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Spatial and sex differences in AIDS mortality in Chiang Rai, Thailand

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ABSTRACT

Aggregate mortality data do not tell us if AIDS mortality is uniformly reduced or if there is spatial differentiation. A total of 2432 male and 1864 female deaths (2000–2004) from AIDS in Chiang Rai are used to detect mortality clusters. Both male and female clusters are more or less in the same location implying similar risk factors; however, male clusters remain more prevalent as male patients are likely to be slower in getting treatment. The findings indicate non-random clustering and confirm that although mortality rates are significantly reduced in most areas some sub-districts need attention for follow-up public health efforts.

1. Introduction

The introduction of highly active antiretroviral therapy (ART) has greatly improved the survival outcomes of patients with AIDS worldwide (UNAIDS/WHO, 2006). The major effort 'three by five' initiative launched by the World Health Organization (WHO) has placed three million people in developing countries on ART by the end of 2005, with the hope of reducing mortality particularly in sub-Saharan Africa, where 1.3 million patients started ART by December 2006 (UNAIDS/WHO, 2006).

The trends in AIDS mortality rates for males and females have been studied for quite some time; however, researchers have not found consistent results (Melnick et al., 1994; Suligoi, 1997; Hogg et al., 2001; Moore et al., 2002; Garcia de la Hera et al., 2004; Nicastri et al., 2005; Ferradini et al., 2006; Chen et al., 2008) possibly due to data-related issues such as small sample size, a short duration of follow-up or a lack of control of confounding factors (Chen et al., 2008). In fact, before the ART initiative was introduced, studies had not found evidence of gender effects on disease progression and AIDS death (Suligoi, 1997); however, since the scale-up of ART began, a handful of studies have identified gender as an important factor in survival outcomes (e.g., Collazos et al., 2007; Jarrin et al., 2008; Lemly et al., 2009).

The knowledge of AIDS mortality and gender differences in Thailand does not match with other efforts to understand the epidemic. Most research on the epidemic has been predominantly on sexual behavior, risk factors, and the knowledge and perception of risks (Allen et al., 2003; Ford and Kittisuksathit, 1994; Morrison, 2004; van Griensven et al., 2001). A detailed review of AIDS in Thailand is provided by Ruxrungtham et al. (2004) and discussions of incidence and trends are given by Punyacharoensina and Viwatwongkasema (2009). While some studies have documented significantly increased risk in mortality among Thai male patients (Im-em, 1999; Nelson et al., 2007), explanations of gender role and AIDS mortality are unclear and geographical progression of AIDS mortality between males and females are not available. This study focuses on the geographic variability of AIDS mortality between males and females in Chiang Rai, a northern province known to have one of the highest rates of HIV/AIDS in Thailand. Specifically, this study analyzes AIDS mortality among males and females and identifies the high risk areas. Next, the socioeconomic characteristics of these clusters are examined to detect demographic patterns.

Geographical analysis of mortality can aid policy makers and increase efficiency of preventive programs. The development and evaluation of effective programs to reduce the burden of a disease usually requires detailed knowledge of the disease, mortality distribution, and causal pathways. This knowledge is generally derived from analytical epidemiological studies that use a large-scale HIV and AIDS survey in which causal relationships between risk factors and disease or mortality are investigated at an individual level. If population-wide programs are too expensive to implement, it is necessary to limit efforts to high risk areas where certain health effects are more likely to occur. Therefore, an investigation of the pattern of health outcomes in a population is important before launching programs toward prevention, therapy, and care. In this area, spatial analysis is extremely useful in identifying clusters with aggregated adverse health effects. Such cluster detection enables local health personnel to identify and develop targeted public health strategies.

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The paper is organized as follow: first, we describe the study site, Chiang Rai province. We then give an outline of the methodology used. Following the presentation of results, we discuss the socioeconomic characteristics related to gender differences in mortality rates. Study limitations are discussed next along with future research possibilities.

1.1. Study context

Chiang Rai is the northernmost province in Thailand, about 785 km north of Bangkok, containing just over 1,200,000 people and about 12,000 km^2 of land. The province is located within the Golden Triangle area, where Myanmar, Laos, and Thailand converge, and can be used as the gateway to southern China as well. There are 18 districts, 122 sub-districts, and approximately 1655 villages in Chiang Rai. In this study, the 122 sub-districts are used for the spatial analysis. Each sub-district is relatively small, approximately 97 km^2 on average; accordingly, commuting across sub-districts is common in Chiang Rai.

HIV incidence in Thailand reached its peak in 1992 with approximately 115,000 cases. A steep decline thereafter discontinued in 1997 and was followed by 42,000 cases in 1999. The second surge, which happened concurrently with the major economic crisis, brought 60,000 new infections. As of December 2008, more than 1 million individuals had been infected and around 430,000 adults were living with HIV corresponding to a prevalence rate of 1.2%. The incidence rate had become less than 0.1% since 2002 (Punyacharoensina and Viwatwongkasema, 2009).

