

# Cancer Risk Perception and Preventive Behaviors among Grilled Meat Vendors

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**Background:** Polycyclic aromatic hydrocarbons (PAHs) are environmental pollutants that cause cancers in humans. Exposure results from incomplete burning of organic materials. Grilled meat vendors are occupationally exposed to PAHs in smoke from continuously burning charcoal and meat, which may have chance to get cancer. Individual risk perception is a critical antecedent of preventive behavior. However, relatively little is known about the cancer risk perception and preventive behaviors among grilled meat vendors.

**Objective:** The present study aimed to examine cancer risk perception and preventive behaviors and factors associated with preventive behaviors among grilled meat vendors in Bangkok, Thailand.

**Material and Method:** A cross-sectional survey was used in the present study. The subjects consisted of 40 males and 82 females grilled meat vendors who conducted their jobs at Victory Monument, Bang Lumpoo, Pratunam, Jakkawat or Patumwan. They were interviewed regarding cancer risk perception and preventive behaviors. Multiple logistic regression analysis was used to analyze data.

**Results:** Average cancer risk perception score was  $23.3 \pm 3.3$  out of 32. About 79.5% of the subjects had high risk perception. The prevalence of good preventive behaviors was 86.1%. The three most frequent preventive behaviors among the subjects during grilling meat were using good quality charcoal (65.6%), ventilation fan (41.0%) and wearing long sleeves shirt (36.1%). Only 10.7% always used gloves. Multiple logistic regression analysis showed 2 factors were independently associated with preventive behaviors: educational level and risk perception. The subjects who had higher educational level or risk perception were more likely to develop better behaviors than those who had a lower educational level and perception ( $p < 0.05$ ).

**Conclusion:** In conclusion, the present study found that the educational background and cancer risk perception were associated with preventive behaviors among grilled meat vendors. To improve the preventive behaviors among grilled meat vendors, interventions focusing on cancer risk perceptions and considering educational background among target group are recommended.

**Keywords:** Cancer risk perception, Preventive behavior, Grilled meat vendor, Bangkok

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Polycyclic aromatic hydrocarbons (PAHs) are environmental pollutants that have been linked to the etiology of human cancers, mainly in the lung<sup>(1)</sup>. PAHs result from incomplete burning of organic materials such as meat, fuels and hydrocarbons, including burning forests<sup>(2)</sup>. Selling grilled meat is one of the professions that vendors frequently exposed to PAHs in the smoke from continuously burning charcoal and meat.

The present study of Ruchirawat et al<sup>(3)</sup> showed the PAHs concentrations that grilled meat vendors in the Bangkok Metropolitan area are exposed to is  $34.24 \pm 7.02$  ng/m<sup>3</sup>, which is higher than exposures of a control group of clothes vendors ( $1.07 \pm 1.64$  ng/m<sup>3</sup>) indicating that the grilled meat vendors were facing higher cancer risk.

Individual risk perception is a critical antecedent of preventive behavior<sup>(4)</sup>. If they perceived risk, danger or own sickness, they would develop self-awareness on possible danger and preventive behavior, risk perception towards health threats and life danger, leading to preventive awareness<sup>(5)</sup>.

However, relatively little is known about the

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cancer risk perception and preventive behaviors among grilled meat vendors. Therefore, the present study aimed to examine cancer risk perception and preventive behaviors and factors associated with preventive behaviors among grilled meat vendors in Bangkok, Thailand.

## Material and Method

### Subjects

Sample size was estimated using the single proportion formula, with a 95% confidence interval. The sample size calculation was based on 6.7% preventive behaviors from the pilot study. Precision was set at 5.0% and the sample size was calculated as 96. The present study recruited 118 respondents to allow for approximately 20% of non-respondents. Inclusion criteria were: grill meat vendors aged 20-60 years and had used charcoal for grilling the meat at least 3 months prior to conduct of the survey.

Interview data was collected by the first author. Ethical approval for the research protocol was obtained from the Ethics Committee of the Faculty of Public Health, Mahidol University, Bangkok, Thailand. All participating subjects were informed about research objectives and methodology before signing an informed consent form.

### Study design and tools

A cross-sectional study was performed during November 1, 2010 to January 31, 2011. Subjects were interviewed using questionnaires comprising three parts: socio-demographic characteristics, risk perception and preventive behaviors.

