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台灣感染愛滋受刑人的生活品質探討  
HIV-infected inmates reported quality of life in Taiwan

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## 中文摘要

背景：愛滋病因為雞尾酒療法的應用，使得疾病趨於慢性化、存活期延長，愛滋感染的盛行率也持續增加。靜脈藥癮者是台灣愛滋病感染的主要危險次族群之一，此族群常因毒品的持有或使用，造成犯罪而判刑入獄，以致矯正機關內的愛滋病感染者近年來增加，且大部份是靜脈藥癮者，帶來醫療照護與管理的問題。健康生活品質的測量可以提供臨床照顧的評估參考。本研究主要是探討於矯正機關內的愛滋病感染受刑人的健康生活品質，並分析其影響因素。

方法：本研究為一橫斷面研究。使用世界衛生組織的生活品質問卷測量矯正機關內的愛滋受刑人，包含生理健康、心理健康、社會關係與環境等四個層面。並以複迴歸分析探討生活品質影響因子。

結果：總共 261 位被納入研究，66 位是女性，195 位是男性(74.7%)。大部份測試者是單身(59.8%)。超過一半(62.9%)的受刑人感染愛滋病少於四年，14.3%符合AIDS的定義，13.4%正在接受雞尾酒藥物治療。複迴歸分析結果顯示男性、非獨居與高的免疫細胞球者有較佳的生理健康。非獨居、有性生活、主要經濟來源是正常工作及每天花費藥錢超過新台幣2000元的感染受刑人有較佳的心理健康。年紀輕、主要經濟來源是工作且越早接觸藥品者有較佳的社會關係。使用毒品經驗越久的男性則有較佳的環境層面的生活品質。

結論：本研究提供感染愛滋病受刑人族群的健康生活品質探討與影響因素，可作為促進病人照顧與相關政策的參考。

## Abstract

**Objective:** HIV infection rates are increasing in Taiwan and the introduction of highly active antiretroviral therapy there is now hope for long-term management of the disease. Intravenous drug users who are HIV-positive are an important subgroup in Taiwan. The punishment for illegal drug use is usually a jail sentence, and as a result, there is a high prevalence rate of HIV/AIDS in Taiwan's prisons. Health-related quality of life (HRQoL) is an important medical outcome and because HIV/AIDS inmates will eventually return to society, from a public health perspective, it is important to gain a better understanding of this population. The aim of this study was to investigate the health-related quality of life among HIV-positive inmates and to determine which factors affect HRQoL. **Methods & Methods:** We conducted a cross-sectional prospective analysis of an HIV clinic based cohort in a correctional facility. HRQoL was assessed using the WHOQOL-BREF (Taiwan version), which includes four domains of: physical, psychological, social relationships and environment. Factors associated with HRQoL were determined by linear regression models. **Results:** The participants consisted of 66 females and 195 male HIV seropositive prisoners. Male accounted for 74.7%, and 59.8% of subjects were single. More than half (62.9%) had been diagnosed with HIV infection for less than four years, only 14.3 % of them had full-blown AIDS, and 13.4 % received combination antiretroviral treatment. Male gender, not living alone, and higher CD4 counts were correlated with significantly better physical health. Not living alone, having sexual activity, income source mainly from work, and higher daily drug cost (more than NT\$2000) before incarceration were associated with significantly better psychological health. Younger age, income source mainly from work, and exposure to illicit drugs earlier were correlated with significantly better quality of life in the social domain. Males with longer illicit drug use history had signifi-

cantly better quality of life in the environmental domain. **Conclusions:** The factors affecting HRQoL of HIV/AIDS inmates found in this study may be of value to researchers, healthcare providers, health policymakers and correctional facility managers in order to promote health care, develop intervention strategies, and establish education programs.

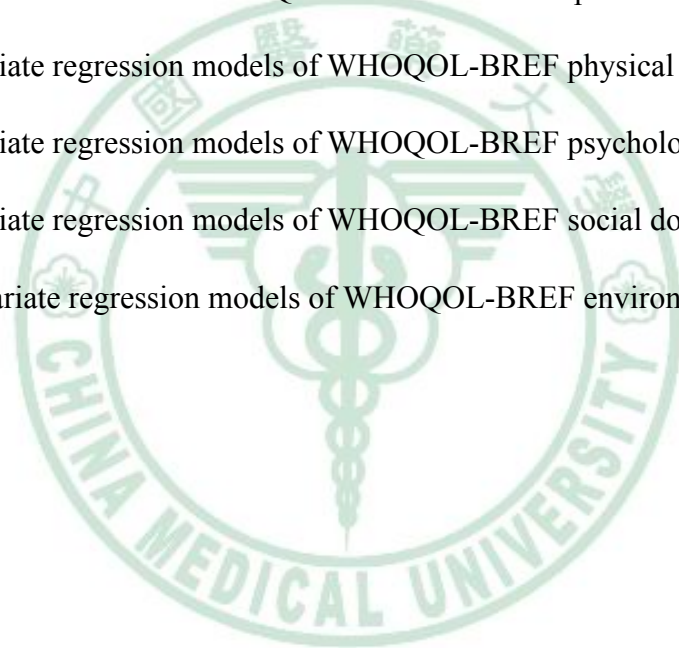


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# 1. Introduction

## 1.1 Problem statement

Human immunodeficiency virus (HIV) infection became chronic disease after induction of highly active antiretroviral therapy (HAART) since 1996. The advent of HAART and improvements in disease management have resulted in significant decrease in mortality and morbidity related to HIV infection and acquired immunodeficiency syndrome (AIDS). However, despite aggressive public health efforts to curb the epidemic, it is estimated that more than 560,000 new cases of HIV infection occur annually in the United States (U.S.). In Taiwan, people living with HIV/AIDS was up to 20,000 in the end of 2010. Transformation of HIV disease to a manageable chronic disease has shifted focus to health-related quality of life (HRQoL) among persons living with HIV/AIDS (PLWHA). HRQoL has become an important facet of HIV/AIDS research. There are 2 approaches to measuring HRQoL: the health status approach, which describes functioning in one or more domains, and the utility/value/preference approach, which assesses the desirability of health states against an external metric. In general, health status measures emanate from the social science paradigm via classical test theory, which assumes that a psychological construct is composed of a set of domains<sup>(1)</sup>; the domains are generally composed of a set of related questions selected through empirical analyses and scale aggregation. Patients' overall HRQoL, in turn, is determined by summing (weighted or unweighted) sub-scale scores. The advantage of the health status approach is that it usually yields instruments that are



valid, reliable, and responsive to change. The clinicians should direct increased attention to patient-assessed quality of life, patient-reported functional health status, and psychosocial factors in an effort to improve medical outcomes<sup>(2)</sup>.

Health-related quality of life (HRQL) is a relevant and quantifiable outcomes of care. Measurements are one means to provide valuable information about patients both in clinical trials and for cost-effectiveness analysis for HIV disease. HRQoL in chronic HIV infection has been assessed in different measurements and settings, including Medical Outcome Study (MOS) <sup>(3)</sup> <sup>(4)</sup>, the Quality of Well-Being Scale<sup>(5)</sup>, the HIV-QL31<sup>(6)</sup>, the HAT-QOL<sup>(7)</sup>, the EQ-5D <sup>(8)</sup> and the World Health Organization Quality of Life Instrument (WHOQOL)<sup>(9)</sup>. Each questionnaire had its unique construct and advantages. Findings from these studies may not reflect morbidity (outcomes) among the broader population of HIV-infected individuals or other sub-populations such as HIV-infected prisoners. Few investigations have explored the health-related quality of life of prisoners. The social, demographic, economic and health status of prisoners is clearly different from other HIV seropositive groups. The WHOQOL is a cross-cultural instrument developed for use across patient groups in different countries<sup>(10)</sup> <sup>(11)</sup> <sup>(12)</sup> <sup>(13)</sup>, and encompass physical, psychological, social and environment domains<sup>(14)</sup>. In addition, the WHOQOL measurement had been used in HIV-infected in Taiwan and showed reliability and validity<sup>(15)</sup> <sup>(16)</sup>. Assessment of quality of life is impor-

tant for documenting the burden of the disease, evaluating treatments, tracking health-related changes over time, and gauging returns from healthcare investments. Past research examining effects of HIV disease on various dimensions of health and QoL have predominantly focused on white homosexual or heterosexual men, most symptomatic or AIDS under HIV treatment<sup>(17)</sup> <sup>(18)</sup>. A limited number of studies have focused on intravenous drug user with HIV disease, and in particular, prisoners<sup>(19)</sup>. Available evidence suggests that women prisoners with HIV disease report lower quality of life compared to their male counterparts.



