)	672	135 (33.6)	ns§
25-29	578	146 (25.3)	1.2 (0.9, 1.6)	597	165 (27.6)	
30-34	832	187 (22.5)	1.0 (0.8, 1.3)	538	149 (27.7)	
> 35	474	108 (22.8)	1.0 (reference)	315	88 (27.9)	
Permanent Partner‡						
No	81	18 (22.2)		244	140 (57.4)	3.1 (2.3, 4.2)
Yes	2064	515 (25.0)	ns§	1608	397 (24.7)	1.0 (reference)
Race†						
African American	155	43 (27.7)	1.0 (0.7, 1.5)	296	140 (47.3)	
Other	66	7 (10.6)	0.3 (0.2, 0.8)	139	38 (27.3)	
Caucasian	1924	483 (25.1)	1.0 (reference)	1417	359 (25.3)	ns§
Education‡						
≤ high school degree	441	112 (25.4)	ns§	571	242 (42.4)	2.0 (1.6, 2.6)
some college	451	122 (27.1)		462	121 (26.2)	1.15 (0.9, 1.5)
college grad	1253	299 (23.9)		819	174 (21.2)	1.0 (reference)
Diabetes†						
Mellitus	17	4 (23.5)	1.1 (0.4, 3.4)	31	6 (19.4)	ns§
Gestational	128	41(32.0)	1.5 (1.0¶, 2.3)	101	30 (29.7)	
Neither	2000	488 (24.4)	1.0 (reference)	1720	501 (29.1)	
Survey method†						
Phone	1639	387 (23.6)	1.0 (reference)		not available‡	
Internet	506	146 (28.9)	1.4 (1.1, 1.7)			
Toddlers cared for during pregnancy†						
≥ 2	223	64 (28.7)	1.4 (1.0, 1.9)			
1	875	229 (26.2)	1.2 (1.0¶, 1.5)			
0	1044	240 (23.0)	1.0 (reference)		not available‡	

*aOR denotes adjusted odds ratios and CI, confidence interval.

†Final phone and internet model. Initial model consisted of unadjusted factors with p<.25 among phone and internet participants: maternal age, race, number of toddlers cared for during pregnancy, diabetes, survey method, and employment during pregnancy (unemployed, employed full time, employed part time).

‡Final mail model. Initial model consisted of unadjusted factors with p<.25 among mail participants: lack of a permanent partner, education, age, race, and diabetes.

§ ns denotes not significant at p<.05 to be in final model.

‡ Denotes questions were not included in the mail survey.

¶ Lower bound 95% confidence interval was rounded down, does not include 1.0.

TABLE 6. Unadjusted Analyses for Serious Fall Among Phone/Internet and Mail Participants

VARIABLE	PHONE/INTERNET			MAIL		
	SERIOUS FALL (n=114)	NO (n=2031)	OR (95% CI)	SERIOUS FALL (n=158)	NO (n=1694)	OR (95% CI)
Permanent Partner‡						
Yes	109	1955		119	1489	1.0 (reference)
No	5	81		39	205	2.38 (1.61, 3.52)
Age†						
20-24	19	242	1.41 (.76, 2.61)	52	350	1.72 (1.04, 2.85)
25-29	35	543	1.16 (.68, 1.96)	43	554	.90 (.54, 1.50)
30-34	35	797	.79 (.47, 1.34)	38	500	.88 (.52, 1.49)
≥ 35	25	449	1.0 (reference)	25	290	1.0 (reference)
Education†‡						
≤ high school	26	415	1.57 (.96, 2.57)	78	493	3.44 (2.28, 5.19)
some college/tech	40	411	2.44 (1.58, 3.77)	44	418	2.29 (1.45, 3.61)
college grad	48	1205	1.0 (reference)	36	783	1.0 (reference)
Employment during pregnancy‡						
Not employed	41	587	1.0 (reference)	50	472	1.0 (reference)
Low risk occupation	57	1206	.68 (.45, 1.02)	76	978	.74 (.51, 1.08)
High risk occupation	16	238	.96 (.53, 1.75)	32	253	1.19 (.75, 1.91)
Race‡						
Caucasian	101	1823	1.0 (reference)	101	1316	1.0 (reference)
African American	11	144	1.38 (.72, 2.63)	45	251	2.34 (1.60, 3.40)
Other	2	66	.56 (.14, 2.34)	12	127	1.23 (.66, 2.30)
Problem with balance or vision prior to pregnancy‡						
Yes	10	157	1.15 (.59, 2.24)	14	74	2.13 (1.17, 3.86)
No	104	1874	1.0 (reference)	144	1620	1.0 (reference)
Number of toddlers cared for during pregnancy†				not in mail questionnaire		
0	44	1000	1.0 (reference)			
1	51	827	1.40 (.93, 2.12)			
≥ 2	19	204	2.12 (1.21, 3.70)			
Number of previous live birth deliveries†				not in mail questionnaire		
0	30	744	1.0 (reference)			
1	42	727	1.43 (.89, 2.31)			
2	17	357	1.18 (.64, 2.17)			
≥ 3	25	203	3.05 (1.76, 5.31)			
Participant's desire for a baby at the time of initial pregnancy†				not in mail questionnaire		
Yes	77	1541	1.0 (reference)			
No	37	490	1.51 (1.01, 2.27)			
Maternal weight gained during pregnancy (pounds)†				not in mail questionnaire		
0-24	33	431				
25-39	50	1001				
≥ 40	31	630				

Maternal height†				not in mail questionnaire
<5'3"	2	430	1.0 (reference)	
5'3" - 5'4"	34	536	1.18 (.68, 2.05)	
5'4" - 5'6"	24	548	.82 (.45, 1.48)	
>5'7"	34	537	1.18 (.68, 2.05)	

* OR denotes unadjusted odds ratio, and CI confidence interval

†Factors with $p < .20$ included in the initial phone/internet model.

‡Factors with $p < .20$ included in the initial mail model.

Factors with $p \geq .20$ for internet/phone were survey method (phone or internet), lack of a permanent partner, diabetes, problem with vision or balance prior to pregnancy, exercise prior to pregnancy, and baby weight at delivery. Factors with $p \geq .20$ for mail participants were diabetes.

TABLE 7: Multivariable Analysis for Serious Fall among Phone/Internet and Mail Participants.

VARIABLE	PHONE/INTERNET			MAIL		
	FELL n=533	SERIOUS n=114 (21.4)	aOR (95%CI)*	FELL n=537	SERIOUS n=158 (29.4)	aOR (95%CI)*
Education†‡						
≤ high school	112	26 (23.2)	1.5 (0.9, 2.6)	242	78 (32.2)	1.9 (1.1, 2.9)
some college/tech	122	40 (32.8)	2.3 (1.4, 3.9)	121	44 (36.4)	2.2 (1.3, 3.7)
college grad	299	48 (16.1)	1.0 (reference)	174	36 (20.7)	1.0 (reference)
Problem with balance/vision prior to pregnancy‡						
Yes	41	10 (24.4)	ns§	28	14 (50.0)	2.6 (1.2, 5.7)
No	492	104 (21.2)		509	144 (28.3)	1.0 (reference)
Environmental hazard†‡						
Yes	307	68 (22.2)	1.2 (0.7, 1.8)	327	101 (30.9)	1.4 (0.9, 2.1)
No	226	46 (20.4)	1.0 (reference)	210	57 (27.1)	1.0 (reference)
Lack of safety†‡						
Yes	166	36 (21.7)	1.0 (0.6, 1.7)	202	72 (35.6)	1.7 (1.1, 2.5)
No	367	78 (21.3)	1.0 (reference)	335	86 (25.7)	1.0 (reference)
Time of fall†						
2:30 PM or later	208	59 (28.4)	2.0 (1.2, 3.1)			not available‡
Unknown	93	14 (15.1)	1.0 (0.5, 2.1)			
Before 2:30 PM	232	41 (17.7)	1.0 (reference)			
Feeling ill at time of fall†						
Yes	79	27 (34.2)	2.2 (1.3, 3.7)			not available‡
No	454	87 (19.2)	1.0 (reference)			

*aOR denotes adjusted odds ratios and CI, confidence interval

† Final phone and internet model. Initial phone and internet model consisted of unadjusted factors with $p < .25$ among the 533 phone and internet participants who fell: education, employment during pregnancy (unemployed, employed full time, employed part time), number of toddlers cared for during pregnancy, diabetes, maternal gestational weight gain, maternal height, time of fall, feeling ill at the time of the fall, environmental hazard and lack of safety factors.

‡ Final mail model. Initial mail model consisted of unadjusted factors $p < .25$ among the 537 mail participants who fell: age, education, problem with vision or balance prior to pregnancy, environmental hazard and lack of safety factors.

§ ns denotes factors not significant at $p < .05$ to be in final model.

‡ Denotes questions not included in the mail survey.

Table 8: Characteristics and Outcomes for Early Responders (Phone and Internet) and Later Responders (First and Second Mailing).*

	Phone (n=1639)	Internet (n=506)	First mailing (n=1556)	Second Mailing (n=296)
Age	30.7 ± 4.9	30.6 ± 4.9	29.2 ± 5.3	28.7 ± 5.3
Education				
< HS grad	3.5 (57)	2.2 (11)	5.5 (85)	5.1 (15)
HS grad	18.6 (305)	13.4 (68)	25.1 (391)	27.0 (80)
Some college	20.1 (330)	23.9 (121)	24.4 (380)	27.7 (82)
College grad	57.8 (947)	60.5 (306)	45.0 (700)	40.2 (119)
Occupation				
Didn't work	30.3 (497)	25.9 (131)	27.7 (431)	30.7 (91)
Low risk occupation	56.3 (922)	61.7 (312)	54.5 (848)	52.4 (155)
High risk occupation	13.2 (216)	6.7 (34)	14.5 (226)	15.2 (45)
Permanent Partner	96.5 (1581)	95.4 (483)	87.0 (1353)	86.1 (255)
Race				
Caucasian	88.9 (1457)	92.3 (467)	77.3 (1203)	72.3 (214)
African American	8.3 (136)	3.8 (19)	15.6 (243)	17.9 (53)
Other	2.2 (36)	4.0 (20)	7.1 (110)	9.8 (29)
Fall	23.6 (387)	28.9 (146)	29.3 (456)	27.4 (81)
Serious Fall	5.2 (86)	5.5 (28)	8.7 (136)	7.4 (22)

* data presented as mean ± std dev or % (n)

TABLE 9: Birth Certificate Information for Participants and Non Participants.*

	<u>Participants</u> N=3997	<u>Non-participants</u> n=2220	<u>p-value</u>
Mom age			
Mean \pm std dev	29.7 \pm 5.1	27.4 \pm 5.3	<.0001
Range	20 - 46	20 - 45	
Dad age			
Mean \pm std dev	32.0 \pm 5.6	30.5 \pm 6.4	<.0001
Range	19 - 67	17 - 64	
No paternal information	7.1 (285)	23.9 (530)	<.0001
Birth hospital			
Private	6.1 (242)	17.1 (379)	
Non private	93.9 (3755)	82.9 (1841)	<.0001

* data presented as mean \pm std dev or % (n)

CHAPTER 3: FALLS IN WORKERS DURING PREGNANCY: RISK FACTORS, JOB HAZARDS, AND HIGH RISK OCCUPATIONS

It is estimated accidental injury occurs in 6-7% of all pregnancies and that falls are the most common cause of minor injury during pregnancy ¹⁻³. In addition, falls cause 17-39% of all trauma during pregnancy associated with emergency department visits and hospital admissions ¹⁻

⁹ Falls during pregnancy may result in injury to the mother including fractures, sprains/strains, head injury, rupture of internal organs, placental separation, rupture of the uterus and membranes, and occasionally maternal or fetal death ^{3,7,10-12}.

Overall, 70.3% percent of mothers 20 years of age and older report employment during their pregnancy; 88.1%, 67.2%, and 51.4% report employment with their first child, second, and third or later child, respectively ¹³. Falls are a leading cause of occupational injury ¹⁴ and, in 2000, caused 19.7% of missed work days ¹⁵. Of a total of 330,913 yearly non-fatal falls, 39% (n=131,751) occur to women ¹³. For Swedish female employees under 45 years of age, falls accounted for 18% of occupational accidents, and data suggests that falls for men and women differ with respect to contributing factors ¹⁶. During pregnancy, women undergo continuous physiological, anatomical, hormonal, and biomechanical changes that may increase risk of fall. There are no statistics, however, related to falls occurring to pregnant workers even though women represent approximately 43.2% of the civilian labor force or 56.6 million workers ¹³. The study objective was to identify rates and risk factors of falls among pregnant workers.

METHODS

Outcome definitions

As discussed in Chapter 2, in order to determine if a fall had occurred during pregnancy, all subjects were asked “During this last pregnancy, did you experience any loss of balance, resulting in a fall where some part of your body -- other than your feet -- touched the ground?” For participants with multiple falls, the most severe fall was chosen for analysis based on injury, medical attention, and restricted activity. Injuries included bruise, cut, sprain or strain, broken bone, turned ankle, or other. Medical attention included a phone call or visit to a physician, an emergency room visit, or hospital admission. All falls analyzed occurred in women who were employed during pregnancy, the falls were distinguished by the location of the fall. Work falls were defined as those falls that occurred while working, and non-work falls were defined as those that occurred elsewhere including the home and community.

Questionnaire

As discussed in Chapter 2, a fall and injury survey was developed based on previously identified risk factors among non-pregnant populations and with questions selected from other instruments including the Job Content Questionnaire ¹⁷, the NIOSH questionnaire for Mature Workers ¹⁸, and the Fall from Elevation Questionnaire developed by the Bureau of Labor Statistics ¹⁹. Survey instruments received outside expert review from members of a Scientific Advisory Board and other recognized injury experts ²⁰. Three methods of surveys were used for data collection including phone, internet, and mail questionnaires. The 15 minute phone and internet questionnaires were identical, but the mail questionnaire was a subset of the former

limiting the length to four pages. In addition to the risk factors discussed in Chapter 2, work conditions were ascertained from phone and internet participants including duration of employment, noise, shift rotations, number of breaks, lifting, and full or part time status. Stress at work was assessed through five questions regarding adequate time to complete job task, fast working pace, job satisfaction, and control over work load and schedule. A work environment was defined as loud if the participant had to speak overly loud to be heard. Lifting questions included weight, frequency, and any accommodations made by the employer during pregnancy.

