

# Listeriosis risk factors of women during pregnancy and the potential impact of targeted food safety information

Ellen W. Evans\*, Adrian C. Peters and Elizabeth C. Redmond

Zero2Five<sup>o</sup> Food Industry Centre, Cardiff School of Health Sciences,  
Cardiff Metropolitan University, Wales, United Kingdom.

\*Corresponding author: elevans@cardiffmet.ac.uk



## Introduction

Cases of listeriosis are reported to be largely sporadic<sup>1</sup>, which may be associated with unsafe food handling and storage practices in consumers' domestic kitchens<sup>2,3</sup>. Given *Listeria monocytogenes* is a psychrotrophic mesophile and a facultative anaerobe<sup>4</sup>, the pathogen has the ability to survive and grow in vacuum packed food products during refrigeration; consequently, the majority of listeriosis incidence are predominantly associated with ready-to-eat (RTE) foods<sup>5,6</sup>.

Subsequently, recommended domestic practices to reduce risks associated with *L. monocytogenes* include<sup>7,8</sup>:

- Adhere to 'use-by' dates on RTE foods
- Ensure safe refrigeration temperatures
- Consume RTE foods within two days of opening

Due to weakened immune function, listeriosis is particularly associated with 'at-risk' consumers, predominantly affecting pregnant women and older adults (aged  $\geq 60$  years)<sup>5</sup>.

Historical surveillance data (1980s-1990s) suggest listeriosis incidence was commonly associated with pregnant women. Recent international data (1990s-onwards) suggest decreased incidence of pregnancy associated-infection, thus suggesting successful implementation of targeted food-safety information initiatives.

Research to determine pregnant women's current food-safety behavioural influences is lacking.

## Aim

This study aimed to determine knowledge, attitudes and self-reported practices associated with listeriosis risk factors and evaluate potential impact of food-safety education during pregnancy.

## Methods

Participants were recruited according to predetermined criteria. The study included pregnant (20%) and post-partum ( $\leq 12$  months) (80%) women ( $n=40$ ) from South Wales UK.

Participation involved a self-complete questionnaire to ascertain food safety knowledge, attitudes, self-reported practices implemented during pregnancy relating to listeriosis and recall of food safety information.

Data analysis - IBM SPSS statistics 17.0, Microsoft Office Excel 2007 and Access 2007 were used to conduct quantitative and statistical analysis of the data.

## References

1. Gillespie, I. et al., (2006) Changing Pattern of Human Listeriosis, England and Wales, 2001–2004. *Emerging Infectious Diseases*, 12(9): p. 1361 - 1366.
2. Redmond, E.C. & Griffith, C.J. (2003) Consumer Food Handling in the Home: A Review of Food Safety Studies. *Journal of Food Protection*, 66: p. 130-161.
3. Scott, E. (1996) Foodborne disease and other hygiene issues in the home. *Journal of Applied Microbiology*, 80(1): p. 5-9.
4. Adams, M. & Moss, M. (2006) *Food Microbiology*, Second Edition, The Royal Society of Chemistry.
5. ACMSF (2008). Increased incidence of Listeriosis in the UK. Ad Hoc Group on Vulnerable Groups, Advisory Committee on The Microbiological Safety of Food, FSA.
6. Gombas, D.E., et al., (2003) Survey of *Listeria monocytogenes* in Ready-to-Eat Foods. *Journal of Food Protection*, 66: p. 559-569.
7. HPA (2006) *Listeria* fact sheet in Health Protection Agency Centre for Infections, Health Protection Agency.
8. DoH & FSA (2008) *Listeria - keeping food safe*, Department of Health and Food Standards Agency

## Results

### Knowledge, attitudes and self-reported practices relating to listeriosis risk factors

The majority (90%) believed that during pregnancy it is 'more important' to implement food safety practices and 63% reported that practices changed. Consequently, many reported to be more careful with cooking (73%), following 'use-by' dates (67%) and with consuming foods within two-days of opening (68%).