### *1.2 Significance*

With growing numbers of drug users in correctional facilities, the prevalence of infectious diseases has increased correspondingly and need for more attention on this issue<sup>(20)</sup>. In Taiwan, the trend towards increase intravenous drug user with HIV disease, and also incarceration of individuals represents an important public health conditions. The prisoner health is a problem not only of inmates but for society<sup>(21)</sup>. Understanding inmate HRQL is essential to developing effective programs and policies. Thus, we may expand nursing knowledge and strengthen nursing care for the specific HIV-infected population<sup>(22)</sup>.

## 2. Review of literature

### 2.1 HIV infection status in Taiwan

HIV epidemics in Asia show great diversity, both in severity and timing. But epidemics in Asia are far from over and several countries including China, Indonesia, and Vietnam have growing epidemics. Several factors affect the rate and magnitude of growth of HIV prevalence, but two of the most important are the size of the sex worker population and the frequency with which commercial sex occurs. Both HIV infection and AIDS have been reportable diseases by law in Taiwan since 1984. Cases of HIV infection detected by enzyme immunoassay or particle agglutination assay must be confirmed by a western blot test. Free HIV counseling and testing services have been provided to high-risk groups for HIV transmission, such as commercial sex workers, patients with sexually transmitted diseases, men who have sex with men (MSM) and injection drug users (IDU) since 1984. Mandatory screening for HIV infection was implemented among prison inmates since 1990. HIV testing was applied to newly admitted to correctional inmates since 1993.

From 1984 to the end of 2005, there were 10,158 reported cases of HIV infections in Taiwan, it represented an average annual increase of 15% in HIV diagnoses before 2003. The most common route of transmission is through men having sex with men followed by heterosexual contact, while infections through injecting drug users (IDU) remained low. However, the number of newly reported HIV infections has been rising sharply since 2003, mainly

among IDU. It may be due to the HIV testing was further provided to all prisoner annually in correctional settings since 2003. By the end of 2010, the cumulative number of HIV-infected citizens in Taiwan has reached 20,057 (MSM 44.0 %, followed by IDU up to 32.2%). The proportion of the AIDS population that is injecting drug user has increased from 8% in 2003 to 32.2% in 2010. Their mean age at HIV diagnosis was 33.4 years, and 91.4% were male. Injecting drug use increased sharply from 4.0% in the pre- HAART period and 1.0% in the early HAART period to 48.5% in the late HAART period (23).

HIV/AIDS patients are provided with free medical care by the government in Taiwan, including anti-retroviral treatment<sup>(24)</sup>. The HAART also demonstrated cost-effectiveness in control HIV infection in Taiwan<sup>(25)</sup>. However, HIV-IDU used limited medical service and less portion of AIDS patients under HAART treatment<sup>(26) -27) (28)</sup>.

## *2.2 Intravenous illicit drug users*

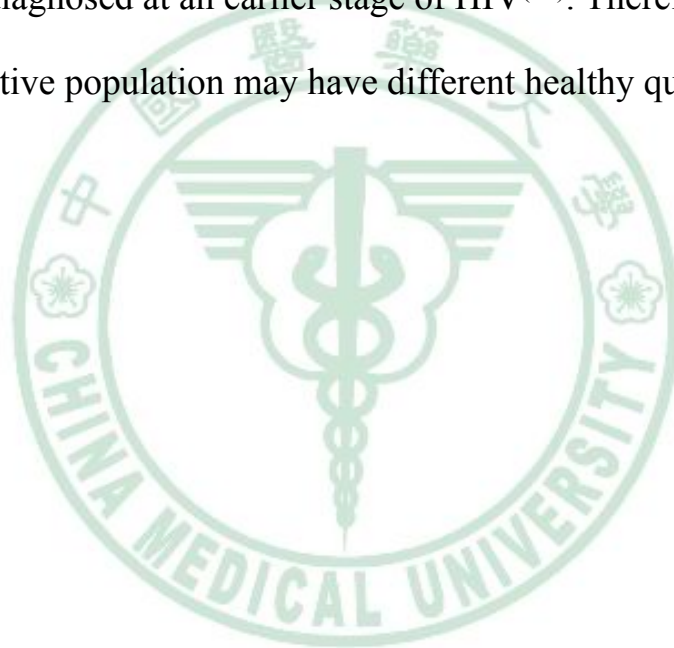
For people who inject drugs, imprisonment is a common event, with studies from a large number of countries reporting that between 56% and 90% of people who inject drugs had been imprisoned at some stage<sup>(29)</sup> <sup>(30)</sup>. Multiple prison sentences are more common for prisoners who inject drugs than for other prisoners. Some people who used drugs prior to imprisonment and discontinue their drug use while in prison. However, many carry on using on the inside, often with reduced frequency and amounts<sup>(31)</sup>, but sometimes maintaining the same level of use<sup>(32)</sup>. Prison is also a place where drug use is initiated, often as a means to release tension and to cope with being in an overcrowded and often violent environment<sup>(33)</sup> <sup>(34)</sup>.

Injecting drug use in prison is of particular concern given the potential for transmission of HIV, TB and viral hepatitis. Those who inject drugs in prisons often share needles and syringes and other injecting equipment, which is an efficient way of transmitting HIV<sup>(35)</sup>. Needle/containers sharing and having relatives or close friend in an HIV infection circle were to major factors of HIV infection in prisoners population in previous Taiwan study<sup>(36)</sup>.

A large number of studies from countries around the world report high levels of injecting drug use, including among female prisoners<sup>(37)</sup>. Although more research has been carried out on injecting drug use in prisons in high-income countries, studies from low-income and middle-income countries have found similar results. In Iran, for example, about 10% of prisoners are believed to inject drugs<sup>(38)</sup>. Injecting drug use has also been documented in

prisons in countries in eastern Europe and central Asia<sup>(39)</sup> <sup>(40)</sup> and there are also reports of injecting drug use in prisons in Latin America and sub-Saharan Africa<sup>(41)</sup>. A range in HIV prevalence among IDU prisoners has been reported in developing and transitional countries: 3.0% in Mexico, 9.9% in Brazil, 42% ~79 % in China<sup>(42)</sup>, 46% in Russia, 50% in Serbia, 56% in Indonesia, 60% in Libya, 63% in Iran, and 80% in Manipur<sup>(43)</sup>.

According to taiwan official reports revealed that IDU with HIV infection are often diagnosed at an earlier stage of HIV<sup>(44)</sup>. Therefore, these specific HIV-infective population may have different healthy quality of life patterns.



### *2.3 Prisoners in correctional facility*

The prison population has grown significantly during the last half of the 20th century in the United States as well in Taiwan<sup>(45)</sup>. The correctional facilities are fundamentally designed to confine and punish, not to treat disease. The harsh and socially isolating conditions in jail or prison often exacerbate mental illness, especially when inmates are placed under solitary confinement. Health services in prison settings are most often sub-standard and underfunded, and short of staff, of essential medications, of equipment and of appropriate infrastructures. Often, health services in prison settings work in complete isolation from the general healthcare system, hampering the quality of healthcare and making continuity of care a challenge. More than half of inmates have symptoms of a psychiatric disorder and major depression and psychotic disorders are four to eight times as prevalent among inmates as in the general population<sup>(46)</sup>. Substance use and dependence are highly prevalent in the incarcerated population. With growing numbers of drug users in correctional facilities, the prevalence of infectious diseases has increased correspondingly<sup>(47)</sup>. The prevalence of infectious disease is on average 4 to 10 times greater among prisoners than among the rest of the US population<sup>(48)</sup>, and the prevalence of chronic disease is even greater<sup>(49)</sup>. Prison conditions are integrally linked to prison health, and have the potential to affect the health of prisoners in positive or negative ways. As many as a quarter of all Americans infected with HIV and one in three with hepatitis C pass through a correc-

tional facility each year. Hence, infection control measures may need to improve in the correctional facility<sup>(50)</sup>.

Another problem is that, these prisoners had poor healthy status after releasing the jail<sup>(51)</sup>, and even suffered from death event, most due to accident or illicit drug overdose<sup>(52)</sup>. Public health professionals can play a role throughout the incarceration and reentry process by working toward healthier out- comes for both ex-offenders and the communities to which they return.

