



# Husband Smoking Cessation Associated with Decreased Risk of Both Husband' and Wife' Hypertension

## A National Longitudinal Analysis

Wu Qianru<sup>1</sup>; Yang Ying<sup>2</sup>; Ding Sijing<sup>1</sup>; Cheng Ziyi<sup>1</sup>; Liu Zheheng<sup>1</sup>; **Wang Long<sup>1</sup>**; Ma Xu<sup>2</sup>

1. Institute for Epidemiology and Health Statistics, School of Public Health, Lanzhou University, Lanzhou, China.
2. National Institute for Family Planning, Beijing, China.

# Backgrounds

- Hypertension is a midstream disease for multiple cardiovascular diseases
- Smoking is a leading cause of hypertension that could be prevented
- Public health call for quitting smoking
- TWO FACTs
  - Population attributable fraction estimated by cohort studies **cannot be realized** by **interventions** in real-world practice.
  - The expected health gains in trials could **hardly achieved** in real practice.
- WHAT we are facing
  - Not all individual exposed to risk factors will take action to avoid exposing
  - Time required by to take action has uncertainty
  - Optimistic attitude and willing to fight toward risk factor removal could minimize the gap between theory and practice

# Backgrounds

- **Tobacco Problem in China**

- Largest producer and consumer of tobacco in the world
- Male smoking rate is **almost 28 times** to female smoking
- Adult smoking has decreased slightly from 30.8% in 2007 to 26.7% in 2018
- **Tobacco control in public places since 2011**
- Husband smoking has become the main source of tobacco exposure in family environment

