



## Tobacco use among HIV-infected individuals in a rural community in Yunnan Province, China



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### ABSTRACT

**Objective:** To examine the prevalence and correlates of smoking versus tobacco chewing, and potential gender differences in tobacco use among HIV-infected individuals in a rural community in Yunnan Province, China.

**Method:** A cross-sectional design using face-to-face interviews.

**Results:** Among the participants, 301 (66.2%) were male; 79 (17.4%) were ethnic Han, 310 (68.1%) were Jingpo minority, 62 (13.6%) were Dai minority; 17.8% had no formal education and 55.6% had only primary school education; 15.4% were never married; 40% reported drinking in the past 30 days; 55.4% had ever used drugs; and 67% were currently receiving antiretroviral therapy (ART). The mean age of the study participants was 38.1 years (SD = 8.8). About 62% were current cigarette smokers. Current cigarette smoking was positively associated with being male (OR = 142.43, 95% CI: 35.61–569.72) and current drinking (OR = 7.64, 95% CI: 2.68–21.81), as well as having ever used drugs (OR = 4.03, 95% CI: 1.31–12.35). Among current smokers, 67.6% were heavy smokers (smoked at least 20 cigarettes per day). Those who were older than 46 years of age (OR = 9.68, 95% CI: 1.41–66.59) and current drinkers (OR = 2.75, 95% CI: 1.56–4.83) were more likely to be heavy smokers. Approximately 9% were currently used chewing tobacco. Those who were female (OR = 41.29, 95% CI: 8.53–199.93) and current drinkers (OR = 3.22, 95% CI: 1.02–10.16) were more likely to use chewing tobacco. All who used chewing tobacco were ethnic minorities.

**Conclusions:** Cigarette smoking and use of chewing tobacco were highly prevalent among HIV-infected individuals in rural Yunnan, underscoring the urgent need for tobacco prevention and intervention programs tailored for this population.

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### 1. Introduction

Since the introduction of the highly active antiretroviral therapy (HAART) in 1996, the morbidity and mortality attributable to AIDS-related diseases has steadily decreased (Mocroft et al., 2003). Ironically, with improved survival people living with HIV/AIDS (PLWHA) are now facing a host of other non-AIDS-defining health conditions and illnesses, including cancer and cardiovascular disease (Polesel et al., 2010). That is, HIV has changed from a fatal disease to a manageable chronic disease (Porter et al., 2003). Now, HIV treatment and care must also address health issues related to

primary care and preventive medicine such as smoking (Aberg et al., 2004).

Cigarette smoking is common among PLWHA (Reynolds, 2009; Vidrine, 2009) with prevalence ranging from 40% to 80%, considerably higher than in the general population (Bénard et al., 2006; Friis-Møller et al., 2003; Gritz et al., 2004; Jaquet et al., 2009; Marshall et al., 2011). Smoking among PLWHA may result in many deleterious health effects, including but are not limited to bacterial pneumonia, cardiovascular disease, adverse fetal morbidity outcomes, and oral diseases (Aliyu et al., 2013; Benard et al., 2010; Chattopadhyay et al., 2005; Lifson et al., 2010; Pines et al., 2011; Sroussi et al., 2007). Moreover, research reveals that smokers who are on HAART have lower viral loads, poorer immunologic response, greater risk of virologic rebound, and more frequent immunologic failure. In other words, these smokers have a higher risk for developing AIDS (Feldman et al., 2006). Compared with light smokers, heavy smokers were more likely to engage in painkiller use and binge drinking and less likely to use health care (Villanti et al.,

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2012). Thus, cigarette smoking among HIV-infected individuals has profound health implications (Reynolds, 2009). Use of chewing tobacco might cause serious outcomes on personal health (Stewart et al., 2011), but the prevalence among HIV-infected individuals is unavailable.

China is the largest producer and consumer of tobacco in the world (Zhang et al., 2011). In 2010, it was estimated 28.1% (301 million) of adults in China (52.9% of men and 2.4% of women) were current smokers (Li et al., 2011). Meanwhile, there was an estimated population of 780,000 PLWHA by the end of 2011 (WHO et al., 2011). To date, surprisingly, limited data are available on tobacco use among HIV-infected individuals in China. To fill this significant gap, we designed and conducted a community-based, cross-sectional study in Dehong's Dai and Jingpo Autonomous Prefecture of Yunnan Province to examine the prevalence and correlates of smoking, heavy smoking and tobacco chewing among HIV-infected individuals. The study site was chosen for three reasons. First, China's first HIV outbreak was observed among injection drug users (IDUs) in 1989 in Dehong Prefecture of Yunnan Province, which borders the drug-trafficking routes known as the "Golden Triangle" and has a high concentration of ethnic minorities (Jia et al., 2010). Second, Yunnan Province has the largest number of reported HIV/AIDS cases among all Chinese provinces, accounting for 22% (93,567) of the total of 429,000 reported HIV/AIDS cases in the country (Lu et al., 2005). Since 2006 sexual contact has surpassed injection drug use (IDU) as the predominant mode of transmission in Yunnan Province (Jia et al., 2010). Nonetheless, among the general population in the province, HIV infection is independently correlated with drug use among males and with multiple sexual partnerships among females (Fu et al., 2011). Third, although the Dai and Jingpo minorities, respectively, constitute only 2.5% and 0.3% of Yunnan's population, they account for 9% and 7.1% of all new HIV infections (Lu et al., 2005).

