

Supplementary File 2 for: Firefighter occupational factors and the risk of preterm birth: results from a cohort of women firefighters in the United States

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Table S2. Occupational factors and risk of preterm birth during most recent pregnancy in fire service among 934 pregnancies^{a,b}

		Preterm births N (%)		RR (95% CI) Model 1 ^c	RR (95% CI) Model 2 ^d	RR (95% CI) Model 3 ^e
Firefighter subgroups						
Employment, stratified by wildland firefighter status						
Structural firefighter		No	Yes			
	Career	433 (85%)	78 (15%)	1.00 (Ref.)	1.00 (Ref.)	-
	Volunteer	71 (79%)	19 (21%)	1.36 (0.84 - 2.20)	1.27 (0.77 - 2.09)	-
Wildland/combination firefighter		No	Yes			
	Career	290 (95%)	15 (5%)	1.00 (Ref.)	1.00 (Ref.)	-
	Volunteer	19 (73%)	7 (27%)	4.72 (1.69 - 13.17)	2.90 (1.23 - 6.81)	-
Work practices						
Shift schedule of career firefighters						
	No		Yes			
	Less than 24 hr on shift	135 (88%)	19 (12%)	1.00 (Ref.)	1.00 (Ref.)	-
	24 or more hr on shift	587 (91%)	75 (11%)	0.96 (0.60 - 1.55)	1.12 (0.69 - 1.81)	-
Fire responses during pregnancy						
Worked fire/rescue calls at pregnancy start						
	No	176 (87%)	27 (13%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	Yes	630 (88%)	88 (12%)	0.99 (0.66 - 1.48)	1.07 (0.74 - 1.66)	1.15 (0.67 - 1.74)
Number of fires responded to during pregnancy						
	No		Yes			
	0 fires	208 (86%)	35 (14%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	1-4 fires	285 (83%)	57 (17%)	1.23 (0.82 - 1.82)	1.22 (0.82 - 1.82)	1.26 (0.84 - 1.88)
	≥5 fires	300 (93%)	22 (7%)	0.54 (0.32 - 0.91)	0.68 (0.39 - 1.17)	0.68 (0.40 - 1.17)
Work restriction during pregnancy						
Was work restricted during pregnancy?						
	No	172 (86%)	27 (14%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	Yes	624 (88%)	85 (12%)	0.94 (0.63 - 1.40)	1.01 (0.58 - 1.75)	0.99 (0.58 - 1.72)
Timing of start of work restriction						
	No		Yes			
	None/during 3 rd trimester	209 (86%)	35 (14%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	2 nd trimester	392 (93%)	29 (7%)	0.52 (0.33 - 0.83)	0.62 (0.38 - 1.01)	0.66 (0.40 - 1.09)
	1 st trimester	202 (81%)	48 (19%)	1.34 (0.90 - 1.99)	1.35 (0.91 - 2.00)	1.42 (0.95 - 2.11)

RR= Relative risk; CI= confidence interval; BMI= Body mass index (kg/m²); Combination= does wildland firefighting in addition to working for a career or volunteer department

^a Generalized estimating equations with Poisson distribution and sandwich variance estimators were used to estimate risk ratios and 95% CIs.

^b 93 total pregnancies had missing information for Shift schedule (3), Worked fire/rescue calls (4), Number of fires (37), Work restriction (19), Time of work restriction (30) and were not included in those models.

^c Model 1 is adjusted for age at pregnancy, modeled as age at pregnancy and age at pregnancy².

^d Model 2 is additionally adjusted for highest education completed (some college/at least college degree), gravidity (yes/no), BMI (<30 kg/m² / ≥30 kg/m²), and smoking status (current or former/never).

Highest education completed, BMI, and smoking status were measured in 2017 at time of survey. Gravidity was assessed for each pregnancy.

^e Model 3 is additionally adjusted for employment status (career/volunteer).

Table S3. Occupational factors and risk of preterm birth during first pregnancy in the fire service among 934 pregnancies^{a,b}