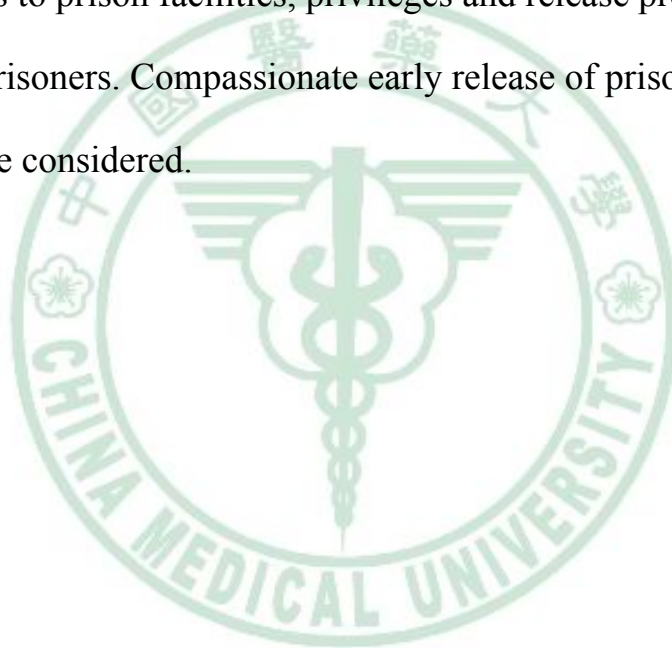
Prison healthcare budgets must reflect the growing needs of the prison population. Prison healthcare should be recognized as an integral part of the public health sector, and evolve from its present reactive “sick call” model into a proactive system that emphasizes early disease detection and treatment, health promotion and disease prevention. Previous study showed that newly incarcerated correctional inmates have a high prevalence of health issues at admission, prior limited access to health care, very high rates of disease and unhealthy behavior, and a strong desire for help in improving their health and in changing health- related behavior<sup>(53)</sup>.

According to the WHO guidelines, “ all prisoners have the right to receive health care, including preventive measures, equivalent to that available in the community without discrimination, in particular with respect to their legal status or nationality”.

The International Guidelines on HIV/AIDS and Human Rights identifies the following specific action in relation to prisons: Prison authorities should take all necessary measures, including adequate staffing, effective sur-



veillance and appropriate disciplinary measures, to protect prisoners from rape, sexual violence and coercion. Prison authorities should also provide prisoners (and prison staff, as appropriate), with access to HIV-related prevention information, education, voluntary testing and counseling, means of prevention (condoms, bleach and clean injection equipment), treatment and care and voluntary participation in HIV-related clinical trials, as well as ensure confidentiality, and should prohibit mandatory testing, segregation and denial of access to prison facilities, privileges and release programmes for HIV-positive prisoners. Compassionate early release of prisoners living with AIDS should be considered.



## *2.4 The HIV epidemic in prisons*

HIV hit prison early and it hit them hard. The rates of HIV infection among prisoners in many countries are significantly higher than those in the general population<sup>(45)</sup>. The prisoner in correctional facility had its unique health impact<sup>(54)</sup> and limited health care were adequate provided, that only 22% of state prisoners and 7% of jail inmates receive mental health treatment while incarcerated<sup>(46)</sup>. However, according to previous report in Taiwan, health care was provided to prisoners in the correctional facility more than they were in the community<sup>(55)</sup>. Interventions are needed to reduce injection and syringe sharing among HIV-seropositive prisoners and to reduce risks for sexual acquisition and transmission among drug using men who have sex with other men while incarcerated<sup>(56)</sup>.

HIV surveillance has been the most common form of HIV research in prison<sup>(43)</sup>, although this has largely been restricted to high-income countries. Data from low- and middle- income countries are more limited. Even within high-income countries, the precise number of prisoners living with HIV is difficult to estimate. Nevertheless, reviews of HIV prevalence in prison have shown that HIV infection is a serious problem, and one that requires immediate action<sup>(57)</sup>. In most countries, HIV prevalence rates in prison are several times higher than in the community outside prisons, and this is closely related to the rate of HIV infection among people who inject drugs in the community and the proportion of prisoners convicted for drug-related offenses<sup>(58)</sup>. In other countries, particularly in sub-Saharan Africa, elevated HIV prevalence

rates in prisons reflect the high HIV prevalence rates in the general population<sup>(59)</sup>. Everywhere, the prison population consists of individuals with greater risk factors for contracting HIV (and HCV and TB) compared with the general population outside of prisons. Such characteristics include injecting drug use, poverty, alcohol abuse, and living in minority communities with reduced access to healthcare services<sup>(60)</sup>.

Studies have shown HIV prevalence that ranges from zero in a young male offenders institution in Scotland <sup>(61)</sup> and among prisoners in Iowa, United States, in 1986 <sup>(62)</sup> to 33.6% in an adult prison in Catalonia, Spain, to more than 50% in a correctional facility for women in New York City <sup>(63)</sup>. As early as 1988, about half of the prisoners in Madrid and 20% of prisoners in New York City tested HIV positive. More recent reports show that HIV prevalence rates remain high in prisons in North America <sup>(64)</sup> <sup>(65)</sup> and western Europe, although they have decreased in countries like Spain that have introduced comprehensive HIV interventions in prisons, including needle and syringe programmes and methadone maintenance treatment<sup>(66)</sup>.

In the countries of central and eastern Europe and the former Soviet Union, HIV prevalence is particularly high in prisons in Russia and Ukraine, but also in Lithuania, Latvia and Estonia. In Russia, by late 2002, the registered number of people living with HIV/AIDS in the penal system exceeded 36,000, representing approximately 20% of known HIV cases. In Latin America, prevalence among prisoners in Brazil and Argentina was reported to be particularly high, with studies showing rates of between 3% and more than

20% in Brazil and from 4% to 10% in Argentina. Rates reported from studies in other countries, including Mexico, Honduras, Nicaragua and Panama are also high<sup>(43)</sup>. In India, one study found that the rates were highest among female prisoners, at 9.5% <sup>(67)</sup>. In Africa, a study undertaken in Zambia found a rate of 27% <sup>(68)</sup>. The highest HIV prevalence reported among a national prison population was in South Africa, where estimates put the figure as high as 41.4%. Conversely, some countries report zero prevalence; most of these are in north Africa or the Middle East <sup>(69)</sup>. The HIV epidemic in prisons is not occurring alone: prevalence rates of viral hepatitis in prisons are even higher than HIV rates <sup>(58)</sup> <sup>(70)</sup>. In particular, while the World Health Organization (WHO) estimates that about 3% of the world's population has been infected with the hepatitis C virus (HCV), estimates of the prevalence of HCV in prisons range from 4.8% in an Indian jail to 92% in two prisons in northern Spain. In addition, HIV/HCV co-infection had an elevated prevalence of any psychiatric disorder <sup>(71)</sup>.

## *2.5 HIV infection and Quality of life*

Quality of life (QoL) is one of the most commonly used self-assessment outcome measures in chronic disease. In a multi-site study examining HRQoL among PLWHA, researchers found that lower scores on QOL were associated with being older, being female, and being Black or Hispanic, among other factors<sup>(72)</sup>. A review of psycho-social consequences of HIV disease impacting QOL suggested that poverty, HIV-related stigma, depression, substance abuse, and domestic violence influence a person's willingness to seek medical care and motivation to adhere to therapy, ultimately affecting his/her QOL<sup>(73)</sup>. Several studies involving PLWHA have indicated a strong negative association between HIV-related symptoms and QOL<sup>(74) (75) (76)</sup>. A substantial body of research indicates that depression also has a significant negative impact on QOL among PLWHA<sup>(75) (77) (78) (79)</sup>.

HIV-related stigma, social support, and coping have also been found to be significantly associated with QOL among PLWHA. HIV-related stigma has been shown to compromise physical, psychological, and social health, which in turn affects QOL of PLWHA through multiple ways including interference in daily routine as well as the person's intention and ability to access health care services<sup>(80)</sup>.

In a multi-site study, Holzemer et al. <sup>(81)</sup> found that perceived stigma explained a significant amount of variance in QOL among PLWHA in addition to that explained by HIV-related symptoms and severity of illness. Buseh et al. <sup>(82)</sup> also found a significant negative association between stigma and

QOL among PLWHA. Social support is an important resource in buffering and managing stress and has been shown to be significantly associated with QOL and life satisfaction among PLWHA<sup>(83) (84) (85)</sup>.

Two other concepts related to QOL have been examined in the context of HIV disease by a few researchers. These concepts include locus of control and healthy lifestyles (self-care behaviors). Locus of control, a construct derived from Rotter's social learning theory, is often used to predict perceived health, health behaviors, and health outcomes<sup>(86)</sup>. Internal locus of control, a general belief of control by self, has been found to be positively associated with both perceived health and QOL, whereas external locus of control (belief in control by powerful others or chance) has been found to be negatively associated with health and QOL among PLWHA<sup>(87)</sup>.

