

Reproductive Health & the Fire Service



WOMEN IN FIRE



DANGERS OF THE JOB

- Toxic products of combustion: CO, PAHs, PFAS, etc.
- Certain chemicals and metals may be absorbed faster by pregnant women
- Some toxins more dangerous to the fetus than to the mother
- Circulation upregulated during pregnancy so the fetus is at increased risk
- Intense thermal environment
- Loud noises
- Psychological and physical strain
- Weight of full equipment: ~45-75 lbs
- Ill-fitting protective equipment
- Shift work
- Wide variation in pregnancy policies (30% of women reported their department had NO pregnancy/maternity leave policy)

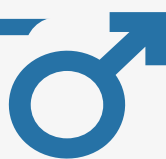
Potential



CONSEQUENCES

- **Infertility/reduced fertility**
 - Increased use of fertility drugs among women FFs (8.7% for first pregnancies to 15.0% for fourth pregnancies)¹
 - Increased rates for adverse pregnancy, childbirth, and puerperium outcomes²
 - Exposure to heat may lead to delayed conception³
 - Increased rates of infertility among FFs (16%) compared to national average (6%)⁴
- **Menstrual/ovulatory cycle disorders**
 - Different phases of the menstrual cycle and oral contraceptive use can impact thermoregulation⁵
 - Shift work (including evening, night, or irregular shifts) can result in altered menstrual cycle length, increased menstrual pain, and changes in duration and amount of menstrual bleeding; can also result in changes in hormone secretion⁶
- **Sex-hormone imbalances**
 - Noise-exposed women were more likely to experience hormonal disturbances and idiopathic infertility than nonexposed controls³
- **Miscarriage**
 - Miscarriage rates among FFs 2.3 times higher compared to national average (29.1% vs 13.5%)^{1,4}
 - Excessive bending/crouching associated with elevated risk of miscarriage^{7,8}
 - Preliminary data shows miscarriage rates higher among volunteer than career FFs (volunteer FFs had 1.42 times the risk of miscarriage)⁴
 - Among wildland and WUI, volunteers 2.53 times more likely to have miscarriage than career FFs⁴
- **Stillbirth**
 - High ambient temperatures associated with shorter gestation periods and greater occurrence of stillbirth^{9,10,11}
- **Birth defects**
 - Maternal hyperthermia associated with neural-tube defects during early pregnancy¹²
 - Exposure to carbon monoxide and high temperatures may increase the risk of birth defects¹³
- **Child developmental disorders**
 - Birth defects are a leading cause of infant mortality and developmental disabilities in the US¹⁵
 - Occupational exposure has been linked to a number of birth defects but **there is little literature examining developmental disorders of FF offspring**
- **Premature birth**
 - FFs had higher rates of pre-term birth compared to national average (11.6-16.7% vs 9.6%)^{1,4}
 - Shiftwork has been connected to miscarriage and pre-term labor¹⁶
 - Among structural FFs, volunteers 1.47 times as likely to have preterm birth compared to career FFs⁴
 - Among wildland and WUI, volunteers 2.82 times more likely to experience preterm birth than career FFs⁴
 - Exposure to air pollution & non-occupational wildfire smoke during pregnancy associated with increased risk of pre-term birth^{17,18}
- **Low birth-weight babies**
 - Loud noises may result in lower fetal weight and increased risk of fetal mortality¹⁹
- **Work Restriction**
 - Timing of when work restriction is started may influence risk⁴
 - Women who started restricting their work during the 2nd trimester appeared to have lower risk for preterm birth compared to women who started work restriction in the 3rd trimester or who didn't restrict work at all⁴

Male Reproductive Health is Affected Too!



- Danish FFs had 46-53% increased risk of male-factor infertility compared to general workers²⁰
- Male infertility 46-53% higher than general population²⁰
- Paternal employment as a FF was associated with ventricular septal & atrial septal defects among offspring¹⁹
- Semen parameters (e.g., volume, sperm concentration, total sperm count, motility, normal forms) of FFs were lower than male fertility reference values published by the World Health Organization²¹
- Increased fire exposure is also associated with reduced sperm parameters²¹

Solutions & Next Steps



- Check out NFPA 1582, Section 9.12, 2020 ed.
- Limit exposures with appropriate decontamination (see NFPA 1585)
- Take this guide and discuss options with your physician
- Know your department's policy or suggest adding one if there isn't one already

FOR MORE INFORMATION & REFERENCES,
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