Situational factors of falls included month of gestation at the time of the fall, location, and whether the fall was associated with a slippery floor, uneven or sloped ground, stairs, ladder, curb, van, car, elevator, escalator, machinery, or a cluttered or poorly lit area. Shoewear at the time of the fall was ascertained including heel height and if the shoes were slick, worn, loose, or backless. Time of day and events occurring at the time of the fall were recorded for phone and internet participants including body actions (turning, reaching, or bending), obstruction of view, and being more tired than usual. In addition, acute illness (including hypoglycemia, dizziness, and extreme vomiting or diarrhea) on the day of the fall and consumption of medications, caffeine, and nicotine within eight hours prior to the fall were recorded for phone and internet participants. If the fall had occurred at work, phone and internet participants were asked questions to determine if they were performing a new task or unfamiliar task, if the fall was reported to the employer, and if a workers' compensation claim was filed as a result of the fall.

Employment was defined as working outside the home for pay. Full time work was defined as working at least 30 hours per week. All women who were employed during pregnancy were asked five questions from which staff at the National Institute for Occupational Safety and Health coded industry and occupation based on 1990 census classification system:

company name, type of business or industry, job title, job activities, and the primary product or service produced. Occupational codes were grouped into ten categories for analysis based on apriori hypotheses regarding high risk groups and ease of targeting intervention.

Data Analysis

Descriptive statistics were used to examine the distribution of each variable. One outcome was whether a woman fell at work (yes, no). In addition, contributing factors of work and non-work falls were compared using chi square. Unadjusted odds ratios and 95% confidence intervals were calculated to determine variables marginally associated with fall at work. Mantel-Haenszel chi square was used to evaluate significant trends for ordinal categorical variables. Correlations among covariates were determined, and cluster analysis was carried out to assess associations among subsets of variables to aid in data reduction. Logistic regressions were performed to investigate the association between risk factors and the dichotomous outcome of fall at work (yes, no) during pregnancy. Because the phone and internet surveys provided more information, two separate logistic regression models were obtained, one for the phone and internet participants, and one for the mail participants. Logistic model building proceeded by first entering all variables at least marginally associated ($p < .25$) with fall at work. Interactions and confounders were investigated by stratified analyses, observing changes of greater than 15% in coefficients, and by backward regression. Factors significant at $p < .05$ and factors that changed coefficients more than 15% were retained for the final model. For the phone and internet dataset a variable identifying whether the survey was completed by phone or internet was tested for confounder or interaction status but was not significant for the final model and did not change coefficients more than 15%.

The amount of missing data was small (<5%) and evenly distributed across methods, except for race and occupation. Race had missing frequencies of 4%, 2% and 6.7% in the telephone, internet, and mail questionnaires respectively. Occupation was missing in 0.4%, 7.7%, and 4.2% in the telephone, internet, and mail questionnaires respectively. Imputation of missing data was carried out prior to analyses by supplying the mean value in the case of a continuous predictor and the modal value for dichotomous and categorical predictors except for race and occupation which were imputed by relating each to other predictor variables. The missing values of race and occupation were then replaced by a predicted value that was most probable by using the SPLUS function TRANSCAN (Harrel 2001). All other statistical analyses were performed using SAS (Cary, North Carolina), version 8.1.

RESULTS

Participation and description of population

Of the 3997 participants, 2847 (71.2%) were employed during pregnancy. Demographics of those women employed and not employed were similar (Table 1); 83.4% of those employed were Caucasian, compared to 83.6% for those not employed. Also, both groups were of similar age and similar method for responding (e.g. 46.7% of the employed versus 45.4% of the unemployed responded by mail). However, college attendance was somewhat dissimilar between the employed and non-employed at 76.6% versus 70.0%, respectively. Over 90% of both groups reported having a permanent partner.

Comparing work and non-work falls in employed pregnant women

The overall fall rate among all 3997 women was 26.8% (1070) and, among the 2847 employed, it was 26.6% (757) for falls versus 27.2% (313) among the 1150 not employed. Of these 757 employed women who fell during their pregnancy, 99(13.1%) fell at work, 578 (76.4%) fell elsewhere, and 80 (10.6%) fell both at work and elsewhere. Of the 80 who fell at both, 41 described their most serious fall as a work fall and 39 as a non-work fall. Therefore, in order to achieve mutually exclusive events when comparing work and non-work falls, 140 work falls (99 + 41) and 617 non-work falls (578 + 39) were used. When analyzing risk factors for a fall at work, however, 179 women who fell at work (99 + 80) were used.

The majority (61.4%) of work falls occurred from the fifth through seventh months of gestation (Fig 1). Of the women who described their most serious fall at work compared to those occurring elsewhere, 51.4% versus 57.2% experienced an injury, 17.9% versus 19.3% obtained

medical attention, and 30.0% versus 32.7% experienced restricted activity (Table 2). Falls occurring at work were more likely to result in missed work compared to falls occurring elsewhere, 14.3% and 8.1%, respectively ($p=.02$). Though a slightly lower percentage of work versus non-work falls sought some type of medical attention (17.9% versus 19.3%), among those obtaining medical attention a considerable larger proportion of work falls required a more costly emergency room visit or hospital admission (68.0% versus 38.7%, respectively with $p<.01$). Similarly, among the women who missed work, the number who missed two or more working days for a work fall versus non-work fall was higher 70.0% versus 52.0% ($p=.17$), respectively. Those restricted six days or longer was greater for those falling at work (33.3%) than elsewhere (20.3%) ($p=.07$).

As shown in Table 3, the most common contributing factors of work falls were slippery floors (40.0%), moving at a hurried pace (39.3%), and carrying an object or child (30.3%). While the most common factors for non-work falls were stairs (43.4%), slippery floors (33.9%), and carrying and object or child (27.1%). Of the 130 women wearing shoes at the time of the work fall, 33 (25.4%) reported their shoes were slick, loose, or backless and 21 (16.2%) reported a heel height of one inch or greater (not shown).

Time of fall was obtained from 71 phone and internet participants who fell and was divided into four six hour intervals beginning at six AM. The majority of work falls (52.1%) occurred in the afternoon between noon and before 6 PM. The remaining work falls were evenly divided between morning (23.9%) and evening (22.5%) with only 1.4% of the falls occurring in the early morning hours.

The occupations with the highest rates of fall at work were food service, other service (such as beauticians and housecleaners), and teaching and childcare with rates of 13.2%, 12.8%,

and 10.2% respectively (Table 4). Of the 2847 women who worked during pregnancy, 89 had missing occupation (76 refusals and 13 missing or insufficient data). The fall rate at work among these 89 women was 7.9% (7). Contributing factors of falls differed by occupation for those women who described their most serious fall at work (Table 5). Slippery floors were especially important among food service employees, contributing to 58.3% of their work falls. Clutter was the leading factor for nurses, involved in 40% of their work falls. Problems with shoes (including loose, backless, and slick/worn soles) were a leading factor of work falls among healthcare professionals, sales, and management/professionals. In addition, hurrying was a leading factor in work falls among food service, administration, management and professional, and healthcare professional occupations. Location (indoors versus outdoors) varied with occupation. All food service work falls occurred indoors, whereas, for occupations such as service other and management/professional, almost half of work falls occurred outdoors.

Among the 89 phone and internet participants who described their most serious fall at work, 39 (43.8%) reported the fall to their employer and 12 (13.5%) filed a workers compensation claim as a result of the fall. In addition, 6.7% (6) were performing a new task at the time of the fall.

Work risk factors for fall at work

The unadjusted analysis of work conditions showed that women working in a loud environment were significantly more likely to fall at work with an odds ratio of 1.9 (95% confidence interval 1.2, 2.9) (Table 6). Other elevated but non statistically significant factors ($OR \geq 1.2$) included working for less than three months when first pregnant ($OR=1.4$), rotating shifts ($OR=1.2$) or not knowing how much weight was lifted in a typical day ($OR=1.2$).

Questions from the Job Content Questionnaire and job satisfaction were not statistically significant. Women having influence over their schedule demonstrated an observed trend ($p=.10$) of decreased falls at work.

Multivariable analysis for fall at work

Logistic regression modeling showed that, among the phone and internet participants, younger women aged 20-29 or women who worked in a loud environment had odds ratios of 1.5 (95% confidence interval 1.0, 2.3) and 1.9 (95% confidence interval 1.2, 3.0), respectively (Table 7). Phone and internet participants with less education demonstrated a protective odds ratio of 0.4 (95% confidence interval 0.2,0.9). Significant factors among the mail participants were lack of a permanent partner and less than college education with odds ratios of 1.8 (95% confidence interval 1.0, 3.2) and 2.1 (95% confidence interval 1.2, 3.8).

Study reliability

Based on non-response surveys, employment rates between participants and non-participants were similar at 71.2% and 72.6%, respectively. Of the 2847 employed participants, 179 (6.3%) fell at work and of the 276 employed non-participants, 23 (8.3%) fell at work. Among the participants, employment rates did not differ significantly between early responders (phone and internet) through later responders (first mailing and second mailing) although there was a gradual proportional increase in participants employed in high risk occupations from 11.7% in the phone/internet to 15.2% in the second mailing. Test retest reliability for fall and injury was completed by 415 (10.4%) of the 3997 participants. Kappa values were good for fall ($k=.85$) and any injury ($k=.58$), with percent agreement of 92.8% and 84.6%, respectively.

DISCUSSION

To our knowledge this is the first study investigating falls among pregnant workers. It was found that one in four pregnant workers fall and that 23.6% of those falls occur at work. In agreement with other studies, we found that younger workers are at higher risk for fall²¹. In addition, women working in a loud environment were more likely to fall at work. In order to determine the importance of the occupation itself to these risk factors, a post hoc analysis was performed using the 10 category occupational variable in the final model. Upon adjusting for occupation, education remained significant. However, age and loud environment were no longer significant in this post hoc model, suggesting that the risk for falls at work may actually be inherent to occupation itself and not predisposing risk factors such as age. This result may be explained by environmental factors of the job such as slippery floors in food service.

Of the 1517 phone and internet participants, 12 filed a workers compensation claim as a result of the fall during their pregnancy, resulting in a 9 month incidence rate of 7.9 per 1000. A Swedish study reported a yearly incidence rate of reported accidents due to work falls of 1.3 per 1000 for female workers under the age of 45 years²². The Bureau of Labor Statistics reports a rate for missed work due to fall at work of 32 cases per 10,000 workers (0.32%) for all occupations and gender¹⁵. Our study found a rate of 20 cases per 2847 pregnant workers (0.7%) of missed work days due to a fall at work. These increased rates among pregnant women may be due to continuous biomechanical, hormonal, anatomical, and physiological changes that women undergo during pregnancy increasing their risk of injurious fall. Specific changes that may increase risk of falls and injury include weight gain, lengthened abdominal muscles, limited hip joint range of motion, increased lordosis, inferior and anterior shift in center of gravity, increased joint laxity, increased estrogen, decreased kinesthetic sense and diminished coordination,

increased interstitial fluid, decreased reaction time, and changes in foot biomechanics and gait pattern²³⁻²⁵.

The occupations found to be high risk for falls during pregnancy in our study were similar to a Swedish study that reported three female occupations with high rates of fall at work: social work, child nursing and home help; lodging and catering service work; caretaking and cleaning work¹⁶. Nurses in our study, however, did not experience a high fall rate at work. One explanation is that during pregnancy, nurses may receive more help from peers, thus decreasing their workload and their risk of falls.

Similar to our results, Kemmlert found that slippery floors and snow/ice were involved in 28% and 25%, respectively of female fall accident reports and, among waitresses, 63% of all reported falls were due to slippery floors¹⁶. Noting these similarities, intervention targeting female occupations may also prevent falls among pregnant workers.

The yearly cost due to work falls in the United States is estimated at \$8.3 billion in direct cost and \$16.6 billion in indirect cost¹⁴. To estimate the cost in lost wages from missed work due to falls during pregnancy, occupations from our data were applied to 2000 Bureau of Labor Statistics tables²⁶ to calculate a mean daily wage of \$115/day for our employed participants. There are 3.9 million pregnant women annually in the United States²⁷, and our data suggests that 71.2% of them will be employed during pregnancy. This study found that 2.5% of pregnant workers missed work due to a fall, 0.7% due to work falls and 1.8% due to non-work falls. Using the minimum number of days of missed work of 0.5 (at least 1/2 day), 2 (2-5 days), 6 (6-10 days), and 11 (more than 10 days) based on the categories in our questionnaire (Table II), work falls during pregnancy result in at least 99,525 missed work days and \$11,445,375 in lost wages and non work falls during pregnancy result in at least 79,003 missed work days and

\$9,085,345 in lost wages. Considering the minimum number of work days missed were used in this calculation, this is likely to be an underestimate and does not include medical cost or cost to employer such as lost productivity.

The strength of this study is the population based design. However, some limitations exist. Due to the retrospective nature of the questionnaire, recall bias is possible. We believe recall bias for fall and injury is minimal because women were contacted within eight weeks after delivery and test retest analysis for fall and injury showed good consistency. It was possible that falls occurring early in pregnancy were not recalled. Non-participation bias was minimal because results from the non-participation survey indicated fall rates and employment rates were similar in participants and non-participants. An additional strength of this study is the use of multiple survey methods to maximize participation. However, in the analysis this became a limitation when analyzing risk factors for fall. Less than college education was protective among women who used the phone and internet method yet was a risk factor among women who used the mail survey. Thus, any conclusions regarding the association between education and falls in this study may be misleading; results may be due to bias. Additional methodological issues and potential biases will be explored further in a future publication.

