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Research Note

# Information Communication Technology (ICT) use among PLHIV in China: A promising but underutilized venue for HIV prevention and care

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ABSTRACT

In this paper, we report the use of information and communication technology (ICT) among people living with HIV (PLHIV) in Guangxi, China. A total 2987 participants were recruited from 12 sites with the highest number of cumulative HIV incidence, including 2 cities and 10 counties. A questionnaire survey was conducted to collect data on the participants' social demographic characteristics, clinical outcomes, infections and coinfections, pattern of ICT use, and use and intention of using ICT in HIV and AIDS management. The data was analyzed using SPSS, version 24. The results showed 78.7% (n = 2347) never used a computer, 86.9% (n = 2587) had a cellphone, 32.7% (n = 207) owned an email account, and 85.4% (n = 544) owned a social media account. Less than half of the participants reported ever using ICTs for HIV management. Only 26.2% (n = 266) were willing to join a web-based HIV prevention program. Findings of this study suggest that there was an imbalance in the participants' ICT device ownership and choices of media platform. Social media appeared to be a potential platform for health intervention among this group. There was a low penetration of computer use among rural participants and a large disparity between the urban and rural participants, which indicated a need to expand the current infrastructure related to ICTs and increase people's health literacy. Future research also needs to pay attention to security and trustworthiness of the intervention program to better promote ICTs as an efficient and reliable platform for HIV prevention and care.

## 1. Introduction

The application of Information and Communication technology (ICT) in HIV prevention and treatment has been increasingly examined. ICTs provide people living with HIV (PLHIV) with the possibility of remote access as well as low cost of delivery in reducing the virus transmission and in improving the quality of care (Catalani, Philbrick, Fraser, Mechael, & Israelski, 2013; Muessig, Pike, LeGrand, & Hightow-Weidman, 2013; Zhang & Li, 2017). A substantial body of literature focusing on assessments of efficacy and feasibility of ICT use also indicates that the ICT facilitated intervention has become a promising strategy for a population, which is hard to reach and at high risk of HIV infection (Holloway et al., 2014; Lelutiu-Weinberger et al., 2015; Muessig et al., 2015; Mustanski, Garofalo, Monahan, Gratzer, & Andrews, 2013; Noar, Black, & Pierce, 2009; Roth et al., 2014; Velthoven, Brusamento, Majeed, & Car, 2013; Ybarra & Bull, 2007). Computer-based intervention was widely applied in every key component of HIV prevention and treatment, including diagnosis, medical adherence, risk behavior reduction and sigma elimination (Aronson et al., 2016; Bonar et al., 2014; Festinger, Dugosh, Kurth, & Metzger, 2016; Kurth et al., 2016; Roberto et al., 2007). The use of a computer also plays an indispensable role in improving the access to information and in increasing the patients' level of health literacy in terms of HIV (Jacobs, Caballero, Ownby, & Kane, 2014; Ownby, Waldrop-Valverde, Jacobs, Acevedo, & Caballero, 2013).

There were approximately 501,000 PLHIV in China by the end of 2014 (UNAIDS, 2015) and the disease has been most prevalent among men have sex with men (MSM), injecting drug users (IDU), and female sex workers (FSW) (Hu et al., 2017; Zhang et al., 2013). Research has demonstrated that ICT plays an innovative role in effectively delivering HIV and AIDS prevention campaigns or information targeting on these key populations (Avery, Gang, & Mills, 2014; Cheng et al., 2016; Hu et al., 2017; Huang et al., 2013; Muessig et al., 2015; Shi & Chen, 2014; Zou et al., 2013). In addition to the fact that 92% of the Chinese population own a cellphone and 51.7% having access to the Internet (ITU, 2017a, 2017b), ICT has the penetration to function as a powerful and indispensable venue in promoting HIV prevention and treatment in China. However, although research focusing on HIV prevention

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involving ICT progressed rapidly, little evidence has been documented on the ICT use behavior of PLHIV in China. The absence of a good understanding of the use pattern of ICT could possibly limit the utilization, acceptability, and effectiveness of the programs, and moreover, will hinder the future development and scale-up of the interventions. Thus, to provide a better understanding of the potential for application of cutting-edge products and services, the main purpose of this study is to explore the use of ICT among PLHIV, including computer use, and their intention of using ICT in HIV and AIDS prevention and treatment.

## 2. Method

### 2.1. Study design

The study used data from a HIV disclosure research project conducted in Guanxi Autonomous Region from October 2012 to August 2013. Guangxi is one of the regions with the fastest growing HIV epidemic in China (Qiao et al., 2016). Participants were randomly selected from 12 sites with the highest number of cumulative HIV seropositive incidence, including 2 cities and 10 counties. A total 3002 HIV patients agreed to participate, of whom 2987 completed the survey.

Data were collected through a questionnaire survey. To assure confidentiality, participants were asked to complete an anonymous questionnaire in private rooms of local CDC or HIV clinics. Eighty percent of the participants chose to complete the questionnaire through an in-person interview, during which trained interviewers read the questions to them and recorded their responses. The remaining 20% completed the survey independently. The survey took about 75–100 minutes. The study protocol was approved by the Institutional Review Boards at Wayne State University in the U.S. and Guangxi Center for Disease Control and Prevention (CDC) in China.