Although healthy lifestyles have been shown to be associated with improved QOL in general populations, little research has focused on the context of HIV disease<sup>(88)</sup>. Healthy lifestyles include not only behaviors related to nutrition and physical activity, but also health responsibility, stress management, and supportive/nurturing interpersonal relationships. In a study examining QOL among men with HIV-disease, Uphold et al. <sup>(88)</sup> found that health promoting behaviors were significantly and positively associated with QOL. In another study involving women with HIV disease, women who practiced more self-care behaviors including healthy diet, vitamin supplements, adequate sleep and exercise, and stress management reported better health and QOL<sup>(85)</sup>.

Although several studies have examined QOL among PLWHA, a limited number of these studies focused exclusively on prisoners with HIV disease. The prison environment and background of substance use has specific characteristics that may affect HIV-positive patients<sup>(89)</sup>. The HIV infection condition and problems in Taiwan prison was also described in previous studies<sup>(90) (91) (92)</sup>.

Clinical indicators have also been shown to correlate with QOL in persons living with HIV. CD4+ lymphocyte counts, viral burden, and clinical endpoints were significant predictors of health-related quality of life in persons living with HIV disease<sup>(77)</sup>. Adults with HIV infection face a multitude of stressful life events including deterioration in health status, alienation from others, and prospects of losing employment, financial security, and social roles. Evidence of a negative impact of stress on disease progression during HIV infection is growing<sup>(93)</sup>. Similarly, researchers have increasingly noted that stressful life events are inversely related to various components of HRQOL.

Most of the studies on recreational drug use have focused on injection drug abusers and report that drug use was associated with depression and poorer HRQOL during HIV infection. Whereas there are numerous studies investigating the practice of unsafe sexual behaviors, little is known about the relationship of unsafe sexual practices and HRQOL. In a study on risk perceptions, reported that adults with lower HRQOL compared with those with

higher HRQOL were less likely to believe that the practice of safe sexual behaviors was important.





## 2.6 Research questions

Incarceration, illicit drug use and HIV constitute a multiplicity of risk<sup>(94)</sup>. Many prisoners are released back to their families and communities, which means they will bring their infections, illnesses, and diseases with them. Given the increasing impact of the HIV/AIDS epidemic on IDU, it is imperative to identify factors that may influence QoL among inmates with HIV disease incarcerated in correctional facility.

Because most previous researchers have limited their investigations to examining selected behavioral variables that may affect one or more components of HRQoL, the purpose of this study was to disclose the healthy quality of life and examine the interplay of multiple components of lifestyles and HRQoL dimensions among prisoners living with HIV infection. In addition, previous HRQoL surveys on HIV/AIDS patients under antiretroviral treatment<sup>(95) (96) (97)</sup>, nevertheless most our population was asymptomatic and not indicated for therapy. Few articles studied asymptomatic HIV population about their quality of life<sup>(98) (99)</sup>. Identification of these factors of these asymptomatic HIV inmates is critical to be able to develop and test strategies aimed at improving the QoL of these prisoners.

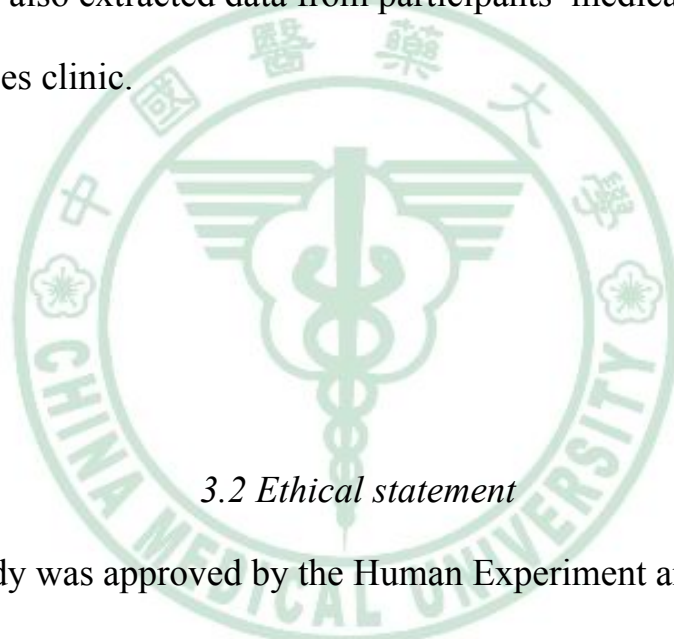
For the purposes of this paper, the term, “prisoner”, is used broadly to refer to adult males and females detained in criminal justice and correctional facilities: during the investigation of a crime; while awaiting trial; after conviction and before sentencing; and after sentencing. The term, “prison”, is used to refer to all criminal justice and correctional facilities.

### **3. Methodology**

#### *3.1 Participants and Procedure*

This study employed a cross-sectional and correctional design. All samples recruitment was performed carried out by convenience sampling. The study population was the consecutive patients attending the out-patient infectious disease clinic of the Ministry of Justice central Taiwan medical treatment special quarter. From October 2009 to September 2010, inmate participants who were confirmed to have HIV/AIDS infection were recruit from one male prison, one women prison and one detection center in central Taiwan. The inclusion criteria was adult older than 18 years old, with confirmatory HIV seropositive, physician's diagnosis and notification to Centers for Diseases Control, Taiwan; educated, and an ability to read and understand the Chinese language. A literature, active drug withdraw syndrome or disorientation subjects were excluded. A structured interview with each subjects was conducted in a private room, originally designed for medical clinic in the correctional facility, by a trained study nurse. This circumstance was chosen to increase the likelihood of revelation of highly personal and criminally liable behaviors. All inmates were read an informed consent statement and were asked if they wished to join the study. The statement denoted that any information they provided would be confidential and that refusal to participate would in no way negatively affect their incarceration experience. Inmates were also told that the information would be part of the medical record. The interview consisted health status communication, quality of life ques-

tionnaire and several sections containing questions on demographic and pre-incarceration characteristics including household, sexual behavior, drug use behavior, and imprisonment data. The study nurse was available to provide assistance when needed, without influencing subjects' responses. Demographic information gathered included age, sex, education, living status etc. Behavioral variables assessed included age at initiation of substance use, kinds of drug in detail, sexual activity, and condom use habits etc. Besides, the study nurse also extracted data from participants' medical charts at the Infectious Diseases clinic.



### *3.2 Ethical statement*

This study was approved by the Human Experiment an Ethics Committee of China Medical University Hospital and all participants provided written informed consent before entering the study.

### 3.3 Measurements

The global state of health of a patient is a uni- personal concept and, since it is changeable and is measured with a varying degree of subjectivity, it does not always coincide with the doctor's opinion of the severity of a patient's illness. One of the most commonly used self- assessment outcome measures in chronic disease is 'health-related QoL'.

The WHOQOL-BREF (Taiwan version) was used to evaluate HRQoL. Whilst the original WHOQOL-BREF contained 26 items, the WHOQOL-BREF (Taiwan version) contains two additional items: Q27 relating to 'respect and acceptance'; and Q28 relating to 'food/eating habits'. These two items were added to the social relationship domain and the environmental domain, respectively, according to their psychometric characteristics<sup>(100)</sup>. These two culture-specific issues for ethnic Chinese people in Taiwan were proposed by a focus group of experts and then validated by psychometric criteria from field tests. This study assessed the HRQoL of each participant, focusing on their personal experiences during the 2-week period prior to the interviews taking place. The score range for each WHOQOL- BREF item was 1–5, whilst the score range for each WHOQOL-BREF domain was 4–20, with lower scores implying a lower quality of life; if more than one item was missing, the domain score was not calculated (two items were allowed in the environmental domain). Both the reliability and validity of the WHOQOL-BREF (Taiwan version) have been confirmed in prior studies<sup>(9) (100) (101)</sup>. This study found that the reliability levels for the WHOQOL-BREF (Taiwan ver-

sion) were acceptable for all 28 items (Cronbach's  $\alpha$  range: 0.70–0.83). The results also showed good test-re-test correlation validity (global agreements all above 80%). Furthermore, the WHOQOL- BREF (Taiwan version) has been previously applied to the study of the HIV in the community in Taiwan<sup>(9)</sup> <sup>(102)</sup>. The WHOQOL-HIV was a specific format for HIV-infection patient<sup>(103)</sup> <sup>(104)</sup>, but lack enough validity in Taiwan population and un-common instrument used.



### 3.4 Data analysis

Descriptive statistical analyses were completed to fully describe the sample. Differences in baseline demographic and clinical characteristics between univariates were assessed using Chi-square test. All analyses were two-tailed, with significance set at  $p < 0.05$ .