Recommendations

This study showed that 2.5% of pregnant workers missed work due to a fall. Clearly prevention of work and non-work falls would greatly benefit both workers and employers. Pregnant workers should be counseled on slowing their pace, using caution when carrying objects especially if visual range is blocked, and being especially mindful of slippery floors. Interventions targeted for specific occupations should include a reduction of slippery floors for

food service employees, removing clutter for nurses, and proper shoe wear for women in sales, management, and professional occupations.

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TABLE 1: Demographic Characteristics of 3997 Participants Stratified by Employment Status During Pregnancy. *

	<u>Employed</u> (n=2847)	<u>Not employed</u> (n=1150)	<u>Total</u> (n=3997)
Age ^a	29.7 ± 5.1	30.6 ± 5.2	29.9 ± 9
Race			
Caucasian	2374 (83.4)	961 (83.6)	3335 (83.4)
African American	280 (9.8)	72 (6.3)	352 (8.8)
Other	98 (3.4)	82 (7.1)	180 (4.5)
Refuse/missing	95 (3.3)	35 (3.0)	130 (3.3)
Education			
≤ high school education	667 (23.4)	345 (30.1)	1012 (25.4)
some college	631 (22.2)	277 (24.2)	908 (22.8)
college grad	1547 (54.4)	525 (45.8)	2072 (51.9)
refuse/missing	2 (0.1)	3 (0.3)	5 (0.1)
Permanent partner	2592 (91.1)	1075 (93.5)	3667 (91.9)
Method			
Phone	1142 (40.1)	497 (43.2)	1639 (41.0)
Internet	375 (13.2)	131 (11.4)	506 (12.7)
Mail	1330 (46.7)	522 (45.4)	1852 (46.3)
Fall	757 (26.6)	313 (27.2)	1070 (26.8)

*Data are presented as n (%)

^aAge presented as mean ± standard deviation.

FIGURE 1: Fall Frequency by Gestational Age for Work Falls (N=140)

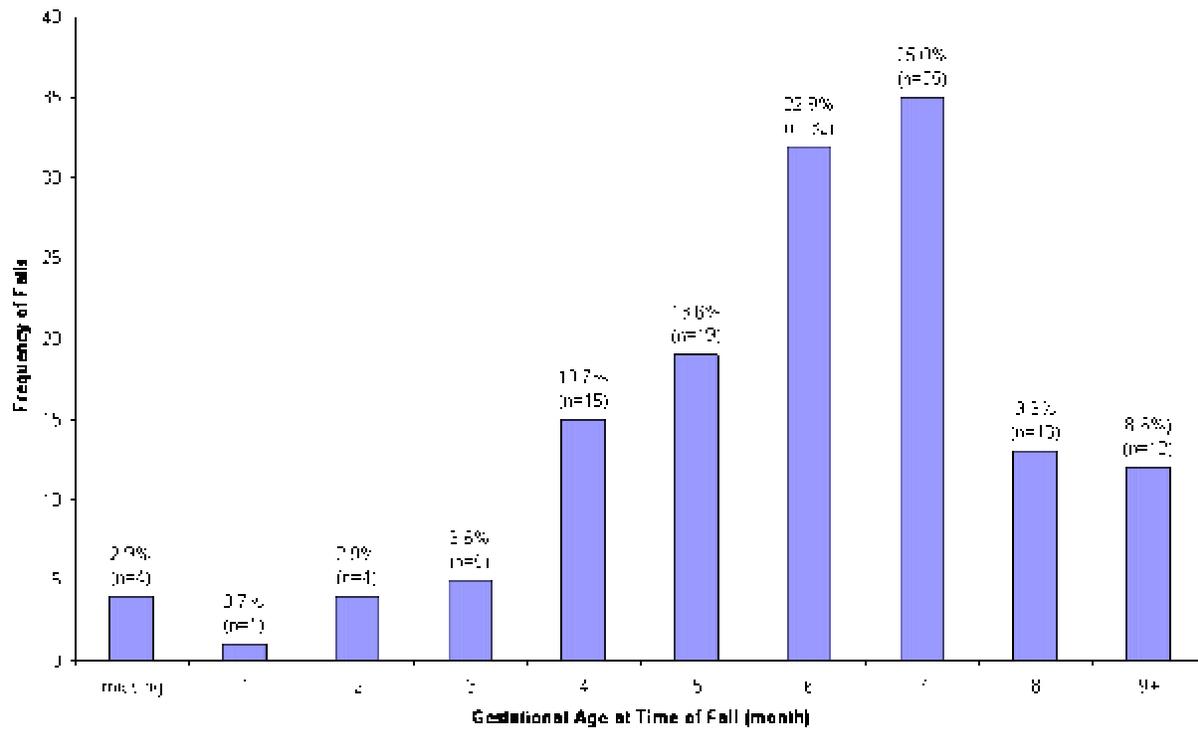


TABLE 2: Injury, Medical Attention, Restricted Activity, and Missed Work for Most Serious Falls Occurring at Work (n=140) versus Elsewhere (n=617).

	WORK FALL	NON-WORK FALL
Injury	<u>n (% of 72)</u>	<u>n (% of 353)</u>
Bruise	26 (36.1)	157 (44.5)
Cut	16 (22.2)	30 (8.5)
Turned ankle	4 (5.5)	44 (12.5)
Sprain/strain	15 (20.8)	94 (26.6)
Broken bone	5 (6.9)	11 (3.1)
Other	6 (8.3)	17 (4.8)
Medical attention obtained	<u>n (% of 25)</u>	<u>n (% of 119)</u>
Visit to physician office	8 (32.0)	73 (61.3)
Emergency room visit	12 (48.0)	36 (30.3)
Hospital admission	5 (20.0)	10 (8.4)
Restricted activity	<u>n (% of 42)</u>	<u>n (% of 202)</u>
≤ 1 day	16 (38.1)	79 (39.1)
2-5 days	12 (28.6)	82 (40.6)
6-10 days	6 (14.3)	18 (8.9)
> 10 days	8 (19.0)	23 (11.4)
Missed work*	<u>n (% of 20)</u>	<u>n (% of 50)</u>
≤ 1 day	6 (30.0)	24 (48.0)
2-5 days	5 (25.0)	23 (46.0)
6-10 days	2 (10.0)	2 (4.0)
> 10 days	7 (35.0)	1 (2.0)

*work falls resulted in more missed days compared to non-work falls (p=.02)

TABLE 3: Comparison of Contributing Factors of Work and Non-Work Falls.

Factor of Fall	Work Falls (n=140) n (%)	Non-work Falls (n=617) n (%)	Total Falls (n=757) n (%)
Indoors ^b	93 (66.4)	327 (53.0)	420 (55.5)
Stairs ^b	30 (21.4)	268 (43.4)	298 (39.4)
Body Movements at Time of Fall:			
Carrying an object or child ^a	27 (30.3)	79 (27.1)	106 (27.8)
Turning, reaching, or bending ^a	23 (25.8)	64 (21.9)	87 (22.8)
Pushing, pulling, or lifting ^a	2 (2.3)	14 (4.8)	16 (4.2)
Hurried pace ^{a,c}	35 (39.3)	76 (26.0)	111 (29.1)
Running ^a	2 (2.3)	8 (2.7)	10 (2.6)
Struck, pushed, or knocked over by accident	5 (3.6)	26 (4.2)	31 (4.1)
Struck, pushed, or knocked over on Purpose	1 (0.7)	4 (0.7)	5 (0.7)
Fell from elevation ^{a,b}	20 (23.3)	122 (41.8)	142 (37.6)
Fell more than 3 feet ^a	1 (0.7)	27 (4.4)	28 (3.7)
Vision Problems:			
Obstructed View ^a	6 (6.7)	36 (12.3)	42 (11.0)
Poor Lighting	18 (12.9)	114 (18.5)	132 (17.4)
Slippery floor surface overall			
Slip on water ^b	31 (22.1)	78 (12.6)	109 (14.4)
Slip on snow	18 (12.9)	102 (16.5)	120 (15.9)
Slip on other	15 (10.7)	52 (8.4)	67 (8.9)
Uneven/sloped floor ^c	25 (17.9)	175 (28.4)	211 (26.4)
Cluttered area ^c	16 (11.4)	37 (6.0)	53 (7.0)
Time of fall ^a			
6:00 am - 11:59 am	17 (23.9)	67 (27.7)	84 (26.8)
12:00 pm -5:59 pm ^c	37 (52.1)	92 (38.0)	129 (41.2)
6:00 pm - 11:59 pm ^c	16 (22.5)	74 (30.6)	90 (28.8)
12:00 am - 5:59 am	1 (1.4)	9 (3.7)	10 (3.2)
Unknown or missing	18	50	68

^aQuestions included in the internet and phone but not in the mail survey therefore the denominators are 89 work falls and 292 non-work falls (total n=381).

^bchi square p<.01

^cchi square p<.05

TABLE 4: Proportion of Falls at Work by Occupation from Highest to Lowest risk.

<u>Occupation</u>	<u>Total employed</u>	<u>Fell at work (%)</u>
Food service	106	14 (13.2)
Service other (hairdressers, housekeeping, protective, & transport)	102	13 (12.8)
Teachers/childcare	354	36 (10.2)
Healthcare professionals (MDs, vets, dentists, pharm, RDs, PAs, therapists, not nursing)	101	8 (7.9)
Missing, refuse, insufficient work data	89	7 (7.9)
Sales/retail sales (not food)	324	18 (5.6)
Management and professional (not healthcare or teachers)	809	44 (5.4)
Nursing	212	11 (5.2)
Administration	497	23 (4.6)
Healthcare services (dental hygiene, tech, not nursing)	95	3 (1.3)
Others (farmers, laborers, forestry, technologists, technicians not healthcare)	158	2 (1.3)

Table 5: Leading Contributing Factors of Work Falls by Occupation*

Occupation	Work Falls (n)	n(%)						
		<u>indoors</u>	<u>slippery flr</u>	<u>clutter</u>	<u>hurry^a</u>	<u>carry^a</u>	<u>shoeprob^b</u>	<u>stairs</u>
Food service	12	12 (100)	7 (58.3)	1 (8.3)	3 (100.0)	2 (66.7)	0	2 (16.7)
Service other	11	5 (45.5)	5 (45.5)	1 (5.6)	1 (14.3)	1 (14.3)	2 (18.2)	2 (18.2)
Teachers/childcare	30	22 (73.3)	12 (40.0)	4 (13.3)	3 (15.0)	4 (20.0)	8 (26.7)	6 (20.0)
Healthcare professionals	6	5 (83.3)	1 (16.7)	1 (16.7)	2 (40.0)	1 (20.0)	5 (83.3)	1 (16.7)
Sales/retail sales	13	8 (61.5)	4 (30.8)	2 (15.4)	3 (50.0)	4 (66.7)	5 (38.5)	3 (23.1)
Management/professional	33	18 (54.5)	15 (45.5)	1 (3.0)	11(45.8)	7 (29.1)	11 (33.3)	7 (21.2)
Nursing	10	8 (80.0)	1 (10.0)	4 (40.0)	1 (16.7)	1 (16.7)	1 (10.0)	1 (10.0)
Administration	16	10 (62.5)	5 (31.3)	1 (6.3)	9 (75.0)	5 (41.7)	4 (25.0)	6 (37.5)

*Factors were not mutually exclusive

^a Questions included in the internet and phone but not in the mail survey therefore the denominators vary by occupation as follows: Food service (3); Service other (7); Teachers/childcare (20); Healthcare professionals (5); Sales/retail sales (6); Management/professional (24); Nursing (6); Administration (12).

^b Shoe problem includes shoes that are loose, backless, or have worn/slick soles.

Table 6: Crude Odds Ratios for Fall at Work for Work Risk Factors for 1,517 Phone and Internet Participants Employed during Pregnancy.

<u>Factor</u>	<u>Fall Rate at Work (n)</u>	<u>Crude OR (95% CI)</u>	<u>p</u>
Loud environment			
Yes	10.5% (30/285)	1.87 (1.20, 2.92)	.006
No	5.9% (73/1232)	1.0 (reference)	
Work history at time became pregnant			
< 3 months	8.8% (16/182)	1.38 (.79, 2.42)	.25
At least 3 months	6.5% (86/1321)	1.0 (reference)	
Work rotating shifts			
Yes	7.9% (15/189)	1.21 (.69, 2.14)	.51
No	6.7% (88/1324)	1.0 (reference)	
How much weight did your job commonly require you to lift (pounds)?			
< 10	6.7% (66/987)	1.0 (reference)	
10 pounds or more	7.1% (34/482)	1.06 (.69, 1.63)	.87
Don't know	6.7% (3/45)	1.00 (.30, 3.30)	.96
How many times a day did you lift that weight?			
<5x	6.9% (23/332)	1.0 (reference)	
At least 5x	7.0% (12/171)	1.01 (.49, 2.09)	.80
Don't know	8.3% (2/24)	1.22 (.27, 5.52)	.86

TABLE 7: Adjusted odds ratios for Fall at Work for Phone/Internet and Mail Participants

VARIABLE	PHONE/INTERNET			MAIL		
	ALL (n) n=1517	FALL ^a n (%) n=103 (6.8)	aOR (95%CI) ^b	ALL (n) n=1330	FALL ^a n (%) n=76 (5.7)	aOR (95%CI) ^b
Age (years) ^c						
20-29	659	53 (8.0)	1.5 (1.0 ^e , 2.3)	741	44 (5.9)	ns ^f
≥ 30	858	50 (5.8)	1.0 (ref)	589	32 (5.4)	
Permanent partner ^d						
Yes	1456	101 (6.9)	ns ^f	1139	55 (4.8)	1.0 (reference)
No	61	2 (3.3)		191	21 (11.0)	1.8 (1.0 ^e , 3.2)
Education ^{cd}						
≤ high school degree	277	11 (4.0)	0.4 (0.2, 0.9)	390	37 (9.5)	2.1 (1.2, 3.8)
some college	304	22 (7.2)	0.9 (0.5, 1.4)	329	15 (4.6)	1.1 (0.6, 2.1)
college grad	936	70 (7.5)	1.0 (reference)	611	24 (3.9)	1.0 (reference)
Loud work environment ^c						
Yes	285	30 (10.5)	1.9 (1.2, 3.0)	Not available ^g		
No	1232	73 (5.9)	1.0 (reference)			

^aDenotes fall at work

^baOR denotes adjusted odds ratios and CI, confidence interval

^cVariables involved in phone and internet final model. Initial model consisted of unadjusted factors with $p < .25$ among phone and internet participants: survey method, education, maternal age, number of toddlers cared for during pregnancy, diabetes, and fulltime employment status during pregnancy (employed full time, employed part time), influence over work schedule, loud work environment, and duration of employment at time of initial pregnancy.

