

# Females, Fire, and Families: Understanding the Role of Health and Wellness

**Maria Koepfel**

Center for Fire, Rescue & EMS Health Research  
NDRI-USA, Inc.



## Overview

- Women in the fire service
- Reproductive health
- Physical health
- Discrimination & harassment
- Mental health
- Alcohol use
- Cancer



## Women in Emergency Services

General population: 50.5%

Emergency Medical Services: 35.5%

Military: 18%

Police: 13%

Fire: 4%

## Reproductive Health: The Concerns

- Chemical, biological, radiologic exposures
- Shift schedule
- Extreme physiological strain of emergency response
- High ambient temperature and noise



## Reproductive Health: The Job



- Reporting pregnancy
  - At the end of 1<sup>st</sup> trimester
- Restricting duties
  - Do not restrict until 2<sup>nd</sup> or 3<sup>rd</sup>
  - 10% never restrict duties
- Department policies
  - 58% have pregnancy policy
  - 66% have maternity leave policy

## Reproductive Health: The Impact



- Miscarriage rates
  - 2x national average
  - Volunteer > Career
  - Wildland/WUI > Career
  - Risk increases with subsequent pregnancies
- Preterm birth rates
  - Higher than national rate
- Other outcomes

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## Reproductive Health & the Fire Service

**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 sluggish during pregnancy so the fetus is at increased risk
- Intense thermal environment
- Loud noise
- Psychological and physical strain
- Weight of full equipment – 45-75 lbs
- ill-fitting protective equipment
- Shift work
- Wide variation in pregnancy policies (not all 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 5.0% for fourth pregnancies)
- Increased rates to achieve pregnancy, childbirth, and subsequent outcomes
- Exposure to heat may lead to delayed conception
- Increased cases of infertility among FFs (20%) compared to national average (8%)

**Menstrual/ovulatory cycle disruption**

- Different phases of the menstrual cycle and endocrine system can impact emergency action
- 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 secretion

**Sex hormone imbalance**

- Non-exposed women were more likely to experience hormonal disturbances and diagnostic infertility than nonexposed control

**Miscarriage**

- Miscarriage rates among FFs 2.3 times higher compared to national average (2.9% vs 12.6%)
- Excess weight bearing (ouching) associated with elevated risk of miscarriage
- Miscarriage rates higher in miscarriage rates higher among volunteer than career FFs (volunteer FFs had 40 times the risk of miscarriage)
- Among wildland and WFL volunteers 3.3 times more likely to have miscarriage than career FFs

**Stillbirths**

- High ambient temperatures associated with shorter gestation periods and greater occurrence of stillbirths

**Birth defects**

- Maternal hyperthermia associated with neuro-folate defects during early pregnancy
- Exposure to carbon monoxide and high temperatures may increase the risk of birth defects

**Child developmental disorders**

- Birth defects are a leading cause of infant mortality and developmental disabilities in the US
- 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 (13.6% vs 9.6%)
- Stillborns had been connected to miscarriage and pre-term labor
- Among structural FFs, volunteers 1.67 times as likely to have pre-term birth compared to career FFs
- Among wildland and WFL, volunteers 2.82 times more likely to experience pre-term birth than career FFs
- Exposure to an industrial non-occupational wildfire on the during pregnancy associated with increased risk of pre-term labor

**Low birth-weight babies**

- Low birth-weight babies (lower fetal weight) and increased risk of fetal mortality

**Work restriction**

- Timing of when work restriction is started may influence risk
- Women who started restricting their work during the 2nd trimester appeared to have been risk for pre-term birth compared to women who started work restriction in the 3rd trimester or who didn't restrict work at all

**Male Reproductive Health is Affected Too!**

- Danish FFs had 46.5% increased risk of male-factor infertility compared to general population
- Male infertility 46.5% higher than general population
- Paternal employment as a FF was associated with ventricular septal & atrial septal defects among offspring
- Sperm 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 Organization
- Increased fire exposure is also associated with reduced sperm parameters

**Solutions & Next Steps**

- Check out NFPA 1582, Section 9.32, 2020 ed.
- Limit exposures with appropriate decontamination (see NFPA 1585)
- Know your department's policy or suggest adding one if there isn't one already