Multivariate linear regression method was utilized for multi-variate analysis. Quality of life was considered to be a dependent variable. The following independent variables were taken consideration: 1. Sociodemographic variables included age, gender, education, marital status, living status, sexual activity, employment, and income source before incarceration, 2: Clinical disease variables included notifying HIV-seropositive time, clinical immunologic maker-CD4 counts, and virological indicators-plasma viral loads, 3: Substance variables contained illicit drug use, previous drug rehab, age at initial drug abuse, drug use duration, and daily drug expense, 4: Prison variables included sentence periods and imprisonment years till participate the study.

In order to find out the independent factors on HRQoL, we carried out multivariate linear regression method in four domains of quality of life.

In the first model (Model 1) we used age, gender, education, marital status, living status, sexual activity, employment, and income source as explaining variables; in the second model (Model 2), we added notifying HIV periods, CD4 counts and plasma viral loads into the fitted model (selected

significant factors in the previous model 1); in the third model (Model 3), we added IDU, rehabilitation, initial age of drug use, drug abuse duration and daily drug expense into the fitted model (selected significant factors in the previous model 2); in the fourth model (Model 4), we added sentence and imprisonment periods into the fitted model (selected significant factors in the previous model 3). In the final analysis, we utilized CD4 counts and the significant variables from the fitted model as explaining variables. The statistical software SAS 9.2 was applied for the analyses.



## 4. Results

There were 352 imprisonment patients in total visited the Infectious Disease clinic in the correctional facility during the study periods. Fifty-three was excluded initially due to 28 patients were non-educated, 12 had neuropsychiatric disorder, five just in prison and eight patients (2.3 %) refused participation. Twenty-four patients were excluded due to either skin, lung contagious disease or eye problems, subsequently. Total 275 inmates were enrolled in the study, and 261 subjects completed the study (Fig. 1).

Two hundred and sixty-one (195 men and 66 women) subjects were administrated the WHOQOL-BREF. The major risk behavior of acquired HIV of the participants was injection drug users (95.4%). The mean age of subjects was 33.96 (SD = 6.48 ). Sample whose age above thirty years-old almost double amounts of those under thirty. Male inmates (Median = 33, Standard Deviation = 6.48 )were older compared to female inmates (Median = 32, Standard Deviation = 6.46 ). Most inmates (60%) received less than high school education.

Over half (60%) of the inmates was singled and around one to three (30%) individuals were living alone. Significantly greater numbers of men (67.2%) were singled than women (37.9%). The majority (85%) of inmates were employed as laborers (118/222) before incarceration. Fewer than one fifth (18%) subjects denied having sexual activities before entering prison. Eight-six percent of the subjects was recidivism and 38% of them were more than three confinements (Table 1).



More than sixty percent of the inmates had been notified HIV infection more than 4 years. However, the majority of our patients enrolled in the study had an asymptomatic HIV-1 infection (85.7%) and had a relatively high median CD4 cell count, i.e.,  $460 \times 10^6$  cells/L. Among this group of patients, the burden of therapy was, on average, not outweighed by its benefits according to present treatment guideline. There were 37 patients received HAART in total. Hepatitis C was the most common (95.5 %) co-infection disease of our patients, and only 14.5 % had chronic hepatitis B infection.

Nearly all of our participants had illicit drug usage, included heroin, amphetamine and club drug, either via injection or oral route. These illicit drug users had exposed 6.5 years in average and usually since their younger age (15~ 30 years-old). Around eighty percent of them had ever sought the rehabilitation programs before incarceration (Table 1).

The most principle offense of our subjects were public order crimes (67.2%) , followed by property crimes (28.4%) (Table 2).

Male inmates reported better quality of life in the physical domain (14.0 v.s. 13.4 ,  $p=0.042$ ) significantly compared with those in women prisoners. Elder HIV seropositive inmates had significant lower QoL on social relationship ( 12.7 v.s. 13.6 ,  $p=0.02$ ), and also decreased scores in both physical and psychologic domains as they became older.

HIV-infected inmates whom living alone and denied sexual activity before incarceration had lowest scores on all four domains, especially in psychological aspect significantly.

HIV seropositive prisoners who was employed before entering prison had no difference on four aspects of quality of life. Nevertheless, those whose income mainly form work contributed better quality of life, particular in psychological ( 12.6 v.s. 11.6 ,  $p=0.022$ ) and environment ( 13.2 v.s. 12.5 ,  $p=0.035$  ) domains (Table 3).

The HIV-infected inmates reported better physical domain of HRQoL as their immunologic indicator, CD4 counts, increased, and CD4 counts more than 500 per deciliter contributed best healthy status (14.3 v.s. 12.9 ,  $p=0.026$  ). However, we can't explore similar findings in other parts of HRQoL (Table 4).

Injection drug users HIV infected persons and whom spent more money for drug, more than NT\$.2000, showed overall better healthy status quality, especially in physical parts significantly. Illicit drug users had attend drug rehabilitation programs told that they had better social relationship (13.2 v.s. 12.5 ,  $p=0.05$ ) in the correctional facility setting. Those illicit drug users addicted to drug in their later age, more than 30 years-old, had poor social relationship. In addition, prisoners self reported that more drug use history had better general HRQoL, in particular the environment parts (Table 5). However, the sentence crime periods and cumulative years in prisons had no statistically significant associations with quality of life (Table 6).

Multivariate linear regression was examined the relationships between sociodemographic variables, clinical disease variables, drug use behaviors, prison profile and HRQoL.

Male, not living alone before incarceration and higher CD4 counts had significant better quality of life in physical domain (Table 7). HIV-infected inmates, whom not living alone, having sexual activity, income source mainly from work himself/herself and more daily drug expense (more than 2000 TWD) before incarceration had significant better quality of life in psychologic domain (Table 8). Younger HIV-infected inmates, whose income source mainly from work before entering prison and exposure illicit drug earlier reported significant better quality of life in social domain (Table 9). Male infected inmates with longer illicit drug use history informed significant better quality of life in environment domain (Table 10).

## 5. Conclusion and Discussions

The present study showed mainly asymptomatic HIV-infected prisoners' health quality of life and its independent factors. We used general HRQoL measurement, WHOQOL, other than HIV-specific disease, and it was more suitable for variety population, such as our subjects, most (86%) were asymptomatic and not receiving treatment yet. The similar condition was that using MOS-HIV was not over SF-36 in study of person with HIV disease<sup>(105)</sup>. In addition, there was no evidence of best instrument for HIV/AIDS patients<sup>(106)</sup>.

The present study showed that HIV-infected prisoners, most were injection drug users (IDU), had poor quality of life compared with other HIV-infected groups<sup>(16) (102)</sup>. Besides, compared to disease-standardized Taiwanese population norms<sup>(107)</sup>, our participants reported poor health quality of life. Previous Taiwan official statistics showed that up to 61.4% of patients in the IDU group did not seek HIV-related medical care, significant higher compared to the sexual contact group<sup>(108)</sup>. The varying findings in regard to self-reported quality of life among inmates are probably particularly attributable to the fact that a high proportions of prisoners come from socially disadvantaged sections of the community at large and very often suffered from not only HIV infection disease, but substance misuse problems and mental disturbances. The results may contribute stigma of HIV infection, especially in the specific population<sup>(109)</sup>. The stigma significantly decreased in life satisfaction with differing rates of change by country, and some positive factors was explicated,

such as positive HIV media reports, taking antiretrovirals, reduced symptom intensity, and disclosure to a friend. These findings support us need pay more attention to the risky population. Knowing the well-being of HIV-infected persons, especially those under incarceration, having impact HIV-transmission within community, may help target services and future prevention needs.

Our study founded that HIV-infected woman prisoners had significantly poor scores both in physical and environment domains of quality of life. A US based study also showed that *women* and *HIV-infected individuals* reported poorest QoL scores<sup>(89)</sup><sup>(110)</sup>. In addition, indian female patients had poor QoL in psychologic and social domains in medical source limiting country<sup>(111)</sup>. Although direct comparisons among different measures can be problematic, some studies of patients with HIV/AIDS using unrelated measures have also reported poorer HRQoL in women<sup>(112)</sup><sup>(113)</sup>.

We disclosed that older HIV inmates had relative poor scores in both psychologic and social relationship domains. Most older inmates in several studies conducted in the UK<sup>(114)</sup> and US<sup>(115)</sup> rated their health as beding fair to bad/very bad, which different from the majority in two other US studies who assessed their health as being good<sup>(116)</sup> or excellent to good<sup>(117)</sup>.

Inmate participants who were employed prior incarceration also had better self-rated health<sup>(115)</sup>. However, our samples showed no significant difference, but incomes source from work had much impaction, focus on psychiatric parts.

The study also indicated that not living alone recalled significant better QoL scores in psychologic domain. HIV-infected inmates who living alone before incarceration had significant poor score in psychologic domains. An increased need for medical support among homeless PLWHA with a history of incarceration was enhanced in previous study<sup>(118)</sup>.