^dVariables involved in mail final model. Initial model consisted of unadjusted factors with $p < .25$ among mail participants: lack of a permanent partner, education, age, and race.

^eLower bound confidence interval was rounded down to 1.0, does not include 1.0

^fNot significant at $p < .05$ to be in final model

^gQuestion was not included in the mail survey

APPENDIX A

Authors' role in the project

I have been involved in this study from its beginning when I had the opportunity to do independent study with Dr. LeMasters. I performed a literature review and conducted two pilot studies regarding a possible study of falls during pregnancy. Surprisingly there was very little literature on this topic. I assisted with writing of the grant which was funded by the National Institute for Occupational Safety Health. I became project coordinator of the study and, with help from many mentors, was in charge of many activities including the following:

- completing IRB paperwork including consent form development and progress report;
- completing funding agency progress reports;
- obtaining approval from health departments and coordinated a system of obtaining birth records;
- being primary contact for subjects and research interview team;
- assuring quality control including training interview team and performing silent monitoring;
- developing questionnaire including conducting a pretest and pilot test;
- developing contact letters for subject correspondence;
- data management including cleanup, frequency checks and merging of datasets;
- data analysis;
- writing papers for publication; and
- presenting results at three conferences.

I feel very fortunate to have been able to participate in this study from the beginning to the end; it has prepared me well for a research career. Finally, I am very grateful to my committee members and other individuals who offered patience and guidance through out this process (see Acknowledgements).

APPENDIX B: Timeline

YEAR ONE	Sep 99	Oct 99	Nov 99	Dec 99	Jan 00	Feb 00	Mar 00	Apr 00	May 00	June 00	July 00	Aug 00
IRB Approvals				X	X			X				
Finalize questionnaires (telephone and mail)		X	X	X			X					
Pilot test questionnaires (telephone and mailed)					X	X						
Train/retrain interviewers				X				X				
Analyze pilot test						X						
Train health dept data entry personnel			X	X								
Pilot and trouble shoot health dept data base				X	X							
Develop data base systems (cohort ID)					X	X	X					
Enter City Hlth Dept.							X	X	X	X	X	X
Prepare letters for telephone/mailed survey								X	X	X	X	X
Receive birth certificate data from health dept (5 weeks after delivery)									X	X	X	X
Telephone questionnaire (6 weeks after delivery)									X	X	X	X
Mailed questionnaire (7 weeks after delivery)					X	X				X	X	X
QC Health Dept. Data										X	X	X
Data entry – mailed questionnaire (double)											X	X
Data Q/C Checks									X	X	X	X

YEAR TWO	Sep 00	Oct 00	Nov 00	Dec 00	Jan 01	Feb 01	Mar 01	Apr 01	May 01	June 01	July 01	Aug 01
Enter City Health Dept Data	X	X										
Cont. to receive birth certificate data	X	X										
Telephone questionnaire (6 weeks after delivery)	X	X	X									
Mailed questionnaire (7 weeks after delivery)	X	X	X	X	X	X						
validate falls & injury with records	X	X	X	X	X	X	X	X	X	X		
Data entry – mailed questionnaire (double)	X	X	X	X	X	X	X	X				
Data Q/C and coding open ended	X	X	X	X	X	X	X	X	X			
Analyze telephone questionnaire						X	X	X	X	X	X	
Analyze mailed questionnaire							X	X	X	X	X	X

YEAR THREE	Sep 01	Oct 01	Nov 01	Dec 01	Jan 02	Feb 02	Mar 02	Apr 02	May 02	June 02	July 02	Aug 02
Combine Telephone and Mailed as appropriate and analyze	X	X	X									
Prepare Draft Reports				X	X							
Send Letters to Participants (n=3627)				X	X	X						
Publications and Report Submission						X						
Presentation to City and County, Scientific Officials					X	X						

APPENDIX C: Initial letter to eligible women who matched with a telephone number

DATE

SUBJECT ADDRESS

Dear _____:

Congratulations on the birth of your baby!

The University of Cincinnati College of Medicine (U.C.) is *conducting a health survey* of women who were recently pregnant to learn more about how women lose or maintain their balance during pregnancy.

Your participation is vital for assisting future pregnant women in avoiding possible hazards. **You will receive a gift as a token of thanks for your participation.** Some questions you may have about the study are as follows:

How do I participate?

1. Talk to our telephone interviewer when she calls!

Someone associated with U.C. will call you in the near future to ask questions about your pregnancy. The survey takes on average 15 minutes. If the timing of the phone call is bad (we understand with a new baby in the house) we can call back when it is a good time.

2. Call us!

If you have “call block” we will not be able to contact you, so please call our research partner, RDI, at 984-5927 Mon-Fri between the hours of 8:00-6:00 and ask for Terri.

3. Use the internet to conduct the confidential survey on-line.

To do your survey on the internet, please go to <http://hgmweb3.com/p858>. *You must use your ID number printed at the bottom of this page.* You may stop at any time and come back to complete the survey. You will be able to go back and change answers if you need to.

For more information about this study, please see attached page.

What is the purpose of this study? The purpose of this study is to help other women by learning more about health and injury and preventing future injury during pregnancy.

How was I selected? All women who recently gave birth in Hamilton County were identified from public information available on birth certificate records.

Is participation voluntary? Yes, participation is completely voluntary. This survey in no way relates to any benefits that you may receive from the city, county, or state.

Who is sponsoring the study? The National Institute for Occupational Safety and Health (NIOSH) of the Centers for Disease Control (CDC) has provided the funding for the study.

Will my information be kept confidential? Yes! Information will be held at the strictest confidence level. Therefore, participation will not affect any receipt of benefits nor be reported to employers. No names are kept with the survey records, only identification numbers, so all information will be completely confidential. The results of the study will be reported as group information.

If you have additional questions, please call me or the project coordinator, Kari Dunning M.S., at (513) 558-5749. Thank you in advance for your assistance.

Sincerely,

Grace K. Lemasters, Ph.D., R.N.
Professor and Director
Division of Epidemiology & Biostatistics
U.C. College of Medicine

APPENDIX D: Initial letter to eligible women who did not match with a telephone number

DATE

SUBJECT ADDRESS

Dear _____:

Congratulations on the birth of your baby!

The University of Cincinnati College of Medicine (U.C.) is *conducting a health survey* of women who were recently pregnant to learn more about how women lose or maintain their balance during pregnancy.

Your participation is vital for assisting future pregnant women in avoiding possible hazards. **You will receive a gift as a token of thanks for your participation.** Some questions you may have about the study are as follows:

How do I participate?

1. Call us!

We would like you to participate in this important survey about pregnancy, but we do not have your phone number. **Please call our research partner, RDI, at 984-5927 Mon-Fri between the hours of 9 A.M. and 3 P.M. and ask for Joan.**

2. Use the internet to conduct the confidential survey on-line.

To do your survey on the internet, please go to <http://hgmrweb3.com/p858>. *You must use your ID number printed at the bottom of this page.* You may stop at any time and come back to complete the survey. You will be able to go back and change answers if you need to.

For more information about this study, please see attached page.

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Who is sponsoring the study? The National Institute for Occupational Safety and Health (NIOSH) of the Centers for Disease Control (CDC) has provided the funding for the study.

Will my information be kept confidential? Yes! Information will be held at the strictest confidence level. Therefore, participation will not affect any receipt of benefits nor be reported to employers. No names are kept with the survey records, only identification numbers, so all information will be completely confidential. The results of the study will be reported as group information.

If you have additional questions, please call me or the project coordinator, Kari Dunning M.S., at (513) 558-5749. Thank you in advance for your assistance.

Sincerely,

Grace K. Lemasters, Ph.D., R.N.
Professor and Director
Division of Epidemiology & Biostatistics
U.C. College of Medicine

APPENDIX E: Phone Questionnaire (the internet questionnaire was identical to this phone questionnaire)

TELEPHONE PREGNANCY AND FALL QUESTIONNAIRE

DATE INTERVIEW COMPLETED: _____

INTERVIEWER: _____

NEED TO CAPTURE FROM SAMPLE:

- *WOMAN'S NAME
- *WOMAN'S DATE OF BIRTH
- *BABY'S DATE OF BIRTH
- RDI ID#

* NEED TO SHOW ON SCREEN WITH QUESTION

A. Hello, this is _____ (INTERVIEWER'S NAME) representing the University of Cincinnati School of Medicine. May I speak to _____ (SUBJECT'S NAME)?

- 1 YES CONTINUE
- 2 NO SCHEDULE CALL BACK
- 3 NO LONGER HERE GET NEW PHONE NUMBER, IF POSSIBLE
- 4 NO SUCH PERSON THANK, TERM AND TALLY

B. We are calling regarding a study of recently pregnant women. A letter was mailed last week about this study. Did you receive the letter?

- 1 YES GO TO "READ" AFTER Q.C
- 2 NO CONTINUE

READ: The University of Cincinnati is conducting a health survey of women who were recently pregnant to learn more about how women maintain – or lose – their balance during pregnancy. Your participation is vital for assisting future pregnant women avoid possible hazards. For your participation, we will send you \$5.

C. May we begin the interview now?

- 1 YES CONTINUE
- 2 NO, SCHEDULE AT DIFFERENT TIME SCHEDULE CALL BACK
- 3 NO, PLEASE SEND LETTER TAKE NAME AND ADDRESS
- 4 REFUSED TO PARTICIPATE THANK, TERM AND TALLY

READ: As we told you in our letter, we would like to talk to you about your recent pregnancy. Before we begin, I would like to assure you that your answers will be kept in complete confidence—they will be added together with other responses and used in summary reports only. Your name will never be used in any report.

PREGNANCY QUESTIONS

D. I would like to ask you some questions about you and the baby. In general, how are you and the baby doing? Would you say: READ LIST.

- 1 GREAT
- 2 PRETTY WELL
- 3 OK
- 4 NOT SO GOOD
- 5 DO NOT HAVE BABY WITH THEM (DO NOT READ)
- 6 REFUSED (DO NOT READ)

DISPLAY BABY'S BIRTH DATE

1 On what date was your baby born?

___ ___ / ___ ___ / ___ ___ ___ ___
month / day / year

Don't know/Refused

2 And what did you name your baby? _____ (USED FOR INTERVIEW AND TO CHECK CORRECT PERSON CONTACTED)

DISPLAY MOTHER'S BIRTHDATE AND FIRST/LAST NAME

3 What is your birthdate?

- 1 Same Person
- 2 Different Person

IF DIFFERENT FROM LIST, THANK, TERM AND TALLY.

4 Did you have one baby, twins, or triplets?

- 3 ONE
- 4 TWINS
- 5 TRIPLETS
- 6 FOUR OR MORE
- 7 REFUSED

IF MORE THAN ONE IN Q.4, READ BEFORE Q.5. Because you had a multiple birth, would you please think in terms of average weight for all of your babies.

5 How much did (INSERT BABY NAME) weigh at birth

_____ pounds

_____ ounces

DON'T KNOW/REFUSED

6 Did you deliver early?

- 1 YES CONTINUE
- 2 NO GO TO Q.8
- 3 DON'T KNOW GO TO Q.8

7 How many weeks early did you deliver? _____ weeks

8 Before this last pregnancy, how many children had you delivered? DO NOT INCLUDE THIS LAST BIRTH
_____ past deliveries

9 During this last pregnancy, how many children age 3 and under did you usually care for? This could include your children, step children or other children you regularly care for even as an in-home day care.

___ ___ number children age 3 and under

EMPLOYMENT HISTORY QUESTIONS

I'd like to ask you questions about your work during this last pregnancy.

10 Which of the following did you do during your last pregnancy. Did you...

	Yes	No	Dk/ref
a. work outside the home for pay?			
b. operate a home business?			
c. volunteer at least 8 hours/week for an organization?			

IF YES TO "WORK OUTSIDE HOME" OR "OPERATE HOME BUSINESS" AUTOMARK "NO" IN FULL TIME HOMEMAKER.

d. do full time homemaking?			
-----------------------------	--	--	--

IF YES TO a or b in Q.10, ASK Q.11. ELSE SKIP TO INTRO BEFORE Q.12

11 During the majority of your pregnancy, did you work full-time or part-time? By full-time we mean 35 hours or more per week.

- 1 FULL TIME
- 2 PART TIME
- 3 DON'T KNOW/REFUSED

LOSS OF BALANCE

READ: One thing of concern to pregnant women is the possibility of losing their balance.

12 During this last pregnancy, did you experience any loss of balance resulting in a fall where some part of your body -- other than your feet -- touched the ground.

- 1 YES CONTINUE
- 2 NO SKIP TO Q.14
- 3 DON'T KNOW/REFUSED SKIP TO Q.14

13 How many times did you fall during your last pregnancy?

- 1 1
- 2 2
- 3 3
- 4 4 OR MORE
- 1 DON'T KNOW/REFUSED

14 And during this last pregnancy, did you experience any slips or trips – where you lost your balance but did not hit the ground?

- 1 YES CONTINUE
- 2 NO SKIP TO INSTRUCTIONS BEFORE Q.16
- 3 DON'T KNOW/REFUSED SKIP TO INSTRUCTIONS BEFORE Q.16

15 Thinking of the times during this last pregnancy that you slipped or tripped, how many times did that slip or trip result in an injury --of any type?

