

Violent injuries and regional correlates among women in China: results from 21 cities study in China

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Background: Ecological models depict violent injuries against women being influenced by both individual and environmental characteristics. However, only few studies examined the association between regional variables and the likelihood of violent injuries. Our study is a preliminary assessment of the impact of regional variables on the likelihood that a woman has experienced violent injuries. **Methods:** Participants were 16 866 urban residents, who were identified through a multi-stage sampling process conducted in 21 Chinese cities. Out of the sampled population, 8071 respondents were female. Subsequent analyses focused solely on the female sample. Multilevel logistic regression analyses were performed to examine regional variation in violent injuries. **Results:** Prevalence of violent injuries against women is 10.7% (95% CI: 7.8%, 15.5%). After controlling for individual-level characteristics, higher regional male–female ratio (OR: 1.97, $P < 0.05$), population growth rate (OR: 4.12, $P < 0.01$) and unemployment rate (OR: 2.45, $P < 0.01$) were all associated with an elevated risk of violent injuries among Chinese women caused by physical attack. **Conclusions:** The results suggest violent injuries among Chinese women caused by physical attack have become an important social and public health problem. The findings point to the importance of developing effective health policies, laws and interventions that focuses on the unequal economic development between different regions.

Introduction

Violence against women is a serious social and public health problem worldwide. Some studies have found that Chinese women were especially susceptible to injuries.^{1,2} Many studies have demonstrated that physical abuse is a major cause of injuries among women.^{1–3} Ecological models indicate that violent injuries against women are influenced by both individual and environmental characteristics. For example, Guttentag and Secord⁴ developed a micro behavioural model and argued that higher male–female ratios contributed to a paternalistic culture and stricter sexual practices. Preference for male children creates an unnatural male–female ratio that can affect the health and well-being of females.^{5–9} Other environmental factors contributing to violence against women include migration, living in urban slums,¹⁰ economic development¹ and disrupted social networks.^{11,12} The number of studies examining the association between regional variables and the likelihood of violent injuries is limited due to the need to obtain large samples, employ homogeneous survey methods,⁵ and use models that analyze multiple effects. But understanding environmental influences on female violent injuries is extremely important from a social and public health perspective; particularly for formulating policy and designing and implementing effective interventions that take into account both environmental and individual variations.¹²

Traditional Chinese family life is patriarchal, where men have responsibility for family decisions while women are economically and symbolically subjugated. The problem of violent injuries among women in China mirrors other social problems that have occurred during the transition and urbanization period. Market reforms in the 1980's improved China's economy and overall

living standards but also created problems that typically accompany social transition. Large imbalances between urban and rural development appeared; income inequality increased and unemployment rates surged. Furthermore, the traditional female gender role expectations along with the economic burden of modernization put a heavier toll on women, making them more likely to experience physical and psychological abuse. One Chinese study found that the rate of domestic violence against women was 64.8% over the lifetime and 42.6% within the past 12 months before the survey.¹³ Another study found that the prevalence of intimate partner violence was 43% over the lifetime and 26% within the year before the interview.¹⁴

Geographically, China is very diverse. The socioeconomic development of the eastern coastal provinces and inland provinces has lagged behind the larger metropolitan areas, which can contribute to regional variations in violent abuse injuries. Many studies found that partner socioeconomic position, and employment status contributed to violent injuries.^{2,15,16} Our study is a preliminary assessment of the impact of the region of residence and regional characteristics on the likelihood that a woman has experienced violent injuries, adjusting for individual-level covariates.

Based on the literature review, several hypotheses were developed for this study. It was hypothesized that a region's economic development level would be associated with violent injuries.^{1,5} Unemployment occurs when people are without work and actively seeking work,¹⁷ high unemployment reflects problems in economic growth and structure. This situation may contribute to violent attacks against female in a male-dominant society. This study hypothesized that violent injuries would be associated with higher unemployment rates in a region.¹⁸

Large cities usually have more financial resources and technology and also have higher social service levels in China.¹⁹ In this study, city population served as a measure of city size. This study hypothesized that population size would be associated with violent injuries among women. Regional population growth has led to challenges in housing, transportation, food supply and environment. Adapting to these changes can be difficult, especially for socially disadvantaged groups. This may contribute to violent injuries in women within these socially disadvantaged groups.⁵ As a result, this study examined associations between regional population growth and violent injuries among women.

The number of people living in a household reflects family size, structure, relationships and support burdens. Larger households may experience more problems related to sufficient food, space and interpersonal conflict. Females are mainly responsible for family matters within the household and thus problems within households may be attributed to females.²⁰ This may be associated with female violence; thus, this study will examine household size in relation to violent injuries.