Comparison with other HIV-infected group, this study revealed the lower overall quality of life, despite most our participants are free-from HIV/AIDS illness. Indeed, incarceration may play a role, as previous studies indicated that inmates had worsened health status during incarceration <sup>(116)</sup><sup>(117)</sup>.

There is a need for a public health infrastructure to fulfill the core functions of public health services within prisons, i.e., to: assess the health status of prisoners; have an effective surveillance system for infectious and chronic diseases; undertake health promotion efforts; have coordinated actions to prevent diseases and injuries; protect the health of prisoners; and evaluate the effectiveness, accessibility and quality of health services. Addressing prisoners' health needs will contribute to the prisoner's rehabilitation and successful reintegration into the community<sup>(119)</sup>. The strength of our study is that the majority subjects were asymptomatic HIV-infected and imprisoned in correctional facility patients. Finding the impact of either socioeconomic status or infection disease on quality of life is significant related to healthy-promoting and health-monitoring behaviors, offers support for implementing a healthy promotion as well as disease prevention framework to the correctional setting, if the underlying challenges are acknowledge and barriers are addressed.

Limitations of this study include challenges to generalizability, because the subjects was drawn from three prisons in one mid-Taiwan county, and we were unable to fully achieve a truly random sample. There exists the possibility of some bias. First, inmates who were more confident about managing their health and who engaged in greater efforts to remain health may have been more likely to participate. We tried to eliminate the selection bias by inviting everyone who visited the clinic for his/her disease and overall response rate was more than 90%, excluded all a-literature, disability, neuropsychiatric disorder and contagious disease. Some missing data occurred, but was managed through list wise deletion for the major study aims. Second, recall and social desirability biases related to self-reported behavior are also possible. These biases were reduced because the questionnaire was self-administered and in private. Besides, any information collected from the inmates was self-reported and not independently validated by us. However, the extremely high response rate of behavior reported by inmates do affirm extensive problems. Finally, causal inference in the analysis of affect factors for HRQoL is limited by the cross-sectional design of the study.

The implication of the study findings is that there is considerable need for healthy program but a one-size-fit-all approach (care) will probably fail to result in uniform effects for all HIV-infected population.

Table 1. Participants demographic data

	N	Percent (%)
<b>Demographic data</b>		
<b>Age (Range 20-57)</b>		
> 30 years-old	86	33.0%
≤ 30 years-old	175	67.0%
<b>Sex</b>		
Male	195	74.7%
Female	66	25.3%
<b>Education</b>		
≥ High school	101	38.7%
< High school	156	59.8%
<b>Marital status</b>		
Single (never married)	156	59.8%
Current married	34	13.0%
Divorced/widowed/separated	71	27.2%
<b>Living status</b>		
Living alone	77	29.5%
Living with household	62	23.8%
Others	122	46.7%
<b>Sexual activity</b>		
Yes	213	81.6%
No	48	18.4%
<b>Employment</b>		
Had job	222	85.1%
Jobless	39	14.9%
<b>Income source (n=259)</b>		
work	209	80.7%
others	50	19.3%
<b>Monthly income (n=260)</b>		
< NTD\$ 30,000	135	51.9%
> NTD\$ 30,000	76	29.2%
Variable	49	18.8%
<b>Recidivist (n=260)</b>		
Yes	223	85.8%
No	37	14.2%
<b># of lifetime arrests (n=233)</b>		
One arrest	37	15.9%
≤ 3 arrests	111	47.6%
> 3 arrests	85	36.5%
<b>Incarceration profile</b>		
<b>Sentence</b>		
>5 years	101	44%
≤ 5 years	126	56%
<b>Imprisonment periods</b>		
>1 years	103	60%
≤ 1 years	69	40%



Table 1. Participants demographic data (cont.)

		<b>Clinical disease</b>		
<b>Notify HIV years (n=221)</b>		>4 years	82	37.1%
		≤ 4 years	139	62.9%
<b>HIV</b>			222	85.7%
		Stage A1	90	40.5%
		Stage A2	130	58.6%
		Stage A3	2	0.9%
<b>AIDS</b>			37	14.3%
		Stage C1	17	45.9%
		Stage C2	19	51.4%
		Stage C3	1	2.7%
<b>HAART CD4 (n=259)</b>			35	13.4%
		< 200	5	1.9%
		200-350	63	24.3%
		350-500	86	33.2%
		>500	105	40.5%
<b>plasma Viral Loads</b>				
		> 10,000	28	10.8%
		5,000-10,000	22	8.5%
		1,000-5,000	98	37.8%
		< 1,000	111	42.9%
<b>HBV co-infection</b>			29	14.5%
<b>HCV co-infection</b>			191	95.5%
		Abnormal LFT	120	46.90%
<b>Illicit drug use data</b>				
<b>Injection drug user</b>				
		Yes	249	95.4%
		No	12	4.6%
<b>Illicit drug user</b>				
		Yes	256	98.1%
		No	5	1.9%
<b>Rehabilitation History</b>				
		Yes	204	78.2%
		No	57	21.8%
<b>Age at initial illicit drug use</b>				
		> 30 years-old	34	13.4%
		15 - 30 years-old	205	80.7%
		≤ 15 years-old	15	5.9%
<b>Drug use duration</b>				
		> 6.5 years	126	49.6%
		≤ 6.5 years	128	50.4%
<b>Daily drug expense</b>				
		> NT\$.2000	101	43.2%
		≤ NT\$.2000	133	56.8%
<b>Drug from friend's supply</b>				
		Yes	149	57.1%
		No	112	42.9%
<b>Drug from drug dealer</b>				
		Yes	141	54.0%
		No	120	46.0%

Table 2. Imprisonment crime type

Crime Type	N	Percent
<b>Violent crimes</b>	7	3.0%
Homicide	3	
Weapon offenses	2	
Assault	1	
Robbery	1	
<b>Property crimes</b>	66	28.4%
Burglary	35	
Larceny-Theft	31	
<b>Public order crime</b>	156	67.2%
Drug offense	153	
Violation	3	
<b>White-collar crime</b>	3	1.3%
Fraud	2	
Forgery	1	
<b>Total</b>	232	