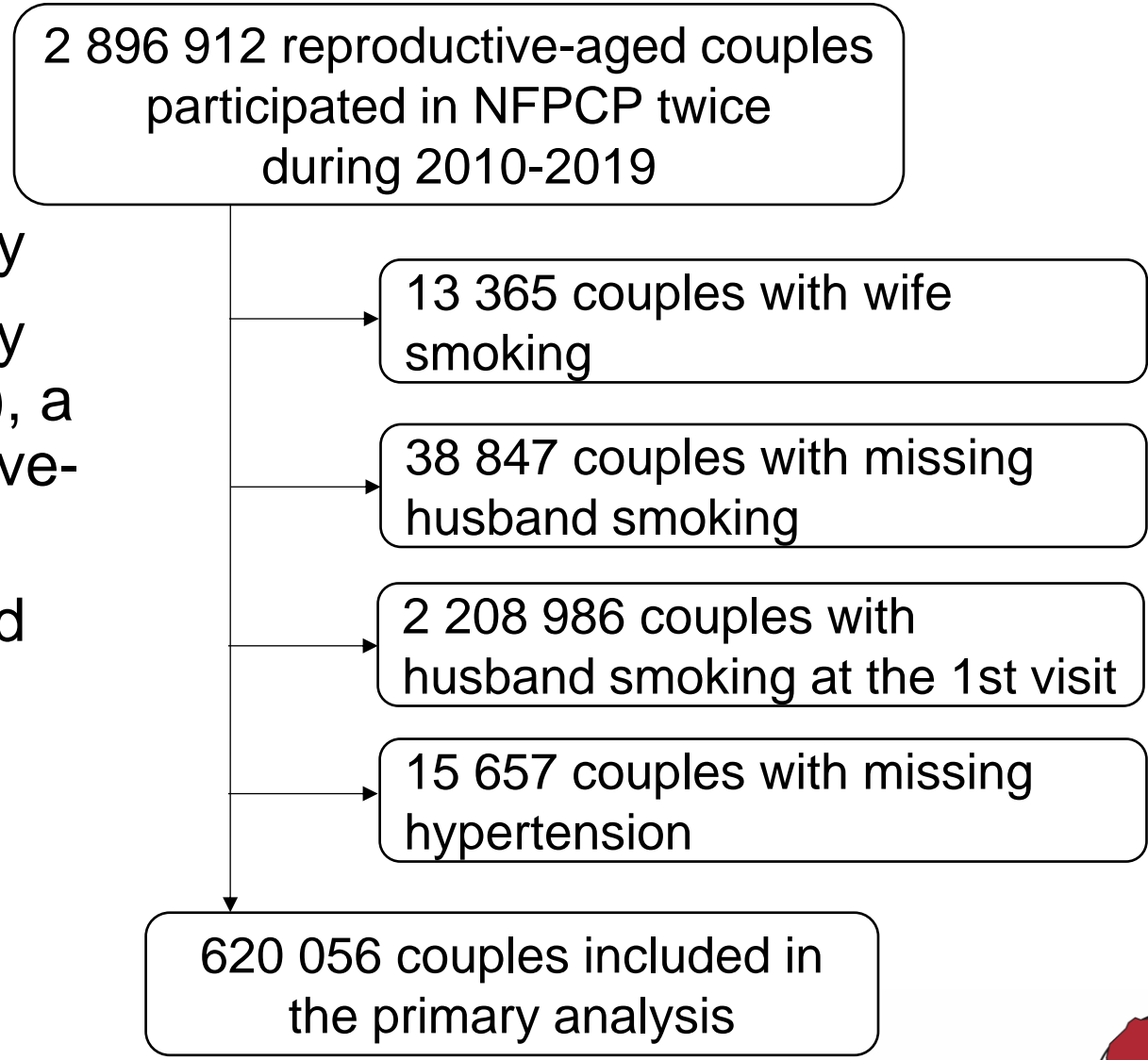
- **Research Questions**

- Regarding to hypertension, what the health benefits of husband smoking cessation and even smoking amount reducing in real-world setting?

# Methods

## • Participants

- Study design: A population-based historical cohort Study
- National Free Pre-pregnancy Check-ups Project (NFPCP), a health service for reproductive-aged couples
- 2.8 million reproductive-aged Chinese couples who had participated in NFPCP twice during 2010-2019



# Methods

- **Exposure: Husband smoking**
  - **Smoking cessation**
    - Not smoke at the second visit
  - **Reduced amount**
    - **In cigarettes/days**: cigarettes smoked daily on the second visit compared to which at the first visit
    - **In pack-years**: reduced amount in pack/days multiplied by time interval of two visits in years.
- **Outcome: Hypertension**
  - Systolic/diastolic BP  $\geq 140/90$  mmHg, self-reporting hypertension, or taking hypotensive medicine.

# Methods

- **Statistical Analysis**

- Logistic regression
- Multivariable-adjusted odds ratios (**OR**) and 95% confidence intervals (**CI**)
- **Covariates:** age, ethnicity, higher education, household registration, BMI, and alcohol consumption, secondhand smoking
- Subgroup analyses stratified by husbands smoking in cigarettes/day and pack · years at the first visit

# Results & Discussion

**Table 1.** Association of husband smoking cessation and the risk of hypertension at the second visit among normotensive participants at the first visit.

Husband Smoking	Wives' Hypertension			Husbands' Hypertension		
	N (%)	Age-adjusted OR (95% CI)	Multivariable-adjusted OR (95% CI)	N (%)	Age-adjusted OR (95% CI)	Multivariable-adjusted OR (95% CI)
<b>Smoking cessation</b>						
No	388 083 (1.55)	1 (Reference)	1 (Reference)	348 081 (3.41)	1 (Reference)	1 (Reference)
Yes	303 659 (1.26)	0.82 (0.78-0.85)	<b>0.86 (0.83-0.90)</b>	297 508 (2.33)	0.68 (0.66-0.70)	<b>0.86 (0.83-0.88)</b>
<b>Reduced amount in cigarettes/day</b>						
Increased or not changed	290 244 (1.54)	1 (Reference)	1 (Reference)	252 831 (3.43)	1 (Reference)	1 (Reference)
1 to 5	144 116 (1.35)	0.90 (0.85-0.95)	0.93 (0.88-0.98)	140 842 (2.77)	0.82 (0.79-0.85)	0.94 (0.91-0.98)
6 to 10	164 517 (1.30)	0.85 (0.80-0.89)	0.89 (0.84-0.94)	161 134 (2.45)	0.71 (0.68-0.74)	0.88 (0.84-0.91)
11 to 15	29 890 (1.42)	0.91 (0.82-1.01)	0.95 (0.86-1.05)	29 209 (2.58)	0.73 (0.68-0.79)	0.89 (0.83-0.97)
16 to 20	58 849 (1.34)	0.82 (0.76-0.89)	0.86 (0.79-0.92)	57 601 (2.51)	0.69 (0.65-0.73)	0.88 (0.83-0.94)
≥21	4 126 (1.75)	0.97 (0.77-1.23)	1.02 (0.81-1.29)	3 972 (2.74)	0.70 (0.58-0.85)	0.87 (0.72-1.06)
<i>P</i> <sub>for trend</sub>	0.488	0.622	<b>0.935</b>	0.197	0.039	<b>0.026</b>
<b>Reduced amount in pack-years</b>						
Increased or not changed	292 572 (1.54)	1 (Reference)	1 (Reference)	255 099 (3.41)	1 (Reference)	1 (Reference)
0.1 to 0.5	117 881 (1.45)	1.00 (0.94-1.05)	1.05 (0.99-1.11)	115 382 (2.79)	0.85 (0.81-0.88)	0.99 (0.95-1.03)
0.6 to 1.0	103 950 (1.22)	0.82 (0.77-0.87)	0.85 (0.80-0.91)	101 899 (2.50)	0.74 (0.71-0.77)	0.89 (0.85-0.93)
1.1 to 2.0	105 053 (1.33)	0.86 (0.81-0.91)	0.89 (0.84-0.94)	102 834 (2.47)	0.71 (0.68-0.74)	0.87 (0.83-0.91)
≥2.1	72 286 (1.33)	0.78 (0.72-0.83)	0.81 (0.75-0.87)	70 375 (2.57)	0.68 (0.65-0.72)	0.85 (0.81-0.90)
<i>P</i> <sub>for trend</sub>	0.182	0.041	<b>0.074</b>	0.098	0.017	<b>0.014</b>