Socio-demographic characteristics included the questions of gender, marriage status, age, education, working year and working hour.

Risk perception was defined as individual perception of cancer risk from PAHs exposure during selling grilled meat. It was measured by eight items with a four point rating scale varying from strongly disagree to strongly agree. A total risk perception score provided a comprehensive measure of risk perception. The subjects were assigned into the group of low or high perception if their score was less than or equal to mean or greater than mean, respectively.

Preventive behavior was defined as individual activities to avoid developing cancer from PAHs exposure while grilling meat. In the present study, preventive behaviors include using good quality charcoal, having ventilation, using a mask, wearing a long sleeve shirt and gloves. The subjects were

assigned into the group of poor behavior if they had not regularly practiced any preventive behavior. Those who regularly practiced at least one or more are classified as good preventive behavior practitioner.

Questions on risk perception and preventive behavior were developed. The internal consistency of risk perception and preventive behavior using Cronbrach alpha's coefficients were 0.75 and 0.72, respectively.

### Statistical analysis

Data were expressed as mean ( $\pm$  SD) and percentage. Logistic regression was used to estimate the odds ratio (OR) of the personal factors and risk perception for preventive behavior. The statistically significant criterion was set at  $p < 0.05$ .

## Results

The subjects finally consisted of 40 male and 82 female grilled meat vendors in five areas in Bangkok Metropolis, including Victory Monument, Bang Lumpoo, Pratunam, Jakkawat and Patumwan. The characteristics of the subjects are shown in Table 1.

### Cancer risk perception

About 79.5% of the subjects had high risk perception and 20.5% low risk perception. Average risk perception of the subjects was 23.4 ( $\pm$  3.3) with the

**Table 1.** Characteristic of the subjects (n = 122)

Variables	Mean (SD)
Age (yr)	40.4 (10.4)
Working career (yr)	7.4 (6.1)
Working hour (hr/day)	7.6 (2.7)
	n (%)
Gender	
Male	40 (32.8)
Female	82 (67.2)
Marital status	
Married	96 (78.7)
Single/Widowed/Divorced	26 (21.3)
Education	
Illiterate/Primary	68 (55.7)
Secondary or higher	54 (44.3)
Smoking	
Yes	23 (18.9)
No	99 (81.1)
Location	
Outdoor	103 (84.4)
Indoor	19 (15.6)

maximum of 30 and minimum 15 (possible score; 8-32). Table 2 shows that more than 75% of the subjects perceived that smoke from grilled meat or eating crispy grilled meat or long term exposure to smoke can cause cancer. More than 70% perceived that grilling oil develops carcinogens. More than 70% perceived that grilling meat in open air and taking shower after grilling meat can reduce exposure to carcinogen. Less than 50% perceived that they have chance of having cancer from their occupation. Less than 5% perceived that they may have chance of having cancer in the next ten years from their occupation.

### Preventive behaviors

About 86.1% of the subjects had good preventive behaviors and 13.9% poor preventive behaviors. Table 3 shows the three most frequent behaviors among the subjects during grilling meat were using good quality charcoal (65.6%), ventilation fan (41.0%) and wearing long sleeves shirt (36.1%). Only 10.7% always used gloves.

### Factors associated with preventive behaviors

Multiple logistic regressions were used to

examine factors associated with preventive behaviors. Table 4 shows variables that were significantly associated with preventive behaviors. They were educational level (adjusted OR = 5.67, 95% CI = 1.37-23.47) and risk perception (adjusted OR = 3.42, 95% CI = 1.06-10.99).

### Discussion

The results of the present study showed that about 80% of the subjects had high levels of risk perception and good preventive behaviors. Factors independently significantly associated with preventive behaviors were educational level and risk perception.

The high levels of risk perception and good preventive behaviors in the present study group were higher than those reported in the present study of avian influenza risk perception and preventive behavior among traditional market workers and shoppers in Taiwan, a similar study which found that 44.3% of the participants had correct perception and about 43.2% of males and 50.0% of females had preventive behavior<sup>(6)</sup>. The possible explanation may be that different disease affects perception and behavior differently.