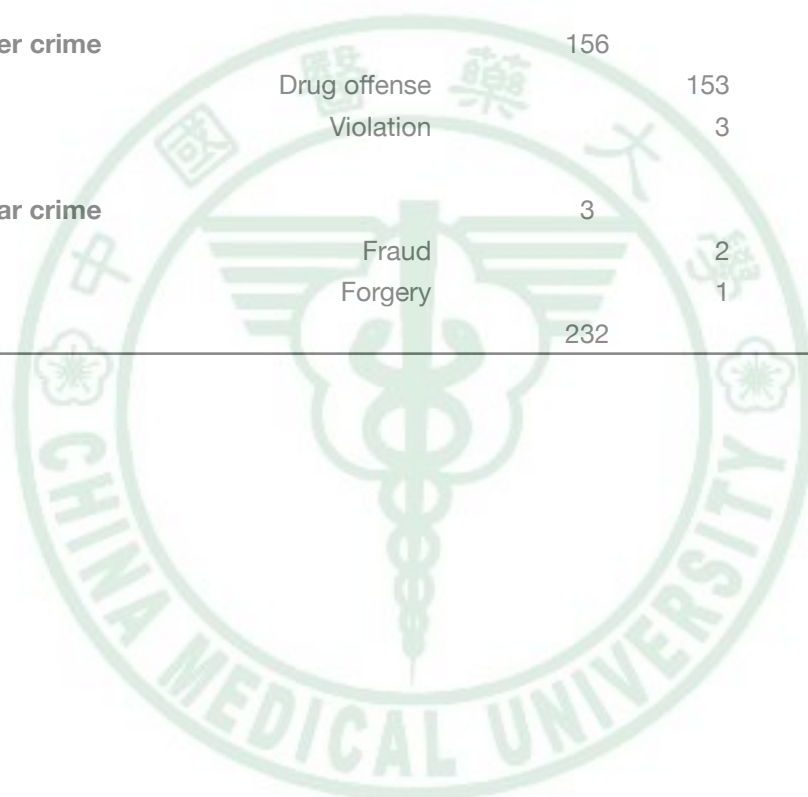


Table 3. Four domains scores of WHOQOL-BREF v.s. Demographic characteristic

	N	Physical	p value	Psychologic	p value	Social relationship	p value	Environment	p value	
<b>Age</b>	> 40 years-old	44	13.5 ± 2.1	0.14	12.0 ± 2.8	0.43	12.7 ± 2.2	0.02	12.4 ± 2.4	0.32
	30 ~ 40 years-old	131	13.8 ± 2.2		12.4 ± 2.4		12.9 ± 2.2		11.9 ± 2.2	
	≤ 30 years-old	86	14.2 ± 2.3		12.7 ± 2.9		13.6 ± 2.3		12.4 ± 2.6	
<b>Gender</b>	Man	195	14.0 ± 2.3	0.04	12.5 ± 2.8	0.22	13.2 ± 2.3	0.17	12.3 ± 2.4	0.07
	Woman	66	13.4 ± 2.3		12.1 ± 2.2		12.7 ± 2.1		11.7 ± 2.0	
<b>Education</b>	≥ High school	101	14.0 ± 2.4	0.49	12.5 ± 2.7	0.86	13.0 ± 2.3	0.50	12.3 ± 2.4	0.36
	< High school	156	13.8 ± 2.1		12.4 ± 2.5		13.2 ± 2.2		12.0 ± 2.3	
<b>Marital status</b>	Single (never married)	156	14.0 ± 2.2	0.37	12.5 ± 2.8	0.90	13.1 ± 2.4	0.98	12.2 ± 2.4	0.67
	Current married	34	13.4 ± 2.1		12.4 ± 2.1		13.1 ± 1.7		11.8 ± 1.9	
	Divorced/widowed/separated	71	13.8 ± 2.2		12.5 ± 2.7		13.0 ± 2.2		12.2 ± 2.5	
<b>Living status *</b>	Living alone	56	13.4 ± 2.1	0.06	11.7 ± 2.9	0.03	12.8 ± 2.5	0.29	11.8 ± 2.4	0.26
	Not living alone	205	14.0 ± 2.3		12.6 ± 2.5		13.2 ± 2.2		12.2 ± 2.3	
<b>Sexual activity *</b>	Yes	213	13.9 ± 2.3	0.36	12.6 ± 2.6	0.02	13.1 ± 2.3	0.92	12.2 ± 2.4	0.74
	No	48	13.6 ± 2.0		11.6 ± 2.8		13.1 ± 2.4		12.0 ± 2.1	
<b>Employment * (n=260)</b>	Had job before imprisonment	222	13.9 ± 2.2	0.80	12.4 ± 2.7	0.57	13.1 ± 2.3	0.41	12.2 ± 2.3	0.51
	Jobless before imprisonment	39	14.0 ± 2.5		12.2 ± 2.6		12.8 ± 2.2		11.9 ± 2.4	
<b>Income source * (n=259)</b>	work	209	13.9 ± 2.2	0.30	12.6 ± 2.6	0.02	13.2 ± 2.2	0.04	12.2 ± 2.3	0.12
	others	50	13.6 ± 2.4		11.6 ± 2.6		12.5 ± 2.3		11.6 ± 2.3	
<b>Monthly income * (n=260)</b>	< NTDS 30,000	135	13.7 ± 2.0	0.28	12.4 ± 2.5	0.68	13.0 ± 2.2	0.17	12.1 ± 2.3	0.20
	≥ NTDS 30,000	76	14.1 ± 2.4		12.5 ± 2.9		13.5 ± 2.3		12.5 ± 2.4	
	Variable	49	14.1 ± 2.5		12.1 ± 2.5		12.7 ± 2.4		11.7 ± 2.4	
<b>Recidivist (n=260)</b>	Yes	223	13.9 ± 2.2	0.61	12.4 ± 2.5	0.65	13.0 ± 2.2	0.72	12.1 ± 2.3	0.89
	No	37	13.7 ± 2.4		12.2 ± 3.3		13.2 ± 2.5		12.2 ± 2.7	
<b># of lifetime arrests (n=233)</b>	> 3 arrests	85	13.8 ± 2.3	0.88	12.3 ± 2.6	0.78	13.0 ± 2.4	0.90	12.1 ± 2.1	0.98
	2-3 arrests	111	13.9 ± 2.1		12.5 ± 2.4		13.1 ± 2.2		12.1 ± 2.4	
	One arrest	37	13.7 ± 2.4		12.2 ± 3.2		13.2 ± 2.2		12.2 ± 2.7	

Table 4. Four domains scores of WHOQOL-BREF v.s. Clinical Diseases

Clinical disease	N	Physical	p value	Psychologic	p value	Social relationship	p value	Environment	p value
<b>CD4 cell count per ul</b>									
< 200	5	12.9 ± 2.4	0.026	13.7 ± 1.7	0.588	14.2 ± 1.9	0.73	11.7 ± 1.7	0.809
200-350	63	13.3 ± 2.2		12.0 ± 2.5		13.0 ± 2.3		12.0 ± 2.1	
350-500	86	13.9 ± 2.5		12.5 ± 3.1		13.1 ± 2.4		12.1 ± 2.6	
>500	105	14.3 ± 2.0		12.6 ± 2.3		13.1 ± 2.1		12.3 ± 2.3	
<b>plasma Viral Loads copies/ml</b>									
> 10,000	28	13.6 ± 2.0	0.463	11.9 ± 3.2	0.247	13.0 ± 2.4	0.945	11.8 ± 2.3	0.478
5,000-10,000	22	13.6 ± 1.8		12.8 ± 2.2		12.9 ± 1.9		12.3 ± 1.7	
1,000-5,000	98	13.8 ± 2.4		12.1 ± 2.7		13.1 ± 2.4		12.0 ± 2.4	
< 1,000	111	14.1 ± 2.1		12.7 ± 2.5		13.1 ± 2.2		12.4 ± 2.4	
<b>Notify HIV years</b>									
>4 years	82	14.1 ± 2.2	0.639	12.6 ± 2.8	0.741	13.1 ± 2.4	0.830	12.5 ± 2.4	0.206
≤ 4 years	139	14.9 ± 2.2		12.5 ± 2.6		13.1 ± 2.2		12.1 ± 2.3	

Table 5. Four domains scores scores of WHOQOL-BREF v.s. Drug use condition

Drug use	N	Physical	p value	Psychologic	p value	Social relationship	p value	Environment	p value
<b>IDU</b>									
Yes	249	13.9 ± 2.2	<b>0.03</b>	12.5 ± 2.6	0.14	13.1 ± 2.2	0.37	12.2 ± 2.4	0.75
No	12	12.5 ± 1.5		11.3 ± 3.5		12.5 ± 2.9		11.9 ± 1.8	
<b>Drug</b>									
Yes	256	13.9 ± 2.2	0.10	12.4 ± 2.6	0.31	13.1 ± 2.2	0.29	12.2 ± 2.4	0.46
No	5	12.2 ± 1.5		11.2 ± 3.3		12.0 ± 3.5		11.4 ± 1.8	
<b>Rehabilitation</b>									
Yes	204	13.8 ± 2.2	0.19	12.4 ± 2.6	0.72	13.2 ± 2.2	<b>0.05</b>	12.2 ± 2.3	0.85
No	57	14.2 ± 2.3		12.3 ± 2.8		12.5 ± 2.3		12.1 ± 2.4	
<b>Drug from friend</b>									
Yes	149	13.8 ± 2.1	0.78	12.5 ± 2.7	0.68	13.1 ± 2.2	0.78	12.2 ± 2.3	0.94
No	112	13.9 ± 2.4		12.3 ± 2.6		13.0 ± 2.4		12.1 ± 2.4	
<b>Drug from dealer</b>									
Yes	141	13.9 ± 2.2	0.87	12.4 ± 2.5	0.81	13.1 ± 2.3	0.88	12.1 ± 2.4	0.99
No	120	13.8 ± 2.2		12.4 ± 2.8		13.1 ± 2.3		12.1 ± 2.3	
<b>Age at initial illicit drug use</b>									
> 30 years-old	34	13.6 ± 2.1	0.61	11.9 ± 3.0	0.47	12.8 ± 2.3	<b>0.02</b>	12.3 ± 2.2	0.91
15 - 30 years-old	205	14.0 ± 2.3		12.5 ± 2.5		13.0 ± 2.2		12.1 ± 2.4	
≤ 15 years-old	15	13.8 ± 2.4		12.8 ± 3.3		14.7 ± 2.5		12.2 ± 2.8	
<b>Drug usage duration</b>									
> 6.5 years	126	14.0 ± 2.2	0.61	12.6 ± 2.6	0.32	13.2 ± 2.3	0.42	12.5 ± 2.3	<b>0.01</b>
≤ 6.5 years	128	13.8 ± 2.3		12.2 ± 2.7		13.0 ± 2.2		11.8 ± 2.4	
<b>Daily drug expense</b>									
> NT\$.2000	101	14.0 ± 2.2	0.52	12.9 ± 2.5	0.02	13.2 ± 2.3	0.55	12.3 ± 2.5	0.70
≤ NT\$.2000	133	13.8 ± 2.2		12.1 ± 2.7		13.0 ± 2.2		12.1 ± 2.3	