As an integral part of a socioecological perspective, understanding the role that sex ratio plays in violent injuries among Chinese women is essential.²¹ As a result of China's 'family planning policy' and a strong preference for male children, China has a poor male to female ratio. Due to infanticide and selective abortions, there are more men in China than women.²² It is plausible that in an environment that favours such male gender selection, females become a disadvantaged group at risk for violent injuries. Therefore this study also aims to expand the existing literature by examining the association between gender ratio and violent injuries among women at the regional level.

Methods

Sample design

This study employed a cross-sectional multi-stage sampling design. In Stage 1, 21 cities were selected from across China and differentiated by regional location. Nine were located in eastern China, five in central China and the remaining seven in western China. Sixty-eight percent of provinces in Mainland China were covered in this study. Stage 2, two residential districts were randomly selected in the main urban zone of each city, excluding new expanding districts. For the purpose of this study, urban zones were those areas where most permanent residents live, excluding new building districts and sub-districts where many rural migrants reside. In Stage 3, four communities were randomly selected within each residential district. In Stage 4, a household registration ('hukou') list was used to randomly sample households in each community. All individuals aged 15 years and older, who were permanent residents in these cities, were identified within each household. Finally, one eligible participant was selected from each household, determined by having the birthdate closest to the meeting date.²³

Data collection

A face-to-face meeting was scheduled with an investigator once an individual was identified and agreed to participate. All data were collected using structured self-administered questionnaires. The questionnaire was administered privately to participants in their home or a designated quiet place, such as a backyard or community park. Meetings were primarily conducted on Saturdays, Sundays, workday evenings or other times when the participants were available. A participant was asked to complete a survey questionnaire of ~30 min duration, following instructions from the investigator. Investigators checked all the returned questionnaires for completeness. Participants were further requested to resolve any omission, as appropriate, and would receive a token of appreciation (toothbrush

and toothpaste, and other small gifts valued at ~US\$1.00) following questionnaire completion. The data were conducted between June and September in 2011.

A common research protocol was utilized across all 21 cities to ensure homogeneity of the meeting and data collection. The study protocols were approved by the Ethics Committee at the Medical Center, Zhejiang University, and verbal consent was obtained from all participants prior to data collection.

Measures

Violent injury

Violent injury had been previously defined as any physical pain or damage that had been intentionally inflicted by another person (Grisso et al.).²⁴ A qualified violent injury for the purpose of this study was defined as any injury which met at least one of the following three criteria: (i) the injury required a doctor's treatment, (ii) the injury required an emergency room visit or other emergency care or (iii) the injury required the victim to rest for a minimum of one-half day following the attack.²⁵ The participants were asked to report those injuries in the past year that were inflicted 'by another person in a deliberate attack?' A violent injury was considered to have occurred if it met one of the above three conditions.

Individual-level independent variables

Several individual-level independent variables were examined in this study. Sociodemographic variables including age, gender, ethnicity, educational level, and occupation were chosen as individual-level independent variables.

City-level independent variables

There were several city-level independent variables that reflected potential regional variations in the characteristics of the 21 studied cities. These included regional location, distinguished as East, Central and West, level of economic development (per capita gross domestic product (GDP) in Yuan), city population size and population growth rate, unemployment rate and gender ratio (male/female). The first two variables were obtained from the National Data for Bureau of Statistics¹⁹ and later three variables were obtained from the city population census press release from each city's government website (e.g. bureau website of Hangzhou city: <http://www.hangzhou.gov.cn/main/wjgg/gggs/gggs/T353610.shtml>).

Data analysis

All data were entered into a Microsoft Excel database. The dataset was then imported into SAS (9.3 version) for statistical analyses. Descriptive statistics were calculated for violent injury prevalence. Chi-square analyses were conducted to examine the associations between violent injuries among women and the selected regional and individual variables using SAS survey procedure. These associations were confirmed using a multilevel logistic regression model using NLMIXED procedure of SAS.^{26,27} Two models in the multilevel analysis. First the Null Model, a two-level model with random intercepts, was developed. In this base model, all demographic- and regional-level variables were entered as fixed main effects to form the full model to evaluate the separate impact of all individual-level and regional-level variables on the violent injuries.²⁷ For this analysis, the dependent variable, the violent injuries, was operationalized as a binary response (1 = no violent injuries and 2 = violent injuries). The independent variables in this analysis were those emerging as statistically significant ($P < 0.1$) in the Chi-square tests. These results are presented in table 1. The first category in each variable served as the referent in the multilevel logistic regression analysis.