Chiang Rai has experienced one of the highest rates of HIV/AIDS in the past two decades and still remains one of the five provinces with high incidence of AIDS in Thailand. The pattern of incidence in Chiang Rai is somewhat similar to the national trend. The number of cases in Chiang Rai had increased steadily since 1989, reached its peak in 1997–1998, dropped gradually until 2003, and started to increase in 2004 (Fig. 1) due to a declining focus on prevention and an upsurge in unprotected sex (UNAIDS/WHO, 2006).

In 2004, the highest concentration of HIV/AIDS is seen in Wieng (Municipal Chiang Rai), Doi Hang, Wieng Pang Kum, and Mae Sai, the relatively more urban sub-districts with higher population than others (Fig. 2). The characteristics of the cases analyzed are shown in Table 1. Almost two thirds of all patients have AIDS, 40 percent of all are female, and about 61% of all are married or have a partner; 67% of those patients who are single, separated, widowed, or divorced are men. They are virtually all Thai (97%); heterosexual contact is the major mode of transmission (94%).

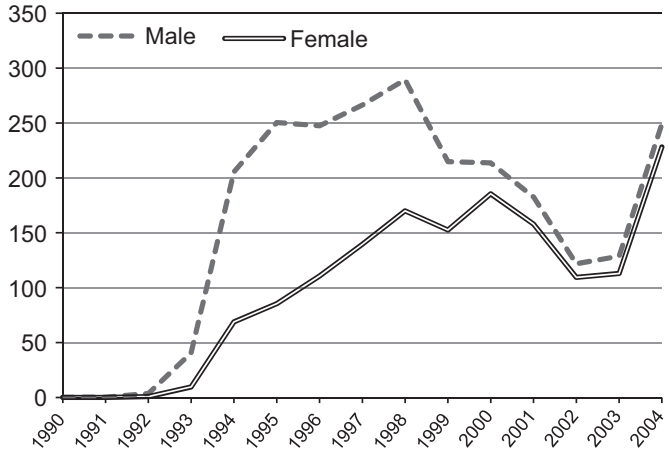

Fig. 1. The pattern of HIV/AIDS, 1990–2004.

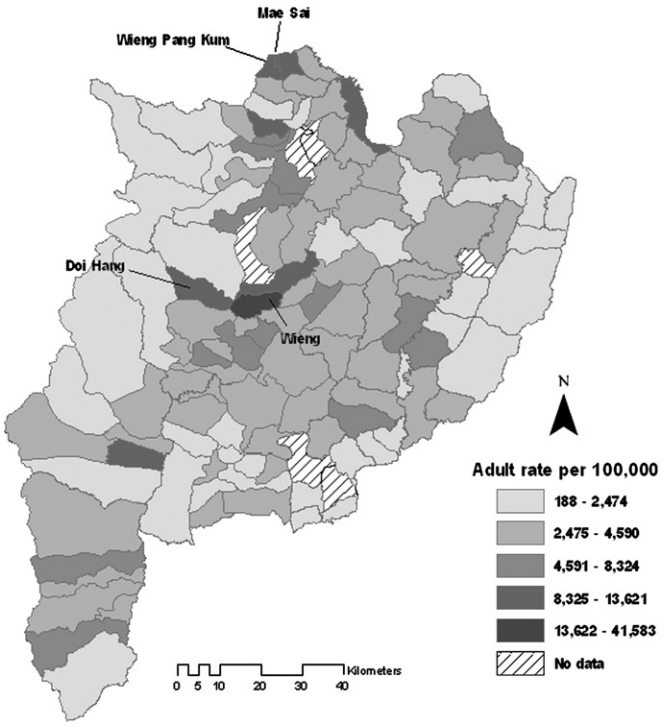

Fig. 2. Cumulative incidence maps of people living with HIV/AIDS in Chiang Rai, 2004.

Table 1
Characteristics of individuals living with HIV/AIDS in Chiang Rai.

Population	Characteristics	%
Status	AIDS	67
	HIV	26
	Don't know	7
	Total	100
Sex	Male	60
	Female	40
	Total	100
Marriage status	Single/Separated/Widow/Divorced	38
	Married/With Partner	61
	Don't know	1
	Total	100
Sexual orientation	Homosexual	<1
	Heterosexual	93
	Bisexual	<1
	Don't know	6
	Total	100
Nationality	Thai	97
	Others	3
	Total	100
Risk factor	Injecting drug	<1
	Sexual contact	94
	Blood transfusion	<1
	Others	6

The maps show the locations and intensity of HIV and AIDS cumulative incidence in Chiang Rai. Chiang Rai's 5-yr migration rate of 3.8% and extensive return migration to seek care in rural settings (Knodela and VanLandinghamb, 2003) suggests that most HIV and AIDS patients do live in the province after they get diagnosed. In addition, cumulative incidence rates were strongly correlated with HIV and AIDS mortality rates based on Pearson correlation coefficient. This suggests that the locations of