Table 1: Cognitive and behavioural comparison of post-partum and pregnant women ( $n = 40$ ) knowledge, attitudes and self-reported practices of listeriosis risk factors

LISTERIOSIS RISK FACTORS	KNOWLEDGE	ATTITUDE	SELF-REPORTED PRACTICES
<b>ENSURING SAFE REFRIGERATION TEMPERATURES</b> 	75% were unaware of recommended refrigeration temperatures (5°C)	83% had positive attitudes towards refrigeration temperatures	65% reported to 'never' check the operating temperature of their refrigerator
<b>ADHERING TO 'USE-BY' DATES ON RTE FOODS</b> 	95% were knowledgeable of 'use-by' dates indicating food safety	75% had positive attitudes towards consumption of foods with expired 'use-by' dates	35% reported to consume RTE food products beyond the 'use-by' date during pregnancy
<b>CONSUMING RTE FOODS WITHIN TWO DAYS OF OPENING</b> 	68% aware of consuming RTE foods within recommended two days after opening	68% had positive attitudes towards consuming foods within the recommended two days after opening	65% report that RTE foods would be consumed beyond two days after opening during pregnancy

Findings in relation to listeriosis risk factors as illustrated in Table 1 indicate awareness of some risk factors however malpractices associated with listeriosis were reported to be implemented during pregnancy:

- **ENSURING SAFE REFRIGERATION TEMPERATURES** – Although positive attitude were held, the majority were unaware of recommended temperatures and more than half reported to 'never' check the temperature of their home refrigerator.
- **ADHERING TO 'USE-BY' DATES ON RTE FOODS** – The majority were both knowledgeable of, and had positive attitudes towards 'use-by' dates, consequently the majority reported that 'use-by' dates would be adhered to during pregnancy.
- **CONSUMING RTE FOODS WITHIN TWO DAYS OF OPENING** – Although around two-thirds were aware and had positive attitudes towards recommendations, however a similar proportion reported recommendations would not be adhered to.

### Recall of food safety information received during pregnancy

The majority (70-83%) recalled receiving information regarding healthy eating and keeping active during pregnancy. Conversely, only 45% recalled receiving food-safety information, of which 75% reported the information to be useful and 80% reporting that the information did change their practices. However, no significant differences ( $p > 0.05$ ) were determined in self-reported food-safety practices relating to listeriosis risk factors during pregnancy whether food-safety information was received or not.

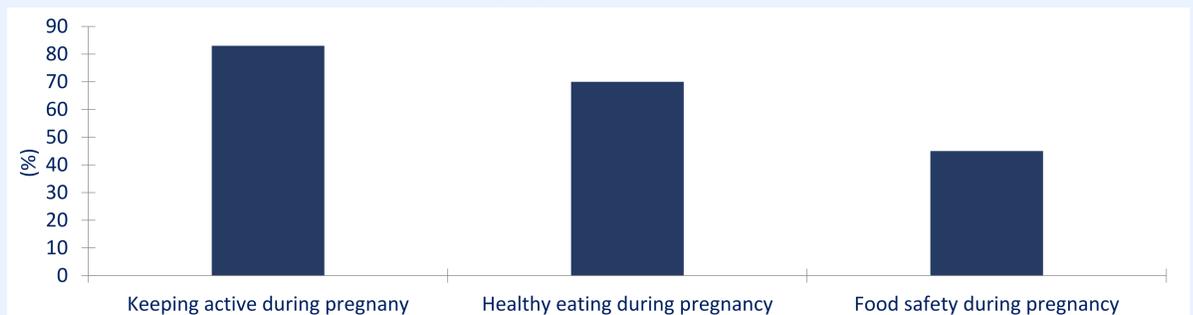


Figure 1. Recall of health related information received during pregnancy ( $n=40$ )

### Perceptions of risk, control and responsibility

Perceptions of risk, control and responsibility were not correlated ( $p > 0.05$ ), suggesting perceived food poisoning risk during pregnancy is perceived to be beyond individual control and responsibility. Findings suggest that heightened risk perceptions among pregnant women may increase likelihood of engaging with food safety education provided for pregnant women in the UK, which may in turn increase knowledge, have a positive impact on attitudes and increase their perception of control to improve subsequent practices. Consequently, engagement with such targeted food safety education may be contributory to the observed reduction in pregnancy associated listeriosis cases in the UK.

## Significance of the study

- Although food-safety information was reported to have a positive impact on practices of individuals, findings suggested no significant differences existed in self-reported food-safety practices according to recall of receiving food-safety advice.
- Food safety malpractices were reported to be implemented during pregnancy
- There is a need for targeted food-safety education to further raise awareness of the potential ability to control risks associated with listeriosis during pregnancy.