**FOR MORE INFORMATION & REFERENCES, Scan the QR code with your phone**

# Physical Health: Obesity

Career women: 15.6%  
 Volunteer women: 31.6%

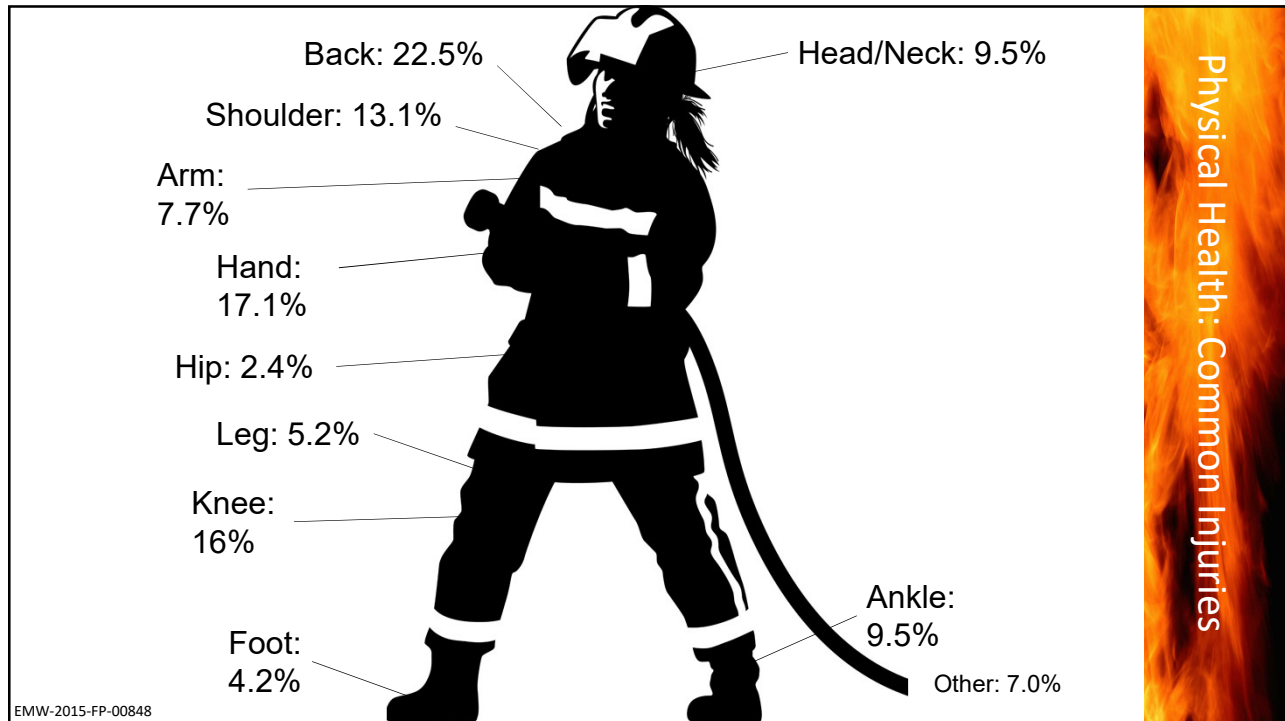
Career men: 33.5%  
 Volunteer men: 43.2%

General population: 41.1%

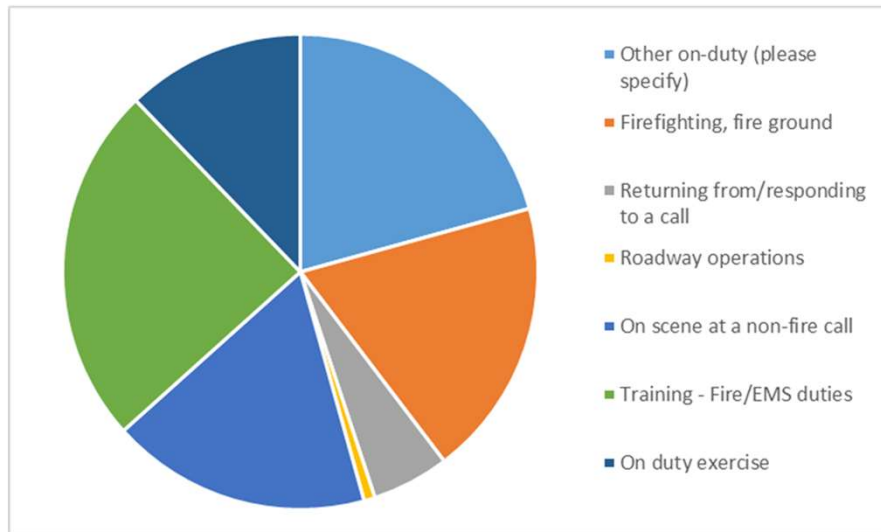
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## Physical Health: Predictors of Obesity

