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Article

An ecological study of social fragmentation, socioeconomic deprivation, and suicide in rural China: 2008–2010

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ABSTRACT

China accounts for a large number of suicides worldwide, and most occur in rural areas. Suicide research in China has primarily focused on individual-level risk factors, few have studied the influence of neighborhood contexts. This ecological study examines the association of suicide rates with social fragmentation and socioeconomic deprivation in Chinese rural villages. Data from the community survey of the China Health and Retirement Longitudinal Study were analyzed using negative binomial regression. A total of 307 rural villages were included. The community survey collected data about the villages from local leaders. Suicide counts were measured by the leaders' report of the number of suicide deaths in the villages. Social fragmentation was indicated by out-migration, in-migration and ethnic diversity; socioeconomic deprivation was indicated by physical infrastructure, illiteracy rates and public transit accessibility. Results show that higher incidence rates of suicide occurred in villages with high proportions of out-migration (vs. low), inflow of migrants (vs. no migrants), mixes of Han and ethnic minority residents (vs. Han only), high degrees of infrastructure deficiency (vs. low) and poor access to public transportation (vs. excellent). Villages with higher percentages of older adults also had higher suicide rates. This is one of the first studies to examine the association between neighborhood contexts and suicide in China. The findings have implications for suicide prevention in rural China.

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Introduction

Suicide is a tragic end of life and a major public health issue that accounted for 804,000 deaths worldwide in 2012 (WHO, 2014). China was the second top contributor to that number, due partly to its large population. Suicide rates have been consistently higher in rural China than in the country's urban areas (Liu et al., 2015; Phillips et al., 2002; Wang, Chan, & Yip, 2014). During the period 2009–2011, 79% of completed suicides in China occurred among rural residents (Wang et al., 2014) although only about half of the Chinese population lived in rural areas (National Bureau of Statistics of China, 2012).

Most suicide research in China has focused on individual-level risk factors (see Li, Li, & Cao, 2012 for a review). The knowledge generated from this line of research, while valuable, has limitations for suicide prevention and may mask plausible fundamental causes of suicide (Rehkopf & Buka, 2006). Some studies have employed aggregate data to identify gender, age, and rural-urban

patterns of suicide in China (Liu et al., 2015; Phillips, Li & Zhang, 2002; Wang et al., 2014). One found that counties with higher socioeconomic levels (as measured by the inhabitants' mean years of education) had lower suicide rates, and that higher proportions of divorced people were associated with lower suicide rates in young females (Liu et al., 2015). Another study found that perceived community stress and problems were correlated with the risk of suicide among rural young adults (Zhang & Wang, 2012). Overall, few studies have examined the influence of neighborhood-level factors on suicide in China. Using data from a nationally representative survey, this ecological study examines the associations between village characteristics that are related to social fragmentation and socioeconomic deprivation and suicide rates in Chinese rural villages.

Social fragmentation and suicide

French sociologist Émile Durkheim, in his influential book *Suicide*, suggests that even though suicide is an individual act with individual causes, suicide rates are social facts and can be explained by two dimensions of the social environment—integration and regulation (Durkheim, 1897). Social integration refers to the degree to which

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members of a social group share collective sentiments and bind together, and social regulation is the degree to which individuals are constrained by social norms and values. Durkheim develops a typology of suicide and suggests that the two most common types—egoistic and anomie suicide—are results of low levels of social integration and social regulation, respectively.

Based on Durkheim's theory, many studies have examined the association between social fragmentation and suicide (Collings, Ivory, Blakely, & Atkinson, 2009; Gunnell, 2005; Hong & Knapp, 2013; Hooghe & Vanhoutte, 2011), although the term "social fragmentation" has been used without great precision. Generally, social fragmentation is used to mean, "relatively low levels of community integration linked to high number of nonfamily households (e.g., one person households, unmarried adults) and high residential turnover" (Congdon, 2012, p.161). Gunnell (2005) reported that a common finding across epidemiological studies of suicide was that areas characterized by high levels of social fragmentation had the highest rates of suicide. Some multilevel studies (Denney, Wadsworth, Rogers, & Pampel, 2015; Martikainen, Mäki, & Blomgren, 2004) have also confirmed Gunnell's observations. For example, Denney et al. (2015) found that adults living in American cities with low percentages of family households had higher odds of suicide, controlling for individual-level socioeconomic status, marital status, family size and other characteristics. In contemporary China, social fragmentation might have increased for the reasons detailed below.