### 2.2. Measurement

The variables used in this study were social demographic characteristics, clinical outcomes, infections and coinfections, pattern of information and communication technology (ICT) utility, use and the intention of using ICT in HIV and AIDS management.

- The social demographic characteristics included gender, age, years of education, employment status, occupation, marital status, income, residence, ethnicity, ART status, and duration after diagnosis. The employment status contains three response options, which were “do not work”, “part-time”, and “full-time.” Fifteen response options of occupation were provided for the participants to choose from, which were categorized into three groups, farm worker, non-farm worker, and others. The group “other” contains students and the unemployed. Marital status included six options, which were combined into three groups, unmarried/unmarried cohabitation, married/remarried, and divorced/separated/widowed. Participants who lived in cities and counties were categorized as urban residents, while those who lived in towns and villages were labeled as rural residents.
- The clinical outcomes included the most-recent CD4 counts ($\leq$250 cells/mm$^3$ vs. $>$ 250 cells/mm$^3$) and viral load ($\leq$200 copies/ml vs. $>$ 200 copies/ml).
- The infections and coinfections included number of family members infected with HIV and concurrent infections in addition to their HIV infection. The coinfection options reflected the participant’s health condition regarding the following diseases: HAV, HBV, HCV, TB, Syphilis, Gonorrhea, and Genital Herpes.
- The pattern of ICT use referred to the ownership of computer, cellphone, email account, and social media account, frequency of using ICT devices and social media, and preferences of social media platforms. The social media options included but were not limited to MSN, QQ, Weibo, and Fetion, which were broadly recognized as communication approaches in China.
- The use of ICT in HIV and AIDS management included use of ICT for information related to the HIV infection, contacting health care work via ICT, and contacting other PLHIV. The intention of using ICT in disease management included willingness to participate in a web-based HIV prevention program and willingness to use a website providing support to PLHIV.

### 2.3. Statistical analysis

Statistical analyses were conducted using the statistical software SPSS, version 24. Descriptive statistics including mean, standard deviation, frequency, percentage were utilized to describe the demographic background of the participants. The Chi-square test or independent *t*-test was used to analyze the differences in demographic features and the pattern of ICT use between male and female participants. The Chi-square test and one way ANOVA were used to explore the demographic correlates of computer use. Data regarding use behavior and intention of ICT use in disease management was analyzed with the Chi-square test and independent *t*-test.

## 3. Results

### 3.1. Characteristics of the participants

The characteristics of the 2987 participants are reported in Table 1. In this study, 62.8% (n = 1876) of the participants were male. The average age of the participants was 42.46 ± 12.83, with the average years of education of 6.93 ± 3.00. Three-quarters (74.6%, n = 1939) of the participants were married. The percentages of work status for unemployment, part-time employment, and full-time employment were 26.9% (n = 800), 33.4% (n = 992), and 39.7% (n = 1182), respectively. More than half of the participants (58.8%, n = 1748) were farm workers, and 17% (n = 517) were students or had no occupation. Most of the participants (80.2%, n = 2391) lived in rural areas, and 53.1% (n = 1572) of them with a monthly household income of less than 1000 RMB (~$160). Among the participants, 70.7% were Han (predominant ethnic group in China), and 25.9% (n = 733) were Zhuang (largest ethnic minority group in Guangxi). The average duration since their diagnosis of HIV was 38.72 ± 28.65 months, 72.1% (n = 2146) of them were on ART, 15.7% (n = 469) reported co-infections, and 38.3% (n = 1142) reported other members in their family getting infected with HIV. The most recent medical reports showed that 36.2% (n = 1035) of the participants have a CD4 counts ≤ 250 (cells/mm$^3$) and 12.2% (n = 200) have a viral load > 200 (copies/ml).

### 3.2. Gender difference in sample characteristics

Compared to the female group, the male participants were older in age (44.21 ± 12.90 vs. 39.50 ± 12.16, p = 0.004), had longer terms of education (7.08 ± 2.88 vs. 6.80 ± 3.19, p < 0.001), had a higher proportion of rural residence (82.4% vs. 76.4%, p < 0.001), were of Han ethnicity (73.5% vs. 66%, p < 0.001), and were with co-infection (18.3% vs. 11.3%, p < 0.001). A higher proportion of female participants reported being employed (75.9% vs. 71.5%, p = 0.012), being married (83% vs. 70.1%, p < 0.001), on ART (74.9% vs. 70.4%, p = 0.009), with family member infected of HIV (53.6% vs. 29.1%, p < 0.001), and having a longer duration of diagnosis (38.94 ± 27.06 vs. 38.58 ± 29.56, p = 0.003). In addition, a higher proportion of female participants reported CD4 > 250 (cells/mm$^3$) (72.8% vs. 58.4%, p < 0.001) than the male participants. No gender difference was found in terms of occupation, family income, or viral load (all p > 0.05).