All analyses were weighted.^{28,29} Methods of weighting were derived from three components. First, sampling weights as the

Table 1 Violent injury prevalence among women

Group	N (% of sample)	Violent injury prevalence (%)	Null mole	Full model (adjusted OR)
Individual level			<i>P</i>	
Age (years)			>0.10	
<25	1717 (14.1)	12.1		
25–34	2205 (20.1)	11.5		
35–44	1730 (18.4)	11.4		
45–54	1111 (21.2)	9.2		
55+	1311 (26.2)	9.9		
Ethnicity			<0.01	
Han	6736 (86.8)	7.4		1.00
Other	1335 (13.2)	32.2		6.67 (2.04,21.78)**
Education			<0.01	
Junior high school or less	2670 (26.6)	5.4		
High school	3241 (42.2)	2.6		
Junior college or college	2160 (31.2)	18.0		
Occupation			<0.01	
Managers and clerks	379 (4.21)	5.0		1.00
Professionals	369 (3.77)	5.5		1.09 (0.56,2.13)
Commerce and service	577 (6.48)	5.6		0.92 (0.70,1.22)
Operations	675 (7.85)	2.8		0.27 (0.03,2.49)
Students	747 (7.95)	6.1		0.07 (0.02,0.33)**
Retired	1597 (29.51)	1.5		1.50 (0.63,3.59)
Other	3727 (21.8)	21.8		1.62 (0.73,3.60)
Regional variables				
Regional location			>0.10	
East	3245 (53.1)	11.1		
Center	1140 (9.5)	9.1		
West	3686 (33.4)	10.6		
Gender ratio (male/female)			<0.05	
<51	1934 (34.7)	7.5		1.00
51	6137 (65.3)	12.3		1.97 (1.04,3.89)*
GDP (yuan) per capita			>0.05	
<40 000	4899 (51.3)	9.0		
40 000+	3172 (48.7)	12.4		
Population (millions)			<0.10	
<10	6114 (50.3)	13.8		
10+	1957 (49.7)	7.5		
House persons			<0.05	
<3	4979 (66.0)	13.1		
3–	3092 (34.0)	5.8		
Unemployed rate (%)			<0.01	
<10	6947 (93.7)	9.03		1.00
10–	1124 (6.3)	34.7		2.45 (1.26,4.74)**
Population Increase rate (%)			<0.01	
<1.5	2770 (37.6)	5.2		1.00
1.5	5301 (62.4)	14.0		4.12 (1.90,8.93)**
Fixed parameters			5.3749 (0.3547)**	3.2147 (1.1551)**
Random parameters between regions			16.6497 (2.2312)	11.0250 (1.5675)

* and ** indicate significant odds ratio at $P < 0.05$ and 0.01 , respectively.

inverse of the probability of selection, which were calculated at region, city, district and community levels. Second, the non-participation weight covered household and individual aspects. Third, post-stratification weights reflect a combination of sex (male, female) and age (<25 year, 25–34, 35–44, 45–54 and 55+) based on estimated distributions of these characteristics from the recent national census.³⁰ The final overall weights were computed as a product of the above three weights.

The unadjusted analyses were weighted using the overall participant-level weights, and the multilevel analysis was weighted using sampling weight at city level, subject-level weights with non-participation and post-stratification weights, respectively.²⁸ As there is no weight syntax available for NLMIXED procedure, the analysis in NLMIXED was weighted through a macro method.²⁸

Results

A total of 18 310 individuals were initially identified in this study's sampling frame, 17 424 attended the survey instruction and agreed

to participate. Of those who agreed to participate 16 866 completed the questionnaire and passed the validity check.

The overall prevalence of violent injuries caused by attack was 7.8% (95% CI: 4.5%, 11.6%). The prevalence of violent injuries was 4.5% (95% CI: 1.3%, 6.2%) among males and 10.7% (95% CI: 7.8%, 15.5%) among females, and the difference between sexes was significant ($\chi^2: 5.50$, $P < 0.01$). Subsequent analyses focused solely on the female sample ($N: 8071$) in this study. Table 1 shows the percentage and adjusted odds ratios of violent injuries caused by attack on women. Participants ranged in age from 15 to 79 years; the age constitution are similar with national population data.³⁰ Forty percent of participants had junior high school, the constitution in different education level are similar with our prior a large-scale survey.³¹ About occupation 4% of them were managers and clerks, and professionals, respectively, 7% were commerce and service, 8% engaged in operations and students, respectively, and the remaining engaged in other occupations. Multilevel logistic regression analysis showed: The prevalence was found to be higher in ethnic minorities (OR: 6.67, $P < 0.01$) than Han, and lower in students (OR: 0.07, $P < 0.01$) when compared with managers and clerks. Those who

lived in regions with higher male–female ratio had 1.97 times higher adjusted odds of having experienced violent injury. The prevalence of violent injuries among women was 4.12 times higher in cities with large population growth and 2.45 times higher in cities with high unemployment rates.