# Results & Discussion

**Table 2.** Association of husband smoking cessation and the risk of hypertension at the second visit among hypertensive participants at the first visit.

Husband Smoking	Wives' Hypertension			Husbands' Hypertension		
	N (%)	Age-adjusted OR (95% CI)	Multivariable-adjusted OR (95% CI)	N (%)	Age-adjusted OR (95% CI)	Multivariable-adjusted OR (95% CI)
<b>Smoking cessation</b>						
No	16 789 (24.08)	1 (Reference)	1 (Reference)	15 999 (21.84)	1 (Reference)	1 (Reference)
Yes	12 525 (11.92)	0.43 (0.40-0.46)	<b>0.44 (0.41-0.47)</b>	12 153 (11.17)	0.45 (0.42-0.48)	<b>0.55 (0.51-0.59)</b>
<b>Reduced amount in cigarettes/day</b>						
Increased or not changed	12 163 (26.03)	1 (Reference)	1 (Reference)	11608 (23.82)	1 (Reference)	1 (Reference)
1 to 5	6 047 (15.76)	0.54 (0.50-0.58)	0.54 (0.50-0.58)	5830 (14.17)	0.53 (0.49-0.58)	0.59 (0.54-0.64)
6 to 10	6 878 (13.04)	0.43 (0.40-0.47)	0.44 (0.41-0.48)	6673 (12.05)	0.44 (0.41-0.48)	0.52 (0.48-0.57)
11 to 15	1 277 (12.06)	0.39 (0.33-0.46)	0.40 (0.33-0.47)	1228 (10.50)	0.37 (0.31-0.45)	0.45 (0.37-0.54)
16 to 20	2 707 (12.34)	0.37 (0.33-0.42)	0.39 (0.34-0.44)	2591 (11.66)	0.40 (0.36-0.46)	0.50 (0.44-0.57)
≥21	242 (13.22)	0.39 (0.27-0.56)	0.41 (0.28-0.60)	222 (11.71)	0.39 (0.26-0.59)	0.49 (0.32-0.75)
<i>P</i> <sub>for trend</sub>	0.086	0.060	<b>0.069</b>	0.086	0.068	<b>0.084</b>
<b>Reduced amount in pack-years</b>						
Increased or not changed	12 304 (26.32)	1 (Reference)	1 (Reference)	11 743 (24.14)	1 (Reference)	1 (Reference)
0.1 to 0.5	4 867 (15.47)	0.53 (0.48-0.58)	0.53 (0.48-0.57)	4 679 (13.98)	0.52 (0.48-0.57)	0.58 (0.53-0.64)
0.6 to 1.0	4 144 (13.44)	0.44 (0.40-0.49)	0.45 (0.41-0.50)	4 005 (12.01)	0.44 (0.39-0.48)	0.50 (0.45-0.56)
1.1 to 2.0	4 543 (12.57)	0.40 (0.36-0.44)	0.41 (0.37-0.45)	4 394 (11.58)	0.41 (0.37-0.46)	0.48 (0.43-0.53)
≥2.1	3 456 (12.04)	0.35 (0.32-0.40)	0.37 (0.33-0.41)	3 331 (11.20)	0.38 (0.33-0.42)	0.45 (0.40-0.51)
<i>P</i> <sub>for trend</sub>	0.076	0.062	<b>0.070</b>	0.089	0.081	<b>0.079</b>