		Preterm births N (%)		RR (95% CI) Model 1 ^c	RR (95% CI) Model 2 ^d	RR (95% CI) Model 3 ^e
Firefighter subgroups						
Employment, stratified by wildland firefighter status						
Structural		No	Yes			
	Career	444 (87%)	67 (13%)	1.00 (Ref.)	1.00 (Ref.)	-
	Volunteer	68 (76%)	22 (24%)	1.82 (1.15 - 2.88)	1.77 (1.11 - 2.82)	-
Wildland/combination		No	Yes			
	Career	287 (94%)	18 (6%)	1.00 (Ref.)	1.00 (Ref.)	-
	Volunteer	20 (77%)	6 (23%)	3.16 (1.20 - 8.33)	1.49 (0.58 - 3.79)	-
Work practices						
Shift schedule of career firefighters						
	No		Yes			
	Less than 24 hr on shift	128 (83%)	26 (17%)	1.00 (Ref.)	1.00 (Ref.)	-
	24 or more hr on shift	602 (91%)	60 (9%)	0.58 (0.37 - 0.89)	0.66 (0.42 - 1.03)	-
Fire responses during pregnancy						
Worked fire/rescue calls at pregnancy start						
	No	63 (88%)	9 (12%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	Yes	753 (88%)	104 (12%)	1.10 (0.59 - 2.07)	1.18 (0.62 - 2.22)	1.14 (0.61 - 2.16)
Number of fires responded to during pregnancy						
	No		Yes			
	0 fires	181 (86%)	29 (14%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	1-4 fires	304 (85%)	52 (15%)	1.21 (0.78 - 1.87)	1.17 (0.76 - 1.82)	1.26 (0.81 - 1.95)
	≥5 fires	314 (92%)	27 (8%)	0.68 (0.40 - 1.14)	0.82 (0.49 - 1.38)	0.84 (0.50 - 1.41)
Work restriction during pregnancy						
Was work restricted during pregnancy?						
	No	165 (85%)	30 (15%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	Yes	643 (89%)	81 (11%)	0.77 (0.52 - 1.29)	0.88 (0.59 - 1.29)	0.94 (0.62 - 1.41)
Timing of start of work restriction						
	No		Yes			
	None/during 3 rd trimester	194 (84%)	37 (16%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	2 nd trimester	378 (93%)	28 (7%)	0.46 (0.29 - 0.74)	0.56 (0.35 - 0.90)	0.61 (0.37 - 1.00)
	1 st trimester	228 (84%)	44 (16%)	1.00 (0.67 - 1.49)	1.04 (0.69 - 1.55)	1.13 (0.75 - 1.72)

RR= Relative risk; CI= confidence interval; BMI= Body mass index (kg/m²); Combination= does wildland firefighting in addition to working for a career or volunteer department^a Generalized estimating equations with Poisson distribution and sandwich variance estimators were used to estimate risk ratios and 95% CIs.^b 74 total pregnancies had missing information for Shift schedule (2), Worked fire/rescue calls (5), Number of fires (27), Work restriction (15), Time of work restriction (25) and were not included in those models.^c Model 1 is adjusted for age at pregnancy, modeled as age at pregnancy and age at pregnancy².^d Model 2 is additionally adjusted for highest education completed (some college/at least college degree), gravidity (yes/no), BMI (<30 kg/m² / ≥30 kg/m²), and smoking status (current or former/never). Education, BMI, and smoking status were measured in 2017 at time of survey. Gravidity was assessed for each pregnancy.^e Model 3 is additionally adjusted for employment status (career/volunteer).

Table S4. Occupational factors and risk of preterm birth using MICE to impute missing responses, among 941 women and 1,371 pregnancies^{a,b}

		Preterm births N (%)		RR (95% CI) Model 1 ^c	RR (95% CI) Model 2 ^d	RR (95% CI) Model 3 ^e
Firefighter subgroups						
Employment, stratified by wildland firefighter status						
Structural	No		Yes			
	Career	718 (87)	104 (13)	1.00 (Ref.)	1.00 (Ref.)	-
Wildland/combination	Volunteer	105 (81)	25 (19)	1.52 (0.97 - 2.38)	1.44 (0.91 - 2.29)	-
	No		Yes			
Career	359 (94)	22 (6)	1.00 (Ref.)	1.00 (Ref.)	-	
	Volunteer	24 (69)	11 (31)	4.29 (1.82 - 10.11)	2.46 (1.01 - 6.06)	-
Work practices						
Shift schedule of career firefighters						
Less than 24 hr on shift	No		Yes			
	179 (87)	27 (13)	1.00 (Ref.)	1.00 (Ref.)	-	
24 or more hr on shift	671 (92)	60 (8)	0.82 (0.56 - 1.20)	0.90 (0.60 - 1.35)	-	
Fire responses during pregnancy						
Worked fire/rescue calls at pregnancy start						
No	No	120 (90)	14 (10)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	Yes	1082 (88)	148 (12)	1.20 (0.72 - 2.02)	1.23 (0.74 - 2.05)	1.21 (0.73 - 2.02)
Number of fires responded to during pregnancy						
0 fires	No		Yes			
	314 (87)	46 (13)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)	
1-4 fires	473 (86)	75 (14)	1.17 (0.81 - 1.67)	1.15 (0.80 - 1.65)	1.19 (0.83 - 1.70)	
	≥5 fires	383 (92)	34 (8)	0.70 (0.41 - 1.10)	0.82 (0.53 - 1.29)	0.83 (0.54 - 1.29)
Work restriction during pregnancy						
Was work restricted during pregnancy?						
No	No	262 (87)	39 (13)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	Yes	929 (89)	117 (11)	0.87 (0.60 - 1.26)	0.96 (0.66 - 1.38)	1.01 (0.69 - 1.47)
Timing of start of work restriction						
None/during 3 rd trimester	No		Yes			
	318 (86)	51 (14)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)	
2 nd trimester	507 (92)	42 (8)	0.58 (0.38 - 0.87)	0.65 (0.43 - 0.99)	0.68 (0.44 - 1.04)	
	1 st trimester	357 (86)	59 (14)	1.05 (0.72 - 1.53)	1.08 (0.74 - 1.57)	1.11 (0.76 - 1.62)

MICE= multiple imputation with chained equations; RR= Relative risk; CI= confidence interval; BMI= Body mass index (kg/m²); Combination= does wildland firefighting in addition to working for a career or volunteer department

^a Generalized estimating equations with Poisson distribution and sandwich variance estimators were used to estimate risk ratios and 95% CIs.