- 1 0
- 2 1
- 3 2
- 4 3
- 5 4 OR MORE
- 6 DON'T KNOW/REFUSED

IF NO TO BOTH 12 and 14, AND SUBJECT DID NOT WORK, ADVANCE TO MEDICAL QUESTIONS (Q.84.)

IF NO TO BOTH 12 and 14, AND SUBJECT DID WORK, ADVANCE TO GENERAL WORK QUESTIONS (INSTRUCTIONS BEFORE Q.71)

IF YES TO EITHER 12 OR 14, CONTINUE.

PROGRAMMING: ALLOW FOR THREE SPOTS FOR FALLS, AND THREE SPOTS FOR SLIP/TRIP.

IF FELL MORE THAN THREE TIMES, READ: You mentioned that you fell several times during this last pregnancy. I would like you to think of the three most serious falls in the next several questions.

(FIRST FALL): Please think first of the most serious of the falls you experienced during your pregnancy.

16 How many months pregnant were you when you fell?

- 1 1
- 2 2
- 3 3
- 4 4
- 5 5
- 6 6
- 7 7
- 8 8
- 9 9 OR MORE
- 10 DON'T KNOW /REFUSED

17 Did you seek any medical attention including a phone call to your health care provider, visit to physician or nurse, emergency room visit, hospital admission, or fetal monitoring?

- 1 YES CONTINUE
- 2 NO GO TO Q.22
- 3 DON'T KNOW/REFUSED GO TO Q.22

18 Which of the following were done? READ LIST. MARK ALL THAT APPLY.

- 1 CALLED MY PHYSICIAN OR OTHER HEALTH CARE PROVIDER
- 2 VISITED MY PHYSICIAN'S OFFICE OR CLINIC
- 3 WENT TO THE EMERGENCY ROOM
- 4 WAS ADMITTED TO THE HOSPITAL
- 5 HAD FETAL MONITORING
- 6 SOMETHING ELSE (SPECIFY) _____
- 7 None/nothing done

19 You mentioned you sought medical attention for this fall or slip. What was the approximate date that you sought medical attention?

20 May I have the name of the doctor or hospital you visited as a result of this fall?

IF ADMITTED TO HOSPITAL IN Q.18, CONTINUE. ELSE GO TO Q.22

21 How long were you in the hospital as a result of this injury? READ LIST AS NECESSARY.

- 1 LESS THAN ONE DAY
- 2 ONE TO TWO DAYS
- 3 THREE TO FIVE DAYS
- 4 MORE THAN FIVE DAYS
- 5 DON'T KNOW/REFUSED

22 What types of injuries, if any, did you suffer as a result of this fall? READ LIST. MARK ALL THAT APPLY.

- 1 NO INJURY
- 2 BRUISES
- 3 CUTS, LACERATIONS
- 4 PUNCTURES
- 5 "TURNED" ANKLE
- 6 MUSCLE SPRAIN/STRAIN OR TORN LIGAMENTS
- 7 BROKEN OR DISLOCATED BONE
- 8 CONCUSSION OR HEAD INJURY
- 9 OR SOME OTHER INJURY (SPECIFY)

23 Did the fall result in premature labor or delivery? MARK ALL THAT APPLY.

- 1 NEITHER
- 2 PREMATURE LABOR
- 3 PREMATURE DELIVERY
- 4 DON'T KNOW/REFUSED

24 Did you feel the fall resulted in injury to the baby including a broken bone or other injury?

- 1 NO INJURY TO BABY
- 2 BONE FRACTURE TO BABY
- 3 OTHER INJURY TO BABY (DESCRIBE)

25 Where were you at when you fell? Were you at work, volunteering, home, or someplace else?

- 1 AT WORK
- 2 AT PLACE WHERE VOLUNTEER
- 3 AT HOME
- 4 SOMEPLACE ELSE (specify)

REPEAT Q.16 THROUGH Q.25 FOR EACH OF THE FALLS AND FOR EACH OF THE TRIP/SLIPS THAT RESULTED IN INJURY.

Now thinking of the second most serious fall

Now thinking of the third most serious fall...

IF HAD MORE THAN THREE SLIP/TRIPS WITH INJURY, READ: You mentioned that you lost your balance several times during this last pregnancy that resulted in a slip or trip that caused some injury. I would like you to think of the three most serious slips or trips in the next several questions.

Now thinking of the most serious slip/trip with injury that you experienced during this last pregnancy,

Now thinking of the second most serious slip/trip with injury ...

Now thinking of the third most serious slip/trip with injury ...

SPECS: IF SUBJECT DOES NOT REMEMBER SPECIFIC MONTHS ASK ABOUT TRIMESTERS AND TAKE THE MIDDLE MONTH OF EACH TRIMESTER. IF PERSON FELL ON EMPLOYER'S PROPERTY, IT CONSTITUTES A "WORK" INJURY (EVEN IF PERSON WAS NOT OFFICIALLY WORKING AT THE TIME) – FOR EXAMPLE THEY MAY HAVE BEEN ON THEIR WAY TO WORK OR FROM WORK

LOOK AT LISTS OF FALLS AND SLIP/TRIPS.

- A MOST SERIOUS FALL**
- B 2ND MOST SERIOUS FALL**
- C 3RD MOST SERIOUS FALL**
- D MOST SERIOUS SLIP/TRIP**
- E 2ND MOST SERIOUS SLIP/TRIP**
- F 3RD MOST SERIOUS SLIP/TRIP**

CHOOSE WORK FALL/SLIP	
IF Q.10A OR 10B = YES AND FALL/SLIP IS AT WORK	CHOOSE HIGHEST AVAILABLE OF A, D, B, E, C, F
IF 10A OR 10B = YES AND NO FALL/SLIP AT WORK	CHECK FOR VOLUNTEER AT Q.9C
IF 10C = VOLUNTEER AND FALL/SLIP WAS WHERE VOLUNTEER	CHOOSE HIGHEST AVAILABLE OF A, D, B, E, C, F
IF NO SLIP/TRIP AT WORK OR VOLUNTEER,	NO FALL SELECTED

CHOOSE OTHER FALL/SLIP	
IGNORE ALL FALLS AT WORK	
IF FALL AT HOME OR OTHER	CHOOSE HIGHEST AVAILABLE OF A, D, B, E, C, F
IF FALL WHERE VOLUNTEER, AND NOT SELECTED ABOVE FOR WORK	CHOOSE HIGHEST AVAILABLE OF A, D, B, E, C, F

FOR THE WORK FALL/SLIP/TRIP, ASK Q.26-28. IF A FALL/SLIP WHERE VOLUNTEER, AND RESPONDENT VOLUNTEERS REGULARLY PER Q.10C, ASK Q.26-28

IF A NON-WORK, NON-VOLUNTEER FALL/SLIP SKIP TO Q.29

The rest of the questions will be about your fall/slip that occurred @location in month of pregnancy (TO DEFINE THE FALL YOU ARE ASKING ABOUT)...

- 26 Was the task you were performing new or unfamiliar?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED

- 27 Did you report this fall to your employer?
- 1 YES

- 2 NO
- 3 DON'T KNOW/REFUSED

- 28 Was a worker's compensation claim filed as a result of an injury due to the fall?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED

GENERAL QUESTIONS ABOUT FALL

ASK THESE QUESTIONS ABOUT BOTH THE WORK AND NON-WORK FALL.

- 29 Please tell me what you were doing when you fell (slipped/tripped) (DOCUMENT 5-6 WORDS)

- 30 Do you think that this fall could have been prevented in some way?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW REFUSED

IF YES IN Q.30 ASK Q.31. ELSE SKIP TO Q.32.

- 31 How might this fall have been prevented? (DOCUMENT AT LEAST 5 EXACT WORDS)

- 32 What time of day was the fall? ____ ____ AM PM
(Hour)

- 33 Were you using the bathtub or shower?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED

- 34 Were you indoors or outdoors?
- 1 INDOORS
 - 2 OUTDOORS
 - 3 DON'T KNOW/REFUSED

- 35 For how many days did the fall restrict or interfere in any way with your physical activities? READ LIST AS NECESSARY
- 1 NONE/NOT AT ALL
 - 2 1 DAY OR LESS
 - 3 2 - 5 DAYS
 - 4 6 - 10 DAYS
 - 5 MORE THAN 10 DAYS
 - 6 DON'T KNOW/REFUSED
- 36 How many days of work did you miss as a result of the injury? READ LIST AS NECESSARY.
- 1 NONE/NOT AT ALL
 - 2 1 DAY OR LESS
 - 3 2 - 5 DAYS
 - 4 6 - 10 DAYS
 - 5 MORE THAN 10 DAYS
 - 6 DON'T KNOW/REFUSED
- 37 Did you fall on stairs?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
- IF YES IN Q.37 CONTINUE. ELSE SKIP TO Q.42
- 38 Were the steps in good condition?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
- 39 Were there handrails available on the stairs?
- 1 YES CONTINUE
 - 2 NO GO TO Q.42
 - 3 DON'T KNOW/REFUSED GO TO Q.42
- 40 Were the hand rails in good shape?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
- 41 Did you use them?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED

- 42 Did you fall off of something, including a ladder, stairs, or other object?
- 1 YES CONTINUE
 - 2 NO GO TO Q.44
 - 3 DON'T KNOW/REFUSED GO TO Q.44
- 43 How far did you fall? READ LIST AS NECESSARY.
- 1 LESS THAN THREE FEET
 - 2 3-6 FEET
 - 3 MORE THAN 6 FEET
 - 4 DON'T KNOW/REFUSED
- 44 Were any of the following items related to or involved in your fall or slip in any way ? READ LIST. MARK ALL THAT APPLY.
- 1 LADDER
 - 2 CURB
 - 3 MINIVAN/SUV/TRUCK
 - 4 CAR
 - 5 ELEVATOR
 - 6 ESCALATOR
 - 7 MACHINERY
 - 8 SOMETHING ELSE? (SPECIFY) _____

Now I'd like to ask you about your body movements at the time of the fall.

- 45 At the time of the fall were you pushing, pulling, lifting or carrying a child or other object?
- 1 YES CONTINUE
 - 2 NO GO TO Q.47
 - 3 DON'T KNOW/REFUSED GO TO Q.47
- 46 Which of the following were you doing at the time of the fall/slip? READ LIST.
- 1 LIFTING A CHILD
 - 2 CARRYING A CHILD
 - 3 PUSHING OR PULLING A CHILD
 - 4 LIFTING AN OBJECT
 - 5 CARRYING AN OBJECT
 - 6 PUSHING OR PULLING AN OBJECT
 - 7 DON'T KNOW/REFUSED

- 47 Were you reaching, turning, or bending?
- 1 REACHING
 - 2 TURNING
 - 3 BENDING
 - 4 NONE OF THESE
- 48 Were you getting up or down from a sitting or lying down position?
- 1 GETTING UP OR DOWN FROM SITTING POSITION
 - 2 GETTING UP OR DOWN FROM A LYING POSITION
 - 3 NOT GETTING UP OR DOWN FORM SITTING OR LYING POSITION.
 - 4 DON'T KNOW/REFUSED
- 49 At the time of the fall were you (MARK ALL THAT APPLY)
- 1 MOVING AT A HURRIED PACE
 - 2 RUNNING
 - 3 NEITHER
 - 4 DON'T KNOW/REFUSED
- 50 Was your view obstructed?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
- 51 Were you accidentally struck, pushed, or knocked over?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
- 52 Were you purposefully struck, pushed, or knocked over?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
- 53 At the time of the fall, did you feel faint or dizzy?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED

- 54 Do you need to wear corrective lenses or contacts, or not?
-1 YES CONTINUE
-2 NO SKIP TO Q.56
-3 DON'T KNOW/REFUSED SKIP TO Q.56
- 55 Were you wearing your corrective lenses at the time of the fall?
-1 YES
-2 NO
-3 DON'T KNOW/REFUSED
- 56 Were you wearing sunglasses in a low lit area?
-1 YES
-2 NO
-3 DON'T KNOW/REFUSED
- 57 Now I'm going to ask you about the conditions of the area where you fell. At the time of the fall, was the area cluttered or poorly lit including poor overhead lighting or darkness due to evening or early morning hours?

-1 CLUTTERED
-2 POORLY LIT
-3 DARKNESS OF EVENING OR EARLY MORNING HOURS
-4 NEITHER
-5 DON'T KNOW/REFUSED
- 58 Was the floor or ground icy or snowy?

-1 YES
-2 NO
-3 DON'T KNOW
- 59 Was the floor slippery due to water?

-1 YES
-2 NO
-3 DON'T KNOW
- 60 Was the floor slippery due to some other cause?
-1 YES
-2 NO
-3 DON'T KNOW

- 61 Was the ground uneven or sloped?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW
- 62 Now I would like to ask you questions about your footwear at the time of the fall. Were you wearing shoes?
- 1 YES SKIP TO Q.64
 - 2 NO CONTINUE
 - 3 DON'T KNOW/REFUSED GO TO Q.64
- 63 Were you barefoot or where you wearing socks or stockings?
- 1 BAREFOOT
 - 2 STOCKING/SOCKS
 - 3 DON'T KNOW/REFUSED
- GOTO Q.68
- 64 Were the soles of your shoes worn or slick?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
- 65 Were your shoes loose?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
- 66 Were your shoes backless? (Spec: no heel support e.g. clogs, flip/flops...)
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
- 67 About how high were the heels of your shoes? Were they...
- 1 LESS THAN 1"
 - 2 1 - 2'
 - 3 GREATER THAN 2"
 - 4 DON'T KNOW/REFUSED

68 Now I would like to ask you some questions regarding your medical condition on the day of the (fall/slip). On the day of the (fall/slip) were you tired or fatigued more than usual?

- 1 YES
- 2 NO
- 3 DON'T KNOW/REFUSED

69 On the day of the (fall/slip) had you experienced a shaky feeling that might be due to low blood sugar, in other words, hypoglycemia?