**Table 2.** Cancer risk perception among 122 grilled meat vendors, by item (%)

Variables	Strongly Agree	Agree	Disagree	Strongly Disagree
Smoke from grilled meat can cause cancer	45.9	41.0	9.0	4.1
Eating crispy grilled meat can cause cancer	48.4	47.3	3.3	0.8
Long-term exposure to smoke may cause cancer	39.3	37.7	19.7	3.3
Grilling oil meat can develop carcinogen	38.3	36.1	23.0	2.5
Grilling meat in open air can reduce exposure to carcinogen	53.3	32.8	13.1	0.8
Taking a shower after grilled meat can reduce risk of cancer	28.7	49.2	18.9	3.3
You are at risk of cancer from selling grilled meat	9.1	40.0	36.4	14.5
You are at risk of cancer in the next 10 years if continue selling grilled meat	0.0	2.5	52.7	41.8

**Table 3.** Preventive behaviors from PAHs exposure during grilling of meat (n = 122)

Behaviors	Practice	
	Regularly n (%)	Sometime or never n (%)
Using good quality charcoal	80 (65.6)	42 (34.4)
Using electric fan	50 (41.0)	72 (49.0)
Wearing long sleeve shirt	44 (36.1)	78 (63.9)
Wearing masks to cover mouth and nose	36 (29.5)	86 (70.5)
Wearing gloves	3 (10.7)	109 (89.3)

**Table 4.** Adjusted odds ratios (ORs) for preventive behaviors among 122 grilled meat vendors by logistic regression analysis

Factors	OR	95% CI
Higher risk perception	3.42*	1.06-10.99
Higher educational level	5.67*	1.37-23.47
Smoking	1.21	0.34-4.33
Working year	2.57	0.59-11.06
Working hours	1.71	0.45-6.46
Age	1.62	0.48-5.45

Individuals with education beyond primary level had focused more on preventive behavior than those who only completed primary school or never attended school (OR = 5.67, 95% CI = 1.37-23.47,  $p < 0.05$ ). This is partly because individual educational level affected self-behavior in sickness prevention. A person with high education is one who is constantly searching for more knowledge and data from various sources. This finding coincides with an earlier study that found educational level significantly correlated with preventive behavior<sup>(6)</sup>.

Grilled meat vendors with higher risk perception had high preventive behaviors than those with lower perception (OR = 3.42, 95% CI = 1.01-10.99,  $p < 0.01$ ). This may due to the grilled meat vendors in this group perceiving that in selling grilled meat, they were at high risk of long-term exposure to smoke, which will put them at high risk of cancer. Risk perceptions do influence preventive behaviors for reducing risk<sup>(7)</sup>, therefore high perception of risk led them to have high preventive behaviors. This finding coincides with the behavioral science theory that mentioned high perception of danger would encourage high preventive behavior<sup>(5,8)</sup> and also agrees with earlier studies of other occupations, which stated that risk perceptions were individually perceived health threats, leading to practice preventive behavior for reducing risks<sup>(6,9)</sup>. However, some studies<sup>(10,11)</sup> yielded different findings when association had not been found between risk perception and preventive behavior, perhaps from having different definitions of, or using different questions to measure risk perception. Therefore, study of risk perception should focus on giving the definition to match with the study objective.

In conclusion, the present study found that the educational background and cancer risk perception were associated with preventive behaviors among grill meat vendors. To improve the preventive behaviors among grilled meat vendors, interventions focusing

on cancer risk perceptions and considering educational backgrounds among target group members are recommended.

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#### Potential conflicts of interest

None.

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## การรับรู้ความเสี่ยงต่อการเกิดมะเร็งและพฤติกรรมการป้องกันของผู้ชายเนื้อสัตว์บึ่งย่าง

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**ภูมิหลัง:** สารโพลีไซคลิก อะโรมาติก ไฮโดรคาร์บอน (PAHs) เป็นสารก่อมะเร็งในคน ที่ปนเปื้อนอยู่ในสิ่งแวดล้อม โดยเกิดมาจากการเผาไหม้สารอินทรีย์ที่ไม่สมบูรณ์ ผู้ที่ชายเนื้อสัตว์บึ่งย่างจึงมีโอกาสสัมผัส PAHs ในควันที่เกิดจากการเผาไหม้ถ่านและเนื้อสัตว์ในขณะที่ชายเนื้อสัตว์บึ่งย่างอย่างต่อเนื่อง และมีโอกาสเสี่ยงต่อการเป็นมะเร็ง การรับรู้ความเสี่ยงเป็นปัจจัยที่มีอิทธิพลต่อพฤติกรรมการป้องกันของแต่ละบุคคล อย่างไรก็ตามความรู้เกี่ยวกับการรับรู้ความเสี่ยงต่อการเกิดมะเร็งและพฤติกรรมการป้องกันของผู้ชายอาหารบึ่งย่างยังมีอยู่จำกัด