- **Age:** those in their 40's & 50's **TWICE** as likely to be obese compared to those <29
- **Years of Service:** those with >31 years **FOUR TIMES** as likely to be obese than <10 years experience
- **Race:** Minorities **42%** more likely to be obese than Caucasian FFs
- **Rank:** Chiefs & Company Officers **more likely** to be obese than FF/Medics
- **PTSD & Depression:** **significantly related** to obesity



## Physical Health: Type of Duty



## Physical Health: Injuries



- Impact of PPE
- Training differences
- Fitting in
- Predictors: race, health, BMI, substance use, mental health

# Discrimination and Harassment



**69%** experienced differential treatment based on gender

**24%** said their gender created barriers to career advancement

**20%** said "I have seen my supervisor's authority challenged because of their gender"



**23%** said promotions are not decided upon fairly

**20%** said the hiring process does not fairly select & hire applicants



**15%** said staff in their dept are treated differently based on their sexual orientation

# Discrimination and Harassment

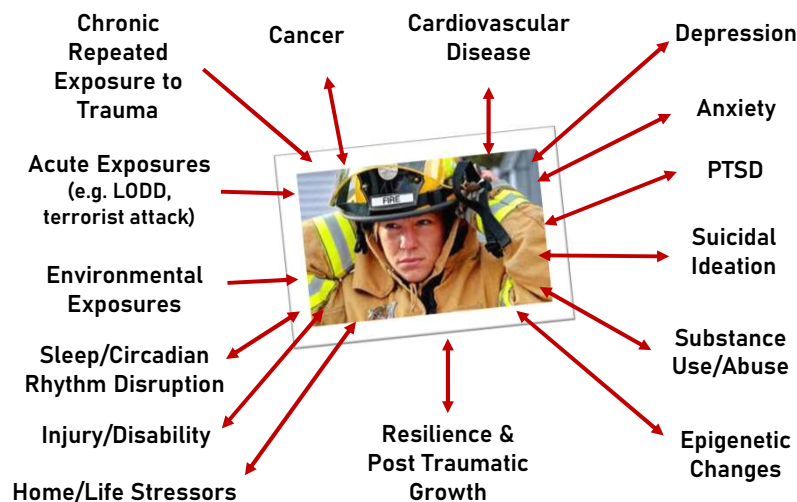
I have experienced incidents because of my gender involving:	Current Study % Yes
Shunning/isolation	40.8
Privacy in showers, dormitory, or when changing clothes	29.3
Verbal harassment	37.4
Pornography	25.4
Sexual advances	36.9
Dormitory accommodations	33.4
Training denial or differences	20.8
Station assignments	24.4
Hazing	16.8
Hostile notes, cartoon, or other written material	12.9
Meal-time related difficulties	11.0
Assault	5.2
These incidents continue in the present	20.5

## Discrimination and Harassment: The Impact

Women who experienced high severity of harassment and discrimination:

- **300%** more likely to suffer from depression
  - **150%** more likely to suffer from PTSD
  - **2 times** more likely to have driven while intoxicated
  - **40%** increased number of poor health days
  - **120%** more likely to report one injury in the last 12 months
  - Report higher rates of work stress
  - Less likely to recommend becoming a firefighter
- ...compared to women who experienced little or no harassment or discrimination