Discussion

This study found the prevalence of violent injury caused by violent attacks on women was 10.7% (95% CI: 7.8%, 15.5%), significantly higher than the 4.5% among men (95% CI: 1.3%, 6.2%). Other studies in China have also found this sex difference.^{13,14} The prevalence of injury among women in this study was lower than other studies in China.^{13,14} This difference is likely due to differences in the definition of injury. A qualified violent injury for the purpose of this study was defined as any injury which met at least one of the following three criteria but there are no restrictions in other studies. However, regardless of the definition used the fact is that the violent injuries among women are common in China. This represents a critical social public health problem and should be cause for attention.

This study found that the prevalence of violent injury was higher in minorities than Han. This difference may reflect the fact that minorities have lower education attainment, which associated with that female was dominated in social matters, and lower awareness of women human rights and self-protect capacity.^{1,30}

Ecological models indicate violent injuries are influenced by both individual and environmental characteristics. This study found a strong association between regional gender ratio, unemployment and population growth rate and violent injuries among women. It is important to understand the environmental influences on violent injuries when formulating policy and designing and implementing effective interventions.³²

This study found a positive association between regional population growth and violent injuries among women. Regional population growth contributes to more housing, transportation, food supply and crowding problems. It also is closely related to environmental changes that cause people to make various adaptations. These population growth stressors may mainly influence violent injuries in socially disadvantaged groups, as women.⁵

Regional unemployment rates reflect economic development, labour absorption capacity and social stability. This study found that higher regional unemployment rates were associated with higher violent injuries rates among women. Regional per capita GDP, however, was not related to violent injuries in this study as had been found in other studies.¹⁸ Unemployment reflects social and economic problem female are the principal victims in male-dominant society. It may be that the stressors associated with unemployment including lack of income, lower pay, gender discrimination, feelings of frustration and hopelessness, and inability to locate employment may lead to the violent attacks.

The result found that a high regional male–female ratio was associated with violent injury. The family planning policy and male preference probably contributed to poor male to female ratio.²² The preference for male children came from a social cultural belief that males are superior to females.²² The corresponding belief that females are inferior many very well make them more vulnerable to violent attacks. Someone that has less worth may be used more harshly or damaged with less concern. At the same time adherence to strict gender norms and gender roles may contribute to violent injuries. Gender norms and roles influence attitudes and behaviours in many areas, including relationships, parenting, schooling, work and health practices.^{7,33} Gender roles can also create economic and cultural pressures that affect the life of females and males differently.^{7,8} In China's male-dominant society females are to be passive and dependent on males. Males in the dominant role may find it perfectly acceptable to violently abuse

women to keep women in their passive and dependent role. Such abused women are more vulnerable to violent injuries.

Violent injury to females is not only a substantial health problem but it also infringes on human rights. The high prevalence of violence against women has a large impact on health care expenditures and human suffering.³⁴ There is an urgent need to address violence against women in national and global health-sector policies and programmes. Appropriate measures to address violence against women in China need legislative support and enforceable national policy. Awareness of the severity and consequences of violent injuries among women is still lacking in the society as a whole. Educational efforts are needed in schools, worksites and universities. Large-scale public awareness campaigns that include television, radio, billboards and newspapers are needed. Furthermore, social services to assist women who have been abused are lacking. Government money needs to be invested to protect these vulnerable women. The Central Government and local health authorities need to collaborate on policies to reduce violence and to stress reduction and prevention of health and human rights violations. Gender inequality and discrimination should be treated as an important social issue. Equally important are strategies to financially and personally empower women, social norms that empower men and devalue women need to be examined and changed.³⁵ Laws and policies that promote and protect the human rights of women are essential to address violence against women.

This study has a number of limitations. First, the study was cross-sectional, which precludes causal inference. However, the survey was large-scale and study results are likely a strong indicator of the extent and degree of violent injuries among women. Second, the sampling frame was urban and covered just 21 socioeconomically heterogeneous cities and did not included rural sections. Hence, findings are not generalizable to the whole of China. Third, marital status is an important variable which may have related to violent injuries among women, but it was not included in this study due to an unfortunate questionnaire printing error.

Key points

- This study is a preliminary assessment of the impact of regional variables on the likelihood that a woman has experienced violent injuries.
- The study found that higher regional male–female ratios were associated with an elevated risk of violent injuries among women.
- The result indicated that higher regional unemployment rates were associated with higher numbers of violent injuries among women.
- The result also confirmed that regional population growth rates were associated with a higher incidence of violent injuries among women.
- Environmental influences on violent injuries need to be considered when formulating policy and designing and implementing effective interventions to address the problem of violent injury among women in China.

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