- 1 YES
- 2 NO
- 3 DON'T KNOW

70 Had you been experiencing extreme vomiting and/or diarrhea that day?

- 1 YES
- 2 NO
- 3 DON'T KNOW

71 Within eight hours of the fall, had you used any of the following: RECORD YES/NO/DK/REFUSED FOR EACH. RECORD REFUSED SEPARATELY FROM DON'T KNOW.

	YES	NO	DK	REF
COFFEE OR SODA WITH CAFFEINE				
TOBACCO INCLUDING CIGARETTES AND CIGARS				
MEDICINE FOR PAIN, SLEEP, NERVOUSNESS, HEART, BLOOD PRESSURE				
ALCOHOL OR RECREATIONAL DRUGS				

REPEAT Q.29 THROUGH Q.70 FOR SECOND SLIP/FALL IF THERE WAS ONE.

GENERAL WORK QUESTIONS

IF DID NOT WORK IN Q.10 A OR B, GO TO Q.84
 (ASKED TO ALL WOMEN WHO WORKED DURING PREGNANCY. IF THE WOMAN FELL AT WORK COLLECT THE FOLLOWING INFO REGARDING THE JOB AND LOCATION WHERE THE FALL OCCURRED. IF THE WOMAN DID NOT FALL AT WORK AND WORKED MORE THAN ONE JOB, COLLECT THE INFO REGARDING THE PLACE OF EMPLOYMENT SHE WAS AT FOR THE LONGEST AMOUNT OF TIME DURING HER PREGNANCY)

We would like to know more about your work environment during your pregnancy. Please remember this survey is completely confidential. (READ AS NECESSARY: If you fell at work, tell me about the place of employment where the fall occurred.)

72 During your pregnancy, what company were you working for?

73 What kind of business or industry was this? (3-4 WORDS)

74 What was your job title?

75 Using 3-4 words or phrases, describe your most important activities on this job and the primary product or service produced.

76 At the time you became pregnant, how long had you worked for this business?
READ LIST AS NECESSARY.

- 1 LESS THAN 3 MONTHS
- 2 3 MONTHS TO 1 YEAR
- 3 LONGER THAN 1 YEAR
- 4 DON'T KNOW/REFUSED

77 Now I would like to ask some questions about your opinion of stress at work during pregnancy. I will read a statement about your job that you performed during this last pregnancy. Please tell me how much you agree or disagree with each statement by using a scale from 7 to 1 where 7 means “agree completely and 1 means “disagree completely. Of course, you can use any number between 7 and 1. How much do you agree...

	Rating
a. I HAD ENOUGH TIME TO GET THE JOB DONE.	
b. MY JOB REQUIRED WORKING VERY FAST.	
c. I WAS SATISFIED WITH MY JOB.	
d. I HAD INFLUENCE OVER THE AMOUNT OF WORK I DID.	
e. I HAD INFLUENCE OVER THE HOURS OR SCHEDULE THAT I WORKED.	

78 Did your work require you to talk overly loud due to noise?

- 1 YES
- 2 NO
- 3 DON'T KNOW /REFUSED

79 Did you work rotating shifts?

- 1 YES
- 2 NO
- 3 DON'T KNOW /REFUSED

80 If you worked more than 4 hours per shift, how many breaks did you take, including lunch and smoking breaks?

- 1 NONE
- 2 1
- 3 2
- 4 3
- 5 4 OR MORE
- 6 DID NOT WORK MORE THAN 4 HOURS AT A TIME.
- 7 DON'T KNOW/REFUSED

- 81 During your pregnancy, did your job commonly require you to lift 10 pounds or more?
- 1 YES CONTINUE
 - 2 NO GO TO Q.85
 - 3 DON'T KNOW/REFUSED GO TO Q.85
- 82 How much weight did your job commonly require you to lift?
- 1 10-20 POUNDS
 - 2 21-30 POUNDS
 - 3 OVER 30 POUNDS
 - 4 DON'T KNOW/REFUSED
- 83 During pregnancy, how many times during the work day (or shift) did you lift that much weight?
- 1 LESS THAN 5 X
 - 2 5-10 X
 - 3 10-20 X
 - 4 MORE THAN 20 X
 - 5 DON'T KNOW/REFUSED
- 84 Were these lifting requirements decreased due to your pregnancy?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED

MEDICAL QUESTIONS ASK OF ALL RESPONDENTS

85 I would like to ask you some questions about your medical status prior to and during pregnancy. Did you have any of the following conditions during this last pregnancy?

	Yes	No	Dk/ Ref
a. DID YOU HAVE DIABETES DIAGNOSED PRIOR TO PREGNANCY			
IF YES TO Q.85a, CONTINUE. ELSE SKIP TO PART C.			
b. DID YOU REQUIRE INSULIN, OR NOT?			
IF YES TO 85a, SKIP TO PART E.			
c. DID YOU HAVE DIABETES DIAGNOSED DURING THIS LAST PREGNANCY?			
IF YES TO Q.85c, CONTINUE. ELSE SKIP TO PART e			
d. DID YOU REQUIRE INSULIN, OR NOT?			
e. A PHYSICAL OR MEDICAL CONDITION THAT AFFECTED BALANCE OR WALKING. THIS MAY INCLUDE A NEUROLOGICAL DIAGNOSIS SUCH AS MENIERE'S DISEASE OR SEIZURES OR CONDITIONS DURING PREGNANCY SUCH AS HIGH BLOOD PRESSURE OR PRE-ECLAMPSIA. (SPECS: ECLAMPSIA IS PREGNANCY INDUCED...)			
f. A VISUAL PROBLEM NOT CORRECTED WITH EYEGLASSES OR CONTACT LENSES INCLUDING PARTIAL BLINDNESS OR RETINOPATHY.			

86 Before this last pregnancy, did you exercise at least 3x/week including such activities as tennis, martial arts, Tai Chi, or aerobic exercise such as biking, running, walking, or swimming.

- 1 YES
- 2 NO
- 3 DON'T KNOW/REFUSED

87 How tall are you? ___ feet ___ inches

88 During this last pregnancy, about how much weight did you gain?

_____ lb

- 88a. Compared to before your pregnancy, would you say you slipped or tripped:
READ LIST.
- 1 More often
 - 2 Less often
 - 3 About the same amount during pregnancy as before.
 - 4 Don't know/refused (DO NOT READ.)
- 88b. Compared to during your pregnancy, would you say you now slipp or trip: READ LIST.
- 1 More often
 - 2 Less often
 - 3 About the same amount as during pregnancy.
 - 4 Don't know/refused (DO NOT READ.)
- 89 Sometimes an unexpected pregnancy can be stressful and have effects on your health. At the time you became pregnant, did you have a strong desire to have a baby at that time?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
- 90 At the time you became pregnant, did your partner have a strong desire to have a baby at that time?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
 - 4 NO PARTNER

DEMOGRAPHICS (Asked of all subjects)

In order for us to understand how similar or different our participants are I would like to ask you a few questions about yourself.

- 91 What is the highest grade or year of school that you completed?
- 1 NOT A HIGH SCHOOL GRADUATE
 - 2 HIGH SCHOOL GRADUATE
 - 3 SOME COLLEGE OR VOCATIONAL SCHOOL
 - 4 COLLEGE GRAD OR HIGHER
 - 5 DON'T KNOW/REFUSED

- 92 Are you now married or with a permanent partner?
- 1 YES
 - 2 NO
 - 3 DON'T KNOW/REFUSED
- 93 How would you describe your racial ethnic background? READ LIST AS NEEDED.
- 1 CAUCASIAN/WHITE
 - 2 AFRICAN AMERICAN/BLACK
 - 3 HISPANIC
 - 4 ASIAN OR PACIFIC ISLANDER
 - 5 AMERICAN INDIAN/ALASKA NATIVE/ALEUT
 - 6 OTHER: (SPECIFY) _____
 - 7 DON'T KNOW/REFUSED
- 94 Which of the following categories includes your yearly household income before taxes?
- 1 < \$5,000
 - 2 \$5,000-\$10,000
 - 3 \$10,001-\$20,000
 - 4 \$20,001-\$40,000
 - 5 \$40,001-\$60,000
 - 6 OVER \$60,000
 - 7 DON'T KNOW/REFUSED

6. In which of the following ways, if any, did you seek medical attention due to the fall?
(MARK ALL THAT APPLY.)

- A phone call to your health care provider
- Visit to physician or nurse
- Emergency room visit
- Hospital admission
- Fetal monitoring
- I sought no medical attention*

7. Which of the following conditions, if any, did you (not the baby) receive as a result of the fall?

- Bruises
- Cuts
- Turned ankle
- Pulled muscle
- Sprain/strain
- Broken bone or dislocated bone
- Concussion
- Premature labor
- Premature delivery
- Some other injury or condition (please specify: _____)
- No injury or condition resulted from the fall*

CONTINUED ON NEXT PAGE. PLEASE TURN PAGE.

8. Did you feel the fall resulted in any injury to or problem with the baby?

No

Yes →

IF BABY HAD PROBLEM/INJURY:

(Please describe: _____)

9. At the time of the fall, were you using the bathtub or shower?

No

Yes

10. At the time of the fall, were you indoors or outdoors?

Indoors

Outdoors

11. For how many days did the fall restrict or interfere in any way with your physical activities?

None at all

1 day or less

2 - 5 days

6 - 10 days

More than 10 days

12. How many days of work did you miss as a result of the injury?

None at all

1 day or less

2 - 5 days

6 - 10 days

More than 10 days

13. Did you fall while on the stairs?

- No
- Yes

IF YOU FELL WHILE ON THE STAIRS:

22a Were the stairs in good condition?

- No
- Yes

22b Were there handrails available on the stairs?

- No
- Yes

14. Were any of the following items related to your fall? (MARK ALL THAT APPLY.)

- Ladder
- Curb
- Minivan/SUV/truck
- Car
- Elevator
- Escalator
- Machinery
- Something else (Please specify: _____)

15. Were you accidentally struck, pushed, or knocked over?

- No
- Yes

16. Were you purposefully struck, pushed, or knocked over?

- No
- Yes

17. Was the area ... (MARK ALL THAT APPLY)

- Cluttered
- Poorly lit
- Dark due to evening, night or early morning hour
- None of these

18. Was the floor or ground... (MARK ALL THAT APPLY)

- Icy or snowy
- Slippery due to water
- Slippery due to another cause
- None of these

19. Was the ground uneven or sloped?

- No
- Yes

20. Do you need corrective glasses or contact lenses?

- No
- Yes

IF YOU NEED GLASSES OR CONTACTS:

Were you wearing glasses or contacts at the time of the fall?

- No
- Yes

21. Now I would like to ask you questions about your footwear at the time of the fall. Were you wearing shoes?

No →

<i>IF YOU WERE <u>NOT</u> WEARING SHOES:</i> Were you barefoot or wearing socks/stockings? <input type="checkbox"/> Barefoot <input type="checkbox"/> Socks/stockings
--

Yes →

<i>IF YOU WERE WEARING SHOES:</i> Were the soles of your shoes worn or slick? <input type="checkbox"/> No <input type="checkbox"/> Yes Were your shoes loose? <input type="checkbox"/> No <input type="checkbox"/> Yes Were they backless, e.g. clogs, flip/flops, etc. <input type="checkbox"/> No <input type="checkbox"/> Yes About how high were the heels of your shoes? <input type="checkbox"/> Less than 1" <input type="checkbox"/> 1-2" <input type="checkbox"/> Greater than 2"
--

22. Do you think that this fall could have been prevented in some way?

No
 Yes → How? (PLEASE BE SPECIFIC)

23. Is there anything else you would like to tell us about the fall? If we missed asking you about something, please briefly describe what you were doing when you fell.

If you were not employed during your pregnancy, skip to Question 29.

Whether you fell or not, we would like to know more about your work environment during your pregnancy. If you fell at work, please answer the following questions regarding that place of employment. If did not fall at work, and you worked at more than one place, tell us about the place you worked most. Please remember this survey is completely confidential.

24. During your pregnancy, what company were you working for?

25. What kind of business or industry was this?

26. What was your job title?

27. Using 3-4 words or phrases, describe your most important activities on this job and the primary product or service produced.

Now we would like to know about work stress during pregnancy.

28. For the following 2 statements, please use a scale from 7 to 1 where 7 means “agree completely” and 1 means “disagree completely” to tell us how much you agree with each statement. Of course, you can use any number between 7 and 1.

	Agree Completely					Disagree Completely	
My job required working very fast.	7	6	5	4	3	2	1
I was satisfied with my job.	7	6	5	4	3	2	1

Now we would like to ask you some questions about your medical status during pregnancy.

29. Did you have any of the following conditions?

- | | No | Yes |
|--|--------------------------|--------------------------|
| a Did you have diabetes diagnosed <u>prior</u> to pregnancy? | <input type="checkbox"/> | <input type="checkbox"/> |
| b Did you have diabetes diagnosed <u>during</u> this last pregnancy? | <input type="checkbox"/> | <input type="checkbox"/> |
| c Did you require insulin? | <input type="checkbox"/> | <input type="checkbox"/> |
| d Did you have a physical or medical condition that affected balance or walking or a non-correctable vision problem? | <input type="checkbox"/> | <input type="checkbox"/> |

30. Where you injured in any other way – other than a fall – during your pregnancy?

No

Yes

IF YOU WERE INJURED:
(Please describe: _____)

The last few questions are about your background. This information will help us describe, in general ways, the women who participate in this study.

31. What is the highest grade or year of school that you completed?

- Not a high school graduate
- High school graduate
- Some college
- College grad or higher

32. Are you now married or with a permanent partner?

- No
- Yes

33. How would you describe your racial ethnic background?

- Caucasian
- African American
- Hispanic
- Asian or Pacific Islander
- American Indian/Alaska Native/Aleut
- Other (Please specify) _____

Have you signed the “Informed Consent” page up front? THANK YOU!

APPENDIX G: Non participant questionnaire (postcard)

YOUR ANSWERS TO THESE FEW QUESTIONS WILL HELP IMPROVE THE HEALTH OF MOMS AND THEIR BABIES.