Since the transition to a market economy in the late 1970s, Chinese society has undergone rapid socioeconomic and demographic changes. One of the most salient of these changes is internal migration. China began implementing a household registration system (*hukou*) which restricts individuals from moving to another location in 1958 (Wang, 2005). This restriction was relaxed though not completely removed in the 1980s, as the demand for cheap labor supply in urban areas increased. About 170 million Chinese adults of rural origin were working in cities in 2014 (National Bureau Statistics of China, 2014). This huge migration has profoundly changed traditional family life in rural China. For instance, an estimated 28.3% of rural children and 37% of rural older adults were left behind by migrating workers (He et al., 2015; Jia & Tian, 2010). High risks of mental health problems among the left-behind (He et al., 2015; Wang et al., 2015) as well as problems resulting from population loss can contribute positively to suicide rates in rural communities as suggested by a Japanese study (Otsu, Araki, Sakai, Yokoyama & Voorhees, 2004).

At the same time, China's rural communities are themselves more likely to harbor migrants now than in the past. Loosening of residential restriction and rapid development of the economy have not only enabled the large scale of rural-to-urban migration, but also made other types of migration, such as rural-to-rural and urban-to-rural, possible. In most rural communities, inhabitants had known each other over multiple generations. Now, having migrants mixed into the population may disturb the tightly-knit social networks and traditional lives in rural villages, and may lead to less cohesive communities (Neal & Neal, 2014).

In addition to migration-related social changes, ethnic diversity is a longstanding yet often overlooked factor that may affect community cohesion in China. Although over 90% of the Chinese population belong to the largest ethnic group, Han, officially China recognizes 55 ethnic minority groups. Rural China is home to many of these groups, to whom special political, economic and social policies apply (Gustafsson & Ding, 2009). In recent years, ethnic minority tensions have increased across China, due partly to discrimination and disadvantages experienced by ethnic minorities in the new market economy (Hasmath, 2014). Furthermore, Western studies have shown that ethnic heterogeneity is negatively associated with trust in others (Putnam, 2007).

Socioeconomic deprivation and suicide

Area socioeconomic conditions have been studied extensively with regard to suicide. In their review of the literature, Rehkopf and Buka (2006) concluded that studies overall support an inverse association between area socioeconomic conditions and suicide, especially when smaller geographic units and area poverty or deprivation measures are used. Recent studies in some Asian and Western nations also support a strong association between area socioeconomic conditions and suicide (Chang et al., 2011; Denney et al., 2015).

In China, geographic disparities in socioeconomic conditions have been widening since the economic reform (Xie & Zhou, 2014). However, research on social stratification in China tends to focus on the rural-urban divide or regional disparity, thereby inappropriately ignoring substantial inequalities within the rural stratum. In rural China, three characteristics—physical infrastructure, education and transportation—are reasonable indicators of area socioeconomic conditions.

Basic physical infrastructure, such as running water and sewage systems, is essential to maintain a basic standard of living. In rural China, local-level infrastructure is primarily the responsibility of local communities (Lin, Tao, & Liu, 2006), so poor villages are likely to lack basic infrastructure, making rural existence very challenging. Moreover, given China's remarkable economic growth in recent decades, living in villages with deficient infrastructure may increase sense of relative deprivation and risks of depression (Li, Liu, Zhang & Xu, 2015).

As the market economy steadily matures and returns on human capital continue to grow, education has become the most important means to move up the social ladder in China (Meng, Shen & Xue, 2013). Limited educational opportunities, as reflected by high rates of illiteracy, reduce the chance for upward mobility of individuals and inhibit social and economic development of the area.

Without easy access to public transportation, it becomes harder for residents to access health and social services which not only delays treatment but also increases levels of stress of those with physical and mental health problems. Difficulty accessing public transportation also increases risks of social isolation and depression. While public transit accessibility is conceived as an indicator of socioeconomic deprivation, geographic remoteness has the potential to operate as an independent risk factor of suicide as well (Cheung, Spittal, Pirkis & Yip, 2012).

Defining geographic areas

In this study, we used statutory villages in China to define rural areas. Villages are the smallest scale in the Chinese administrative hierarchy, and are the basic production and social units in rural China. They have well-defined geographic, economic and administrative boundaries. Each village has a village committee with designated officials, such as village head and accountant (Oi & Rozelle, 2000). Village committee is the organization of self-government in the countryside of China. Under the rules and regulations set by the Organic Law of the Villagers Committees, villagers may self-govern their own affairs, serve their own needs, and conduct election (China.org.cn).

It should be noted that defining rural and urban has been a confusing matter in China (Chan, 2009). Not only that different agencies use different definitions, China's economic development and rapid urbanization have expanded the urban boundary in a fast pace (Kamal-Chaoui, Leman, & Zhang, 2009). Our definition of rural could have included villages that are transitioning to become urban as defined by the National Bureau of Statistics of China (NBS).

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