^b 117 total pregnancies had missing information for Shift schedule (3), Worked fire/rescue calls (7), Number of fires (46), Work restriction (24), Time of work restriction (37) and were not included in those models.

^c Model 1 is adjusted for age at pregnancy, modeled as age at pregnancy and age at pregnancy².

^d Model 2 is additionally adjusted for highest education completed (some college/at least college degree), gravidity (yes/no), BMI (<30 kg/m² / ≥30 kg/m²), and smoking (current or former/never). Education, BMI, and smoking status were measured in 2017 at time of survey. Gravidity was assessed for each pregnancy.

^e Model 3 is additionally adjusted for employment status (career/volunteer).

Table S5. Occupational factors and risk of preterm birth adjusted for other risk factors, among 916 women and 1,335 pregnancies^{a,b}

		Preterm births N (%)		RR (95% CI) Model 2 ^c	RR (95% CI) Model 3 ^d	RR (95% CI) Model 4 ^e
Firefighter subgroups						
Employment, stratified by wildland firefighter status						
Structural		No	Yes			
	Career	703 (87%)	102 (12%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	Volunteer	101 (81%)	23 (19)	1.37 (0.85 - 2.22)	1.33 (0.85 - 2.08)	1.35 (0.84 - 2.17)
Wildland/combination		No	Yes			
	Career	352 (95%)	20 (5%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	Volunteer	21 (68%)	10 (32%)	2.81 (1.11 - 7.08)	2.86 (1.16 - 7.09)	2.63 (1.00 - 7.01)
Work practices						
Shift schedule of career firefighters						
	Less than 24 hr on shift	226 (88%)	32 (12%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	24 or more hr on shift	828 (90%)	91 (10%)	0.93 (0.61 - 1.41)	1.00 (0.67 - 1.50)	0.88 (0.59 - 1.33)
Fire responses during pregnancy						
Worked fire/rescue calls at pregnancy start						
	No	114 (90%)	12 (10%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	Yes	1061 (88%)	144 (12%)	1.331 (0.77 - 2.31)	1.27 (0.72 - 2.25)	1.16 (0.68 - 1.99)
Number of fires responded to during pregnancy						
	0 fires	301 (87%)	45 (13%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	1-4 fires	464 (86%)	73 (14%)	1.12 (0.77 - 1.61)	1.14 (0.79 - 1.63)	1.12 (0.78 - 1.61)
	≥5 fires	383 (92%)	32 (8%)	0.77 (0.49 - 1.22)	0.76 (0.48 - 1.89)	0.83 (0.54 - 1.28)
Work restriction during pregnancy						
Was work restricted during pregnancy?						
	No	256 (87%)	38 (13%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	Yes	909 (89%)	113 (11%)	0.95 (0.66 - 1.39)	0.99 (0.68 - 1.42)	0.98 (0.67 - 1.44)
Timing of start of work restriction						
	None/during 3 rd trimester	317 (86%)	51 (14%)	1.00 (Ref.)	1.00 (Ref.)	1.00 (Ref.)
	2 nd trimester	505 (92%)	41 (8%)	0.64 (0.42 - 0.98)	0.66 (0.43 - 1.00)	0.67 (0.44 - 1.02)
	1 st trimester	351 (86%)	59 (14%)	1.12 (0.77 - 1.62)	1.09 (0.76 - 1.57)	1.05 (0.72 - 1.54)

RR= Relative risk; 95% CI= 95% confidence interval; BMI= Body mass index (kg/m²); Combination= does wildland firefighting in addition to working for a career or volunteer department^a Generalized estimating equations with Poisson distribution and sandwich variance estimators were used to estimate risk ratios and 95% CIs.^b 102 total pregnancies had missing information (Shift schedule (3), Worked fire/rescue calls (5), Number of fires (39), Work restriction (22), and Time of work restriction (33)) and were not included in those models.^c Model 2 is adjusted for age at pregnancy (modeled as age at pregnancy and age at pregnancy²), highest education completed (some college/at least college degree), gravidity (yes/no), BMI (<30 kg/m² / ≥30 kg/m²), and smoking status (current or former/never). Education, BMI, and smoking status were measured in 2017 at time of survey. Gravidity was assessed for each pregnancy.^d Model 3 is Model 2 additionally adjusted for previous preterm birth (nulligravid/no/yes).^e Model 4 is Model 2 additionally adjusted for gestational hypertension (yes/not reported).