1. During your recent pregnancy, what was your work status? **(PLEASE MARK ALL THAT APPLY.)**

- I worked outside the home for pay.
- I operated a home business.
- I volunteered at least 8 hours/week for an organization, not family or friends.
- I did full time homemaking.

2. *One thing of concern to pregnant women is the possibility of losing their balance resulting in a FALL, that is, when some part of the body - other than the feet - touch the ground.*

During your recent pregnancy, did you: ? **(MARK ONE PER LINE)**

- Fall at work . Yes . No
- Fall at home . Yes . No
- Fall someplace else . Yes . No

Please answer these few research questions
to keep Moms and their
babies healthy! Thanks!

APPENDIX H

Test retest questionnaire (postcard)

1. *One thing of concern to pregnant women is the possibility of losing their balance resulting in a FALL, that is, when some part of the body - other than the feet - touch the ground.*

During your recent pregnancy, how many times did you: ? (MARK ONE PER LINE)

Fall at work	0	1	2	3	4+
Fall at home	0	1	2	3	4+
Fall someplace else	0	1	2	3	4+

2. If you fell what types of injuries, if any, did you suffer as a result of any of these fall(s)? (PLEASE MARK ALL THAT APPLY.)

- No injury
- Bruise
- Cut/laceration
- Turned ankle
- Muscle sprain/strain/torn ligament
- Broken or dislocated bone
- Concussion or head injury
- Other (specify)

3. During this last pregnancy, did you experience any **slips/trips** - where you lost your balance but did not hit the ground?

- Yes
- No
- Don't know

4. Thinking of the times during this last pregnancy that you slipped/tripped, how many times did that **slip/trip** result in an injury of any type?

0 1 2 3 4+

Please answer these few research questions
to keep Moms and their
babies healthy! Thanks!

APPENDIX I: Phone consent form

This consent form was signed by the telephone interviews and included a list of ID numbers for participants they interviewed.

**TELEPHONE INTERVIEW
CONFIRMATION OF CONSENT**

Between DATE and DATE, I conducted telephone interviews for the grant entitled “Work Related Risk Factors Associated with Falls During Pregnancy” on a project designated “Pregnancy Pilot”, RDI Job # 99-1099. All of the respondents I called were asked to participate at the beginning of the interview. All completed interviews were with women who were knowledgeable of the purpose of the survey, understood that participation was voluntary and that confidentiality would be maintained. All subjects agreed to participate prior to beginning the survey and understood that by completing the survey over the phone, they gave their consent to participate in the study. **Attached is a list of the respondent ID numbers for interviews I conducted.**

“I agree that all subjects agreed to participate in the study prior to beginning the questionnaire and that subjects were informed of the purpose of the study, that confidentiality would be maintained, and that participation was voluntary.”

Number of Interviews _____

Interviewer Name (Printed) _____

Interviewer Signature _____

Date _____

APPENDIX J: Internet consent form

This consent form was the first screen the participant saw when she visited the internet site. After entering her unique confidential code provided to here in the initial letter, she was allowed into the questionnaire.

WELCOME TO THE INTERNET PREGNANCY & HEALTH SURVEY

The University of Cincinnati **College of Medicine** is conducting a health survey of women who were recently pregnant to learn more about how women maintain – or lose – their balance during pregnancy. Your participation is vital for assisting future pregnant women avoid possible hazards. For your participation, we will send you \$5.

I would like to assure you that your answers will be kept in complete confidence—these will be added together with other responses and used in summary reports only. Your name will never be used in any report.

I would like to remind you that your participation is completely voluntary and by completing this questionnaire you indicate your consent to participate in the study and that you understand your confidentiality will be maintained.

In order to proceed with the study, please enter the ID# we provided you in the letter below:

(If you do not remember your ID#, please call Kari Dunning at 558-5749.)

APPENDIX K: Mail consent form

This consent form was attached to the mail questionnaire. The participant signed it and returned it with the completed questionnaire. When we received the mail questionnaire, this signed consent form was immediately detached from the questionnaire and stored in a separate confidential area.

INFORMED CONSENT
MAIL QUESTIONNAIRE
PREGNANCY, HEALTH, AND INJURY SURVEY

The purpose of this study is to help other women by learning more about health and injury and preventing future injury during pregnancy.

“By completing this questionnaire, I indicate my consent to participate in this study. I understand my confidentiality will be maintained.”

Signature _____

DATE _____

In order to include your responses, we must have your signature. Thank you.

APPENDIX L: Protocol for validation of medical attention including a physician visit, emergency room visit, or hospital admission.

PROTOCOL
VALIDATION OF INJURY/MEDICAL ATTENTION

Purpose: To validate injury and reported medical attention in women who reported receiving medical attention including visit to MD, ER, hospital admission, or fetal monitoring.

Procedure:

- Mail letter & “release form” to subject with self-addressed stamped envelope.
 - ?off campus mail to speed up process
- If authorization has not been received in 1 week:
 - If subject phone # is available, call subject to remind them
 - If subject phone # not available, mail another request
- Receive authorization from subject
- Send authorization and letter to clinic/practice/hospital requesting copy of medical record
- Receive medical record and file appropriately
- Keep log recording all dates of mailings, phone calls, received authorizations, received medical records for each subject ID # (a form will be developed)

Turnaround time:

- 1 week to mail release form to subject
- 1 week to receive release from subject
- 1 week to send authorization to clinic/practice/hospital
- 3 weeks to receive copied medical record

APPENDIX M: Signature form for release of medical chart

RELEASE OF MEDICAL INFORMATION

DATE: _____

TO: _____
(NAME OF PRACTICE or DOCTOR or HOSPITAL or CLINIC)

(CITY/STATE)

I, _____, authorize the release of my medical records concerning a fall during pregnancy to:

Dr. Grace Lemasters, Ph.D. R.N.
ATTN: Kari Dunning, M.S.
Department of Environmental Health
Division of Epidemiology and Biostatistics
PO Box 670056
Cincinnati OH 45267-0056

Fax# (513) 558-4838

WITNESS

YOUR SIGNATURE

YOUR DATE OF BIRTH

PRINT YOUR LAST NAME USED AT THE TIME OF THE FALL (IF DIFFERENT FROM THE ABOVE)

YOUR SOCIAL SECURITY NUMBER (OPTIONAL)

APPENDIX N

Letter of request to healthcare providers for participant medical record

Date

Return address

Dear MD/hospital/medical records:

The University of Cincinnati is conducting a research study to investigate falls and injury during pregnancy. Enclosed is a signed authorization form for release of medical records regarding the patient's fall on (DATE) . Please fax or mail the requested information to the following:

Dr. Grace Lemasters, Ph.D., R.N.
ATTN: Kari Dunning
Department of Environmental Health
Division of Epidemiology and Biostatistics
PO Box 670056
Cincinnati OH 45267-0056

FAX# (513) 558-4838

Please feel free to contact me or the grant project coordinator, Kari Dunning, M.S., at 558-5749. Thank you in advance for your help.

Sincerely,

Grace Lemasters, Ph.D. R.N.
Professor and Director
Division of Epidemiology and Biostatistics

Before this last pregnancy, how many children had you delivered? (Spec: DO NOT INCLUDE THIS CURRENT BIRTH)

_____ past deliveries

How many children has the women birthed PRIOR to this last delivery? DO NOT include this current birth.

During this last pregnancy, how many children age 3 and under did you usually care for? (Spec: DO NOT INCLUDE NEW BABY)

__ __ number children age 3 and under

This question is to estimate physical demand at home. It does not matter whether the children are hers or not, for example, if the woman runs a daycare, then include all children she takes care of. If the woman works outside the home and was caring for a 2 year old during her pregnancy, record "1". DO NOT include the new baby.

---- **EMPLOYMENT HISTORY QUESTIONS**

I'd like to ask you questions about your work during this last pregnancy.

- # Did you...
YES NO
- work outside the home for pay?
 operate a home business?
(Spec: DOES NOT INCLUDE TAKING CARE OF OWN CHILDREN)
 volunteer at least 8 hours/week for an organization? SKIP NEXT QUESTION
(Spec: NOT FAMILY/FRIENDS)
 do full time homemaking? SKIP NEXT QUESTION

Read all the above options because the woman may have done more than one. Check all appropriate boxes. Examples of a "home business" include day care, medical transcriptionist. A "home business" does not include homemaking for your own children. "Volunteering" must have been done at least 8 hours/week and be performed for an organization, for example, church or hospital, not for family/friends. If the woman worked "outside the home for pay" or "operated a home business," do not check homemaking. If the woman volunteered she may also be a full time homemaker.

During the majority of your pregnancy, did you work full-time or part-time? Full-time means 35 hours or greater per week.

- Full-time
 Part-time

If the woman worked more than 1 job, include the total # hours for all jobs. Full time is considered "35 or greater" hours.

----- **LOSS OF BALANCE**

One thing of concern to pregnant women is the possibility of losing their balance. By loss of balance, we mean:

- 1) a fall that results in some part of your body - other than your feet - touching the ground, whether or not injured, or
- 2) a trip or slip causing injury. (Spec: THIS IS NOT A FALL BUT A TRIP OR SLIP THAT CAUSED INJURY)

It is very important that we will ask the following 9 questions regarding ALL FALLS - WHETHER OR NOT IT RESULTED IN INJURY. However, sometimes a woman may slip or trip and not actually fall but still injure herself. For example, a pulled leg muscle from a slip that did not actually result in a fall. A FALL is defined as "some part of the body - other than the feet - touching the ground." A slip/trip is defined as a loss of balance but does not result in a fall. ONLY ASK ABOUT SLIPS/TRIPS IF THE SUBJECT WAS INJURED.

Did you experience a fall (with or without injury) or a slip or trip resulting in injury during this last pregnancy?

YES NO

IF NO AND SUBJECT DID NOT WORK, ADVANCE TO MEDICAL QUESTIONS.

IF NO AND SUBJECT DID WORK, ADVANCE TO GENERAL WORK QUESTIONS.

If "No" and subject did not work i.e. volunteered or was a full time homemaker advance to Medical Questions Section - Question # _____. (You will not collect work information on those women who volunteered or did home making full time.) If "No" and subject did work i.e. worked outside the home or operated a home business advance to General Work Questions Section – Question # _____.

How many times did this occur during this last pregnancy? _____ times

How many times did they fall (WHETHER INJURED OR NOT) and slip/trip RESULTING IN any type of INJURY during this last pregnancy? This question will be used to interview the subject for the following 6 questions. If the subject fell 3x, ask them the following 6 questions regarding their first fall, second fall, and third fall. If the subject also slipped/tripped and it resulted in injury, ask them the following 6 questions regarding this slip/trip. Do not include or ask about slip/trips that did not result in injury.

The following 6 questions are recorded in the table below. Use codes provided to code appropriately.

THE FOLLOWING 6 QUESTIONS RECORDED IN TABLE. USE CODES BELOW TO CODE APPROPRIATELY.

- # How many months pregnant were you with the (first, second...) fall (slip/trip)?
- # Did you seek any medical attention including a phone call to your health care provider, visit to physician or nurse, emergency room visit, hospital admission, or fetal monitoring?
- # Were you injured including bruises, cuts, turned ankle, pulled muscle, sprain/strain, torn ligaments, broken bone, dislocated bone, concussion, or other injury?
- # Did the fall result in premature labor or delivery?
- # Did you feel the fall resulted in injury to the baby including a broken bone or other injury?
- # Were you at work, volunteering, home, or other?
REPEAT IF FALLS>1. Now thinking of your second fall (slip/trip),...

If subject does not remember specific months ask about trimesters and take the middle month of each trimester: months 1-3 = trimester 1; months 4-6 = trimester 2; months 7-9+ = trimester 3.

If subject fell on employer's property, it constitutes a "work" injury – even if the subject was not officially working at the time – for example, she may have been walking from her car to the building in the parking lot.

# Fall (whether or not injury) or slip/trip resulting in injury CODE: F=fall S=slip	Month of Preg CODE: (1-9)	Medical Attention CODE: (0-5)	Injury to you CODE: (0-8)	Prematu L/D CODE : (0-2)	Injury to baby CODE: (0-2)	Location CODE : (1-4)
1						
2						
3						
4						
5						
6						

--	--	--	--	--	--	--

Codes:

Medical Attention

- 0. no medical attention sought or needed
- 1. phone call to physician or other health care provider
- 2. visit to physician office or clinic
- 3. emergency room
- 4. hospital admission
- 5. fetal monitoring

Injury to you

- 0. no injury to you
- 1. bruises
- 2. cuts, lacerations
- 3. punctures
- 4. "turned" ankle
- 5. muscle sprain/strain or torn ligaments
- 6. broken or dislocated bone
- 7. concussion or head injury
- 8. other injury to you: describe

Premature Labor or Delivery

- 0. neither
- 1. premature labor
- 2. premature delivery

Injury to Baby

- 0. no injury to baby
- 1. bone fracture to baby
- 2. other injury to baby: describe

Location:

- 1. work
- 2. place of volunteering
- 3. home
- 4. other

BASED ON THE ABOVE INFO, CHOOSE UP TO 2 FALLS TO ASK THE FOLLOWING FALL

QUESTIONS. How to choose what 2 falls/slips/trips to ask about:

Ask about: 1) the most serious or most recent incident at work or volunteering – if the subject fell at both work and volunteering, ask about the work fall - and 2) the most serious or most recent incident not at work. Ask about 2 incidences. (1 at work and 1 not at work). First, ask the following questions about the most "serious" fall at work. "Serious" is defined as causing injury, premature labor/delivery, or requiring medical attention. If subject did not have a serious fall at work, ask about the most recent fall at work. If subject fell 2x at work, chose the most serious fall. If neither fall was "serious" ask about the most recent. Repeat the process for a non-work fall. If the subject did not have a work incident, just ask about the non-work incident.

BEGIN WITH THIS INTRO QUESTION:

Referring to your fall/slip/trip that occurred location, month of pregnancy (TO DEFINE THE FALL YOU ARE ASKING ABOUT)...

Please tell me what you were doing when you fell (slipped/tripped). DOCUMENT 5-6 WORDS.