# Results & Discussion

**Table 3.** OR (95% CI) for the risk of hypertension at the second visit with husband smoking cessation according to husband smoking at the first visit among **normotensive participants at the first visit.**

Husband Smoking at the First Visit	Wives' Hypertension		Husbands' Hypertension	
	Age-adjusted OR (95% CI)	Multivariable-adjusted OR (95% CI)	Age-adjusted OR (95% CI)	Multivariable-adjusted OR (95% CI)
<b>In cigarettes/day</b>				
1 to 5	0.85 (0.79-0.92)	0.88 (0.81-0.96)	0.72 (0.68-0.76)	0.86 (0.81-0.92)
6 to 10	0.82 (0.77-0.88)	0.87 (0.82-0.93)	0.66 (0.63-0.70)	0.84 (0.80-0.89)
11 to 15	0.91 (0.79-1.05)	0.98 (0.85-1.13)	0.66 (0.59-0.73)	0.84 (0.74-0.95)
16 to 20	0.75 (0.69-0.82)	0.80 (0.73-0.88)	0.66 (0.62-0.70)	0.89 (0.82-0.95)
≥21	0.74 (0.55-1.00)	0.83 (0.61-1.12)	0.52 (0.40-0.66)	0.65 (0.49-0.85)
<b>In pack-years</b>				
0.1 to 2.0	0.88 (0.83-0.94)	0.92 (0.87-0.98)	0.66 (0.63-0.69)	0.82 (0.78-0.87)
2.1. to 4.0	0.85 (0.73-1.00)	0.90 (0.76-1.06)	0.69 (0.62-0.78)	0.89 (0.78-1.02)
4.1 to 6.0	0.81 (0.65-1.01)	0.84 (0.67-1.05)	0.68 (0.58-0.81)	0.93 (0.77-1.13)
≥6.1	0.81 (0.68-0.96)	0.86 (0.72-1.03)	0.64 (0.55-0.75)	0.92 (0.77-1.09)

# Results & Discussion

**Table 4.** OR (95% CI) for the risk of hypertension at the second visit with husband smoking cessation according to husband smoking at the first visit among **hypertensive participants at the first visit.**

Husband Smoking at the First Visit	Wives' Hypertension		Husbands' Hypertension	
	Age-adjusted OR (95% CI)	Multivariable-adjusted OR (95% CI)	Age-adjusted OR (95% CI)	Multivariable-adjusted OR (95% CI)
<b>In cigarettes/day</b>				
1 to 5	0.68 (0.53-0.86)	0.72 (0.56-0.91)	0.55 (0.48-0.63)	0.67 (0.58-0.78)
6 to 10	0.54 (0.45-0.65)	0.57 (0.48-0.69)	0.45 (0.40-0.50)	0.52 (0.46-0.58)
11 to 15	0.54 (0.35-0.85)	0.60 (0.37-0.96)	0.38 (0.29-0.49)	0.53 (0.40-0.71)
16 to 20	0.65 (0.52-0.82)	0.70 (0.56-0.96)	0.41 (0.35-0.47)	0.49 (0.42-0.58)
≥21	0.59 (0.28-1.22)	0.58 (0.27-0.96)	0.33 (0.20-0.54)	0.53 (0.30-0.93)
<b>In pack-years</b>				
0.1 to 2.0	0.63 (0.53-0.76)	0.68 (0.56-0.82)	0.46 (0.42-0.51)	0.57 (0.51-0.64)
2.1. to 4.0	0.46 (0.30-0.69)	0.46 (0.30-0.70)	0.43 (0.33-0.56)	0.56 (0.42-0.75)
4.1 to 6.0	0.58 (0.36-0.94)	0.59 (0.36-0.98)	0.48 (0.35-0.66)	0.58 (0.41-0.84)
≥6.1	0.82 (0.58-1.17)	0.83 (0.58-1.20)	0.45 (0.35-0.59)	0.58 (0.43-0.78)

# Conclusion

- **Husband smoking cessation, including reduction of smoking amount, could decrease the risk of hypertension of both husband and wife.**
- **Spouses are encouraged to quit smoking to prevent hypertension and control high blood pressure of patients in families.**



# Thanks for your attention !

Thanks for all health workers and NFPCP participants for their great efforts and collaboration.