## Mental Health: The Job Stress





## Mental Health: The Outcomes

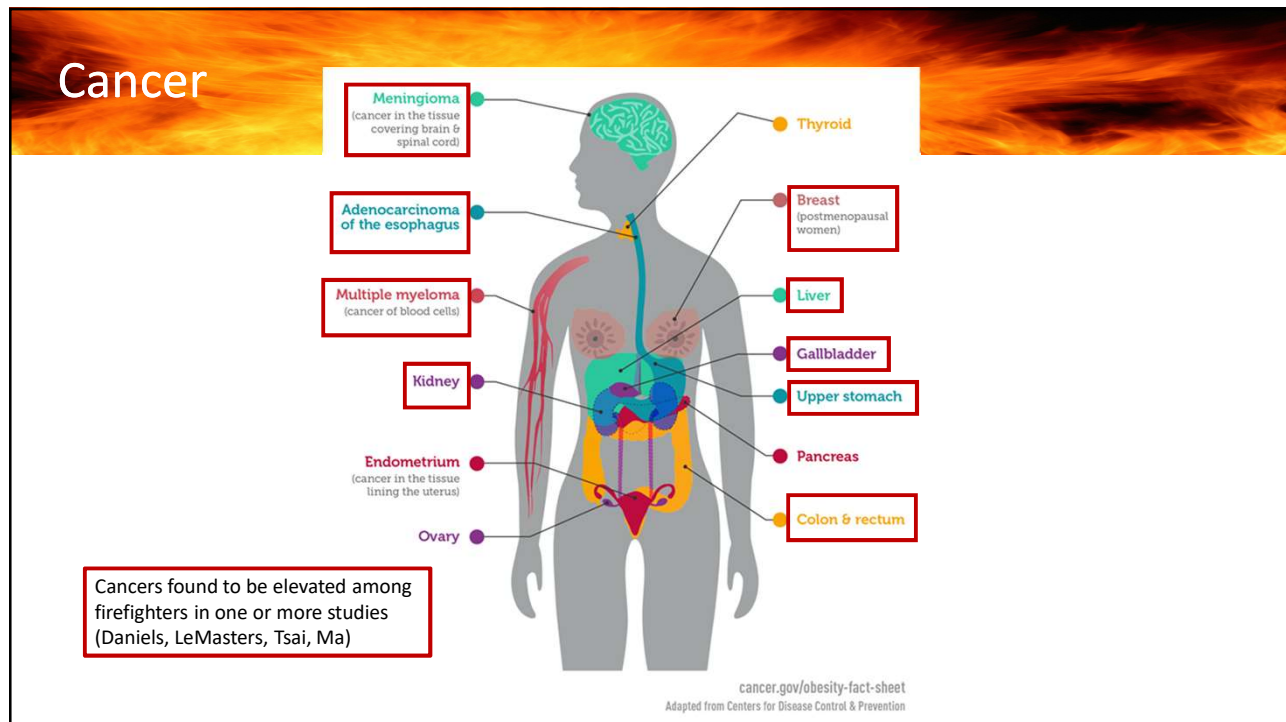


- Depression: 20% vs 27%
  - Repeated exposure to trauma
  - Sleep
  - Natural disasters
- PTSD: 6x higher than general pop
  - Women > men
  - Sleep and depression
- Suicide:
  - Suicidal ideations 13.5% vs. 46.8%
  - Plans: 3.9% vs. 19.2%
  - Attempts: 4.6% vs 15.5%

## Alcohol Use and Women Firefighters

- 40% reported binge drinking in the past 30 days
- 4.3% reported driving while intoxicated
- 16.5% screened positive for problem drinking
- Problem drinkers were 2.5x more likely to experience depression or PTSD
- Risk of injury increased 40%





## Cancer and Women Firefighters

- **Daniels (2014)** found cancer incidence among women was elevated but not statistically significant
- Female bladder cancer incidence was statistically significant
- **Nearly half of all women's cancer cases were breast cancer (46% higher than general population)**
  - Nearly all breast cancer cases were diagnosed prior to age 55 with the highest rates between ages 50-54
  - Most cancer deaths (for women) were from breast cancer

## Cancer and Women Firefighters



















- Lee (2019) found female FFs had an elevated risk of **brain and thyroid cancers and melanoma**
- Ma and colleagues (2006) found female FFs had significantly increased incidence rates of **overall cancer, cervical and thyroid cancers and Hodgkin's disease**

## Most Common Cancer Symptoms




A **subtle** **AND** **persistent** health change lasting 2 weeks or more

**Detec**together

Cancer Survival Rates		
TYPE OF CANCER	STAGE 1	STAGE 4
Bladder	69% 	6% 
Breast	99% 	28% 
Colon	91% 	14% 
Esophageal	47% 	5% 
Lung	63% 	7% 
Melanoma (skin)	99% 	27% 
Prostate	99.9% 	30% 
Testicular	99% 	73% 
Thyroid	99% 	76% 

Source: American Cancer Society 5-year SEER data (based on people diagnosed between 2010-2016)



3 Steps Detect:

**STEP 1 Know Your Great** 

**STEP 2 Use the 2-Week Rule** 

**STEP 3 Share with Your Doctor** 



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**Maria Koepfel**

Email: [Koepfel@ndri-usa.org](mailto:Koepfel@ndri-usa.org)