**วัตถุประสงค์:** เพื่อศึกษาการรับรู้ความเสี่ยงต่อการเกิดมะเร็งและพฤติกรรมการป้องกันรวมทั้งศึกษาปัจจัยที่มีความสัมพันธ์กับพฤติกรรมการป้องกันของผู้ชายเนื้อสัตว์บึ่งย่างในกรุงเทพมหานคร

**วัสดุและวิธีการ:** รูปแบบการวิจัยที่ใช้ในการศึกษาครั้งนี้ คือการศึกษาภาคตัดขวาง กลุ่มตัวอย่างคือผู้ชายเนื้อสัตว์บึ่งย่าง ในย่านอนุสาวรีย์ชัยสมรภูมิ ปทุมวัน ประตูนํ้า บางลำภู และจักรวรรดิ จำนวน 122 คน เป็นเพศชาย 40 คน และหญิง 82 คน เก็บข้อมูลตั้งแต่ เดือนพฤศจิกายน พ.ศ. 2553 ถึง มกราคม พ.ศ. 2554 โดยใช้แบบสัมภาษณ์ วิเคราะห์ข้อมูลด้วยสถิติการวิเคราะห์ถดถอยลอจิสติก

**ผลการศึกษา:** กลุ่มตัวอย่างในการศึกษานี้มี คะแนนเฉลี่ยการรับรู้ความเสี่ยง เท่ากับ  $23.35 \pm 3.32$  จากคะแนนเต็ม 32 คะแนน ร้อยละ 79.5 ของกลุ่มตัวอย่างมีการรับรู้ความเสี่ยงอยู่ในระดับสูง และร้อยละ 86.1 มีพฤติกรรมการป้องกันในระดับดี โดยที่พฤติกรรมการป้องกันที่ปฏิบัติอย่างสม่ำเสมอ 3 อันดับแรก คือ การเลือกใช้ถ่านที่มีคุณภาพดี (ร้อยละ 65.6) การเปิดพัดลมระบายอากาศ (ร้อยละ 41.0) และการสวมเสื้อแขนยาว (ร้อยละ 36.1) มีเพียงร้อยละ 10.7 ที่ใส่ถุงมือขณะบึ่งย่าง ผลการวิเคราะห์ถดถอยลอจิสติกพบว่า ระดับการศึกษาและการรับรู้ความเสี่ยงต่อการเกิดมะเร็ง มีความสัมพันธ์กับพฤติกรรมการป้องกันของผู้ชายเนื้อสัตว์บึ่งย่างอย่างมีนัยสำคัญทางสถิติ กล่าวคือกลุ่มตัวอย่างที่มีระดับการศึกษาหรือการรับรู้ความเสี่ยงระดับที่สูงกว่า มีพฤติกรรมการป้องกันดีกว่า กลุ่มตัวอย่างที่มีระดับการศึกษาและการรับรู้ความเสี่ยงต่ำกว่า ( $p < 0.05$ )

**สรุป:** ผลการศึกษานี้ พบว่าระดับการศึกษาและการรับรู้ความเสี่ยงต่อการเกิดมะเร็งมีความสัมพันธ์กับพฤติกรรมการป้องกันของผู้ชายเนื้อสัตว์บึ่งย่าง ดังนั้นการส่งเสริมพฤติกรรมการป้องกันสัมผัสสารก่อมะเร็งของผู้ชายเนื้อสัตว์บึ่งย่าง ควรมุ่งเน้นการอบรมเพื่อเพิ่มการรับรู้ความเสี่ยงของการเกิดมะเร็งที่ถูกต้อง และคำนึงถึงระดับการศึกษาของกลุ่มเป้าหมายด้วย