Straight forward.

FOR THE WORK FALL/SLIP/TRIP, ASK THE FOLLOWING "SPECIFIC QUESTIONS FOR FALL AT WORK." FOR NON-WORK FALL/SLIP/TRIP, ADVANCE TO "GENERAL QUESTIONS ABOUT FALL."

---SPECIFIC QUESTIONS FOR FALL/SLIP/TRIP AT WORK

FOR THE WORK FALL, BEGIN BY ASKING THESE QUESTIONS AND THEN CONTINUE WITH GENERAL QUESTIONS.

Was the task you were performing new or unfamiliar? No Yes

Straight forward.

Did you report this fall to your employer? No Yes

This includes a written or oral report. A visit to the company RN would also be included, since the RN will complete forms for the employer.

Was a worker's compensation claim filed as a result of an injury due to the fall? No Yes

Straight forward.

---GENERAL QUESTIONS ABOUT FALL

ASK THESE QUESTIONS ABOUT BOTH THE WORK AND NON-WORK FALL/SLIP/TRIP.

These "General Questions" will be asked about both a work incident and a non-work incident, if subject.

I would like to ask you specific questions regarding the circumstances of your ___ fall that occurred at _____. # FALL, LOCATION OF FALL (WORK, HOME, VOLUNTEER, OTHER)

Do you think that this fall could have been prevented in some way?

No

Yes *If yes: How? (DOCUMENT AT LEAST 5 EXACT WORDS)*

This includes any action on the part of the subject, the employer, or anyone else involved.

What time of day was the fall? _____ AM PM (CIRCLE ONE)

If subject does not remember the specific time, ask them to approximate the time. If subject cannot approximate, probe: morning 6am-noon; afternoon noon-6pm; evening 7pm-midnight; night midnight-6am.

Were you indoors or outdoors? Indoors outdoors

Indoors refers to inside a building. Inside a car is considered outdoors.

Were you using the bathtub/shower? No Yes

This includes getting into or out of the bathtub or shower.

For how many days did the fall restrict or interfere in any way with your physical activities?

not at all

1 day or less

2 - 5 days

6 - 10 days

more than 10 days

Straight forward.

How many days of work did you miss as a result of the injury? _____ days

If subject did not work, record 0.

Did you fall on stairs?

- No
 Yes

If Yes:

Were the steps in good condition? No Yes

Were there handrails available on the stairs?

- No
 Yes

If Yes: Were the hand rails in good shape? No Yes

Did you use them? No Yes

"Good condition" means not broken, slanted, missing a step...

Did you fall off of something from a height, including falling down stairs.

- NO Yes

IF YES: How far did you fall?

- less than 3 ft.
 3-6 feet
 greater than 6 feet

This question is to determine if the subject fell from a height. This does not include falling to the ground from a standing position. This does include, for example, falling down stairs or off a ladder, curb, or chair.

Were any of the following items related to your fall?

- ladder
 curb
 minivan/SUV/truck
 car
 elevator
 escalator
 machinery
 other: _____

This includes: stepping up or down from a ladder or curb and standing on a ladder; getting into or out of a minivan/SUV/truck or car; getting into or out of a elevator or escalator; using a escalator; using a piece of machinery; getting into/out of or stepping up/down from a piece of machinery.

Now I'd like to ask you about your body movements at the time of the fall.

At the time of the fall were you pushing, pulling, lifting or carrying an object or child?

- No
 Yes IF YES, CHECK APPROPRIATE BOX(ES):

- lifting an object
 carrying an object
 pushing or pulling an object
 lifting a child
 carrying a child
 pushing or pulling a child

A child is not an "object."

Were you reaching, turning, or bending?

- No
 Yes IF YES, CHECK APPROPRIATE BOX(ES):

- reaching
 turning
 bending

Straight forward.

Were you getting up or down from a sitting or lying down position?

- No
 Yes IF YES, CHECK APPROPRIATE BOX(ES):
 getting up or down from a sitting position
 getting up from lying down position

This includes getting up or down from a piece of furniture (e.g. chair, bed, couch) or floor.

At the time of the fall...

Were you moving at a hurried pace or running?

- No
 Yes MARK ALL THAT APPLY
 moving at hurried pace
 running

Straight forward.

Was your view obstructed? No Yes

This may include, for example, carrying a bag of groceries or a child that obstructs the subjects view. This also includes the subject's pregnant abdomen obstructing the view of the ground or another person blocking the view.

Were you accidentally struck, pushed, or knocked over? No Yes

This includes being pushed, struck, or knocked over by a piece of equipment or person.

Were you purposefully struck, pushed, or knocked over? No Yes

This includes being struck, pushed, or knocked over by a piece of equipment or a person on purpose. This is not an accident. May include attacks or domestic abuse.

Did you feel faint or dizzy? No Yes

Did the subject feel faint or dizzy immediately prior to the fall?

If you need corrective glasses or contact lenses, were you wearing them?

- Not applicable: I don't need corrective eyewear
 No
 Yes

Straight forward.

Were you wearing sunglasses in a low lit area? No Yes

Straight forward.

Now I'm going to ask you about the conditions of the area where you fell. At the time of the fall...

Was the area cluttered or poorly lit?

- No/Neither
 cluttered
 poorly lit including poor overhead lighting and darkness due to evening, night, or early morning hours.

"Cluttered" includes, for example, furniture, toys, boxes, or papers.

Was the floor or ground...

- icy or snowy?
 slippery due to another cause?
 None

"Slippery due to another cause" include For example, water, oil, powder, or sawdust.

Was the ground uneven or sloped? No Yes

This may include, for example, a driveway, hill, yard, or a parking lot.

Now I would like to ask you questions about your footwear at the time of the fall.

Were you wearing shoes?

No IF NO: were you barefoot or wearing socks?

barefoot

socks

Yes IF YES:

Were the soles of your shoes worn or slick? No Yes

i.e. were the soles slippery (without traction)

Were your shoes loose? No Yes

Often during pregnancy, swelling fluctuates and shoes become either too loose or too tight. Were the shoes at the time of the fall too big or loose?

Were they backless? No Yes

"backless" refers to shoes with any heel support such as clogs or flip flops or dress shoes without a back strap.

About how high were the heels of your shoes?

less than 1"

1-2"

greater than 2"

Now I would like to ask you some questions regarding your medical condition on the day of the fall. On the day of the fall...

Were you tired or fatigued more than usual? No Yes

Most pregnant women are tired. This question emphasizes tired or fatigued "more than usual" on the day of the fall.

Had you experienced a shaky feeling due to low blood sugar in other words, hypoglycemia?

No Yes

Hypoglycemia is defined as low blood sugar and results in a shaky feeling. This is fairly common during pregnancy. This does not need to be a "diabetic" response. It can occur in pregnant women who are not diabetic. It does not need to be diagnosed by a physician; if the subject felt shaky from not eating enough, mark "Yes".

Had you been experiencing extreme vomiting and/or diarrhea? No Yes

This question is attempting to identify dehydration, and does not include normal nausea and dry heaves during pregnancy. The word "extreme" is emphasized.

Within eight hours of the fall, had you used any of the following:

YES NO

coffee or soda with caffeine

tobacco including cigarettes or cigars

medicine for pain, sleep, nervousness, heart, or blood pressure

alcohol or Recreational drugs

refuse to answer

----- GENERAL WORK QUESTIONS

(ASKED TO ALL WOMEN WHO WORKED DURING PREGNANCY. IF THE WOMAN FELL AT WORK COLLECT THE FOLLOWING INFO REGARDING THE JOB AND LOCATION WHERE THE FALL OCCURRED. IF THE WOMAN DID NOT FALL AT WORK AND WORKED MORE THAN ONE JOB, COLLECT THE INFO REGARDING THE PLACE OF EMPLOYMENT SHE WAS AT FOR THE LONGEST AMOUNT OF TIME DURING HER PREGNANCY)

We would like to know more about your work environment during your pregnancy. Please remember this survey is completely confidential.

Who was your employer? (Spec: What was the name of company you worked for?)

- name of company _____
- refused

The subject may be reluctant to say the name of the company she worked for. Reassure confidentiality. No one will be contacting employers. Employers have no access to this survey.

What kind of business or industry was this? (3-4 WORDS)

Kind of business: _____
(Spec: TV & radio management, retail shoe store, hotel, leisure and recreation)

What was your job title? _____
(Spec: mailman, assembler)

Using 3-4 words or phrases, describe your most important activities on this job and the primary product or service produced. (Spec: sell cars and marketing, keep account books, operate printing press)

At the time you became pregnant, how long had you worked for this business?

- less than 3 months
- 3 months to 1 year
- longer than 1 year

Straight forward.

Now I would like to ask some questions about your opinion of stress at work during pregnancy. I will read a statement about your job that you performed during this last pregnancy. Please respond to the statements by choosing "rarely," or "sometimes," or "fairly often," or "very often."

	Rarely	Sometimes	Fairly Often	Very Often
# I had enough time to get the job done.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
# My job required working very fast.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
# I was satisfied with my job.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
# I had influence over the amount of work I did.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
# I had influence over the hours or schedule that I worked.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Straight forward.

Please answer the following 2 questions yes or no.

- # Did your work require you to talk overly loud due to noise? No Yes
- # Did you rotate shifts? No Yes

"Rotate shifts" is defined as working different schedules for example, working days one week and nights the following week or working one night shift followed by one day shift.

If you worked more than 4 hours per shift, how many breaks did you take, including lunch and smoking breaks?

- 0 1 2 3 4 N/A did not work more than 4 hours

This question asks how many breaks the subject usually took, not how many they were entitled to.

Now I would like to ask you 3 questions regarding your most common lifting requirements at work.

During your pregnancy, did your job commonly require you to lift 10 pounds or more?

- No **SKIP TO MEDICAL QUESTIONS**
 Yes **IF YES: how much weight?**
 10-20 pounds
 21-30 pounds
 over 30 pounds

If subject lifted various weights throughout the day, choose the weight most commonly required to lift.

During pregnancy, how many times during the work day (or shift) did you lift the above weight?

- Less than 5 x
 5-10 x
 10-20 x
 more than 20 x

Straight forward.

Were these lifting requirements decreased due to your pregnancy?

- No Yes

This includes official or unofficial decreases in lifting requirements. These include, for example, subjects who utilized co-worker help or had an actual job transfer due to pregnancy and lifting limitations.

-----MEDICAL QUESTIONS

(Asked to all subjects)

I would like to ask you some questions about your medical status prior to and during pregnancy. Please answer yes or no. Did you have any of the following conditions during this last pregnancy?

- | | YES | NO | DK | |
|---|--------------------------|--------------------------|--------------------------|--|
| # | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | diabetes diagnosed prior to pregnancy requiring insulin?
<u>Did the subject have diabetes requiring insulin before she got pregnant? Needs to have been diagnosed by her doctor.</u> |
| # | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Diabetes diagnosed prior to pregnancy not requiring insulin?
<u>Did the subject have diabetes but did not require insulin to control blood sugar PRIOR to pregnancy?</u> |
| # | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | diabetes diagnosed DURING this last pregnancy requiring insulin? (GESTATIONAL DIABETES)
<u>If the subject did not have diabetes before pregnancy, did they develop diabetes during pregnancy, commonly referred to as "gestational diabetes." Gestational diabetes is diagnosed by a physician. To test for it, all pregnant women drink a glucose solution (often resembling orange pop) and followed by a blood test.</u> |
| # | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Diabetes diagnosed DURING this last pregnancy not requiring insulin?
<u>Most gestational diabetes do not require insulin to control blood sugar.</u> |
| # | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | a physical or medical condition that affected balance or walking. This may include a neurological diagnosis such as Meniere's Disease or seizures or conditions during pregnancy such as high blood pressure or preeclampsia. (specs: eclampsia is pregnancy induced...)
<u>This may include any diagnosis that may affect balance or walking and may include for example: neurological diseases such as multiple sclerosis, tumors, or spinal cord disease; orthopedic conditions such as recent surgery on an ankle or knee; pregnant conditions such as preeclampsia (high blood pressure caused by pregnancy).</u> |
| # | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | a visual problem not corrected with eyeglasses or contact lenses including partial blindness or retinopathy.
<u>This does not include near sightedness or farsightedness corrected with eyeglasses or contact lenses. This may include for example, partial blindness.</u> |

Before this last pregnancy, did you exercise at least 3x/week including such activities as tennis, martial arts, Tai Chi, aerobic exercise such as biking, running, walking, or swimming.
 Yes No

How tall are you? ___ feet ___ inches
Straight forward.

During this last pregnancy, how much weight did you gain? ___ __ pounds
From beginning of pregnancy to delivery.

Sometimes an unexpected pregnancy can be stressful and have effects on your health.
This question may indicate additional stress in the subject's life during pregnancy. It is important to emphasize "at the time you became pregnant." Many women do not have a strong desire to have a baby at the time they discover they are pregnant, but are happy when the baby is born.

At the time you became pregnant, did you have a strong desire to have a baby at that time? Yes No Don't know/refuse

At the time you became pregnant, did your partner have a strong desire to have a baby at that time? Yes No Don't know/refuse

----- **DEMOGRAPHICS**
(Asked of all subjects)

In order for us to understand how similar or different our participants are I would like to ask you a few questions about yourself.

What is the highest grade or year of school that you completed?
 not a high school graduate
 high school graduate
 some college
 college grad or higher
 Don't know/Refused

Straight forward.

Are you now married or with a permanent partner? No Yes

A permanent partner includes a couple who have a commitment or common law marriage but are not "officially" married.

How would you describe your racial ethnic background?
 Caucasian
 African American
 Hispanic
 mixed
 Asian or Pacific Islander
 American Indian/Alaska Native/Aleut
 Other: (specify) _____
 Don't know/Refused

This is how the individual describes herself. "Mixed" is defined as any combination of the above.

What is your yearly household family income?

- < 5,000
- 5,000-10,000
- 10,001-20,000
- 20,001-40,000
- 40,001-60,000
- greater than 60,000

Straight forward.