## 2. Methods

### 2.1. Study site and participants

This study was conducted in two towns of Dehong's Dai and Jingpo Autonomous Prefecture in the west of Yunnan Province, bordering Myanmar. A roster of registered HIV/AIDS-infected individuals aged 16 and above living in these two towns from May to August in 2012 was obtained from the Dehong Prefecture Center for Disease Control and Prevention (CDC) as a sampling frame, resulting in a sample size of 657. Among them, 175 (26.6%) had either migrating outside (114, or 17.3%) or were incarcerated for drug use (61, or 9.3%) and thus were not identifiable or eligible for this study, and 27 (4.1%) did not participate in the study due to refusal (24, or 3.6%) or illness (3, or 0.5%). Thus, the final sample size with informed consent was 455 (69.2%). For those aged 16 or 17 years of age, written informed consent was also obtained from their caretakers although 16 is the age of consent and marriage in the Dai and Jingpo cultures.

### 2.2. Survey procedure

All participants completed a face-to-face, paper-and-pencil interview administered by a trained local public health worker in a separate or private setting (e.g., consulting room of clinic or the participant's home) designated by study participants. The primary variables of interest included demographic characteristics, tobacco use, alcohol use, drug use, and ART status of the study participants. All participants were compensated with the equivalence of US \$5 for their participation. This study was approved by the Institutional Review Board (IRB) of Fudan University, Shanghai, China.

### 2.3. Measures

**2.3.1. Cigarette smoking.** Two questions were used to measure the prevalence of smoking: (a) "Have you ever smoked at least 100 cigarettes in your life (Pierce et al., 2011; Wang et al., 2009)?" and (b) "Did you smoke in the past 30 days?". If the participants answered "yes" to the first question, then s/he was classified as an "ever smoker"; if the participants answered "yes" to both questions, then s/he was classified as a "current smoker".

**2.3.2. Characteristic of cigarette smoking.** For individuals who answered "yes" to the question: "Have you daily smoked cigarettes in the past 30 days?" we further

quantified frequency of use such as daily, less than daily or none. We also measured types (manufactured or hand-rolled cigarettes) and average number of cigarettes smoked per day. If a smoker consumed both types of cigarette (manufactured and hand-rolled), then his or her absolute numbers were summed.

In this study, heavy smoking was defined as smoking an average of at least 20 cigarettes per day (CPD), moderate smoking as 10–19 CPD, and light smoking as <10 CPD (Okuyemi et al., 2001; Pierce et al., 2011).

**2.3.3. Awareness of the harmfulness of smoking while living with HIV/AIDS and attempts to quit.** A question, "Do you think smoking could do harm to an individual living with HIV?" was used to measure participants' awareness of the harmful effect of smoking. Participants were also asked if they had attempted to quit and/or successfully quit smoking after being diagnosed with HIV to measure the prevalence of smoking cessation.

**2.3.4. Tobacco chewing.** Two questions were used to measure the prevalence of chewing tobacco: (a) "Have you ever chewed tobacco 20 or more times in your life (Nelson et al., 2006)?" and (b) "Did you chew tobacco in the past 30 days?". If the participants answered "yes" to the first question, then s/he was classified as having "ever used chewing tobacco"; if the participant answered "yes" to both questions, then s/he was classified as "currently chewing tobacco". The question, "How many times did you chew tobacco per day?", was asked to capture the frequency of chewing tobacco use.

**2.3.5. Alcohol and other drug use.** A current drinker was defined as an individual who has consumed alcohol at least once a month for more than one year and was still drinking in the 30 days prior to the interview (Luo et al., 2012, 2013). A drug user was defined as an individual who had ever used illicit drug use such as opium, heroin, methamphetamine, ephedrine, ketamine or ecstasy for nonmedical purposes.

### 2.4. Statistical analysis

Data were analyzed using SPSS 17.0 for Windows (SPSS Inc., Chicago). In addition to descriptive analyses, tests of associations between categorical variables were based on the Chi-square test or Fisher's exact test, where appropriate. Three independent sets of logistic regression analysis were performed to explore correlates of smoking, heavy smoking and tobacco chewing in the past 30 days, respectively. For each set of the logistic regression analysis, univariate analyses were conducted and followed by a multivariate analysis with 'forced entry' of all variables examined in the univariate analyses into the multivariate regression model. These variables were considered to be potential confounding variables based on our 'prior knowledge' about the causal relationship between risk factors or independent variables and the dependent variable (i.e., smoking, heavy smoking and tobacco chewing in the past 30 days) as well as the significance of examined risk factors or independent variables in univariate analyses. Respective odds ratio (OR) and 95% confidence interval (95% CI) were calculated. A significance level of 0.05 was used for all tests.

## 3. Results

### 3.1. Study participants and demographic characteristics

Among the 455 participants, 301 (66.2%) were male; 79 (17.4%) were ethnic Han (China's predominant ethnic group), 310 (68.1%) were Jingpo minority, 62 (13.6%) were Dai minority, and 4 (0.9%) were of other ethnic minorities; 17.8% had no formal education and 55.6% had only primary school education; and 15.4% were never married (Table 1). The mean age was 38.1 years old (SD = 8.8). About 67.5% of the study participants were using ART (Table 1). Participants with different status of tobacco use in the past 30 days were significantly different in all but education characteristics (Table 1).

### 3.2. Alcohol and drug use

As shown in Table 1, about 40% of the participants were current drinkers with more males than females being current drinkers (56.8% versus 7.1%). Over 55% had ever used illicit drug, with males (81.7%) using more than females (3.9%).

### 3.3. Tobacco use

Table 2 presents detailed information about cigarette smoking among the study participants. Over 66% of the participants were classified as ever smokers, 30.5% started smoking before 15 years of age, 47.7% did not think that smoking is harmful to PLWHA, and

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