Table 6. Four domains scores of WHOQOL-BREF v.s. Prison profile

Prison profile		N	Physical	p value	Psychologic	p value	Social relationship	p value	Environment	p value
<b>Sentence</b>										
>5 years	101	13.9±2.2	0.917	12.3±2.6	0.449	13.2±2.4	0.310	12.0±2.4	0.510	
≤5 years	126	13.9±2.2		12.6±2.6		12.9±2.1		12.2±2.2		
<b>Imprisonment periods</b>										
>1 years	103	14.1±2.2	0.425	12.7±2.5	0.505	13.2±2.5	0.74	12.2±2.5	0.562	
≤1 years	69	13.8±2.2		12.5±2.5		13.1±2.1		12.0±2.2		

Table 7. Multivariate regression models of WHOQOL-BREF physical domain

			Model 1	Model 2	Model 3	Model 4	Final Model
		N	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
<b>Age, years</b>							
	$\leq 30$	44	<b>0.77 *</b>				
	30 ~ 40	131	0.42				
	> 40	86	Ref.				
<b>Gender</b>							
	Man	195	<b>0.69 *</b>	0.5	<b>0.73 **</b>	<b>0.70 **</b>	<b>0.64 **</b>
	Woman	66	Ref.	Ref.	Ref.	Ref.	Ref.
<b>Education</b>							
	$\geq$ High school	101	0.17				
	< High school	156	Ref.				
<b>Marital status</b>							
	Divorced/widowed/separated	71	0.12				
	Current married	34	-0.34				
	Single (never married)	156	Ref.				
<b>Living Status †</b>							
	Living alone	56	<b>-0.61 *</b>	<b>-0.74 **</b>	<b>-0.81 **</b>	<b>-0.67 *</b>	<b>-0.65 **</b>
	Not living alone	205	Ref.	Ref.	Ref.	Ref.	Ref.
<b>Sexual activity †</b>							
	Yes	213	0.29				
	No	48	Ref.				
<b>Employment †</b>							
	Yes	222	-0.69				
	No	39	Ref.				
<b>Income source †</b>							
	Work	209	0.61				
	Other	50	Ref.				
<b>CD4 cell count per uL</b>							
	< 350	68		<b>-1.05 ***</b>	<b>-0.84 **</b>	<b>-1.13 ***</b>	<b>-1.04 ***</b>
	350-500	86		-0.3	-0.38	-0.29	-0.40
	>500	105		Ref.	Ref.	Ref.	Ref.
<b>Notify HIV, years</b>							
	> 4	82		0.27			
	$\leq 4$	139		Ref.			
<b>IDU</b>							
	Yes	249			1.33	0.12	
	No	12			Ref.	Ref.	
<b>Rehabilitation</b>							
	Yes	204			-0.34		
	No	57			Ref.		
<b>Age at initial illicit drug use, years</b>							
	> 30	34			-0.3		
	15 - 30	205			-0.07		
	$\leq 15$	15			Ref.		
<b>Drug usage duration, years</b>							
	> 6.5	126			-0.01		
	$\leq 6.5$	128			Ref.		
<b>Daily drug expense, NTD. †</b>							
	> 2000	101			0.20		
	$\leq 2000$	133			Ref.		
<b>Sentence periods, years</b>							
	> 5	101				-0.31	
	$\leq 5$	126				Ref.	
<b>Imprisonment periods, years</b>							
	>1	103				0.39	
	$\leq 1$	69				Ref.	

† denote information before incarceration ; \* P < 0.1, \*\* P < 0.05, \*\*\* P < 0.01

Table 8. Multivariate regression models of WHOQOL-BREF psychological domain

		Model 1	Model 2	Model 3	Model 4	Final Model
		N	$\beta$	$\beta$	$\beta$	$\beta$
<b>Age, years</b>						
	≤ 30	44	0.53			
	30 ~ 40	131	0.27			
	> 40	86	Ref.			
<b>Gender</b>						
	Man	195	0.41			
	Woman	66	Ref.			
<b>Education</b>						
	≥ High school	101	0.01			
	< High school	156	Ref.			
<b>Marital status</b>						
	Divorced/widowed/separated	71	-0.01			
	Current married	34	-0.05			
	Single (never married)	156	Ref.			
<b>Living Status †</b>						
	Living alone	56	-0.68 *	-0.94 **	-1.03 **	-0.86 **
	Not living alone	205	Ref.	Ref.	Ref.	Ref.
<b>Sexual activity †</b>						
	Yes	213	0.94 *	1.12 **	0.74	0.26
	No	48	Ref.	Ref.	Ref.	Ref.
<b>Employment †</b>						
	Yes	222	-0.62			
	No	39	Ref.			
<b>Income source †</b>						
	Work	209	1.26 **	1.04 **	0.85 *	1.04 *
	Other	50	Ref.	Ref.	Ref.	Ref.
<b>CD4 cell count per uL</b>						
	< 350	68		-0.14	-0.12	-0.07
	350-500	86		-0.11	-0.10	0.21
	>500	105		Ref.	Ref.	Ref.
<b>Notify HIV, years</b>						
	> 4	82		0.27		
	≤ 4	139		Ref.		
<b>IDU</b>						
	Yes	249			1.42	
	No	12			Ref.	
<b>Rehabilitation</b>						
	Yes	204			0.03	
	No	57			Ref.	
<b>Age at initial illicit drug use, years</b>						
	> 30	34			-0.39	
	15 - 30	205			-0.13	
	≤ 15	15			Ref.	
<b>Drug usage duration, years</b>						
	> 6.5	126			0.07	
	≤ 6.5	128			Ref.	
<b>Daily drug expense, NTD. †</b>						
	> 2000	101			0.60	0.76 *
	≤ 2000	133			Ref.	Ref.
<b>Sentence periods, years</b>						
	> 5	101			-0.56	
	≤ 5	126			Ref.	
<b>Imprisonment periods, years</b>						
	>1	103			0.32	
	≤ 1	69			Ref.	

† denote information before incarceration ; \* P < 0.1, \*\* P < 0.05, \*\*\* P < 0.01



Table 9. Multivariate regression models of WHOQOL-BREF social domain

	N	Model 1	Model 2	Model 3	Model 4	Final Model
		$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
<b>Age, years</b>						
≤ 30	44	<b>1.20 **</b>	<b>1.08 **</b>	0.81	1.00	<b>0.79 *</b>
30 ~ 40	131	0.36	0.25	0.25	0.46	0.19
> 40	86	Ref.	Ref.	Ref.	Ref.	Ref.
<b>Gender</b>						
Man	195	0.47	0.71			
Woman	66	Ref.	Ref.			
<b>Education</b>						
≥ High school	101	-0.20				
< High school	156	Ref.				
<b>Marital status</b>						
Divorced/widowed/separated	71	0.40				
Current married	34	0.48				
Single (never married)	156	Ref.				
<b>Living Status †</b>						
Living alone	56	-0.34				
Not living alone	205	Ref.				
<b>Sexual activity †</b>						
Yes	213	-0.09				
No	48	Ref.				
<b>Employment †</b>						
Yes	222	-0.42				
No	39	Ref.				
<b>Income source †</b>						
Work	209	<b>0.94 *</b>	<b>0.84 **</b>	0.58	<b>0.86 *</b>	<b>0.66 *</b>
Other	50	Ref.	Ref.	Ref.	Ref.	Ref.
<b>CD4 cell count per uL</b>						
< 350	68		0.08	0.28	0.44	<b>0.07</b>
350-500	86		0.35	0.09	0.58	<b>0.15</b>
>500	105		Ref.	Ref.	Ref.	Ref.
<b>Notify HIV, years</b>						
> 4	82		-0.13			
≤ 4	139		Ref.			
<b>IDU</b>						
Yes	249			0.53		
No	12			Ref.		
<b>Rehabilitation</b>						
Yes	204			<b>0.63 *</b>	<b>0.95 **</b>	<b>0.55*</b>
No	57			Ref.	Ref.	Ref.
<b>Age at initial illicit drug use, years</b>						
> 30	34			-0.86	-0.62	-1.24
15 - 30	205			-1.16	<b>-1.33 **</b>	<b>-1.27 *</b>
≤ 15	15			Ref.	Ref.	Ref.
<b>Drug usage duration, years</b>						
> 6.5	126			0.16		
≤ 6.5	128			Ref.		
<b>Daily drug expense, NTD. †</b>						
> 2000	101			0.02		
≤ 2000	133			Ref.		
<b>Sentence periods, years</b>						
> 5	101				0.04	
≤ 5	126				Ref.	
<b>Imprisonment periods, years</b>						
>1	103				0.19	
≤ 1	69				Ref.	

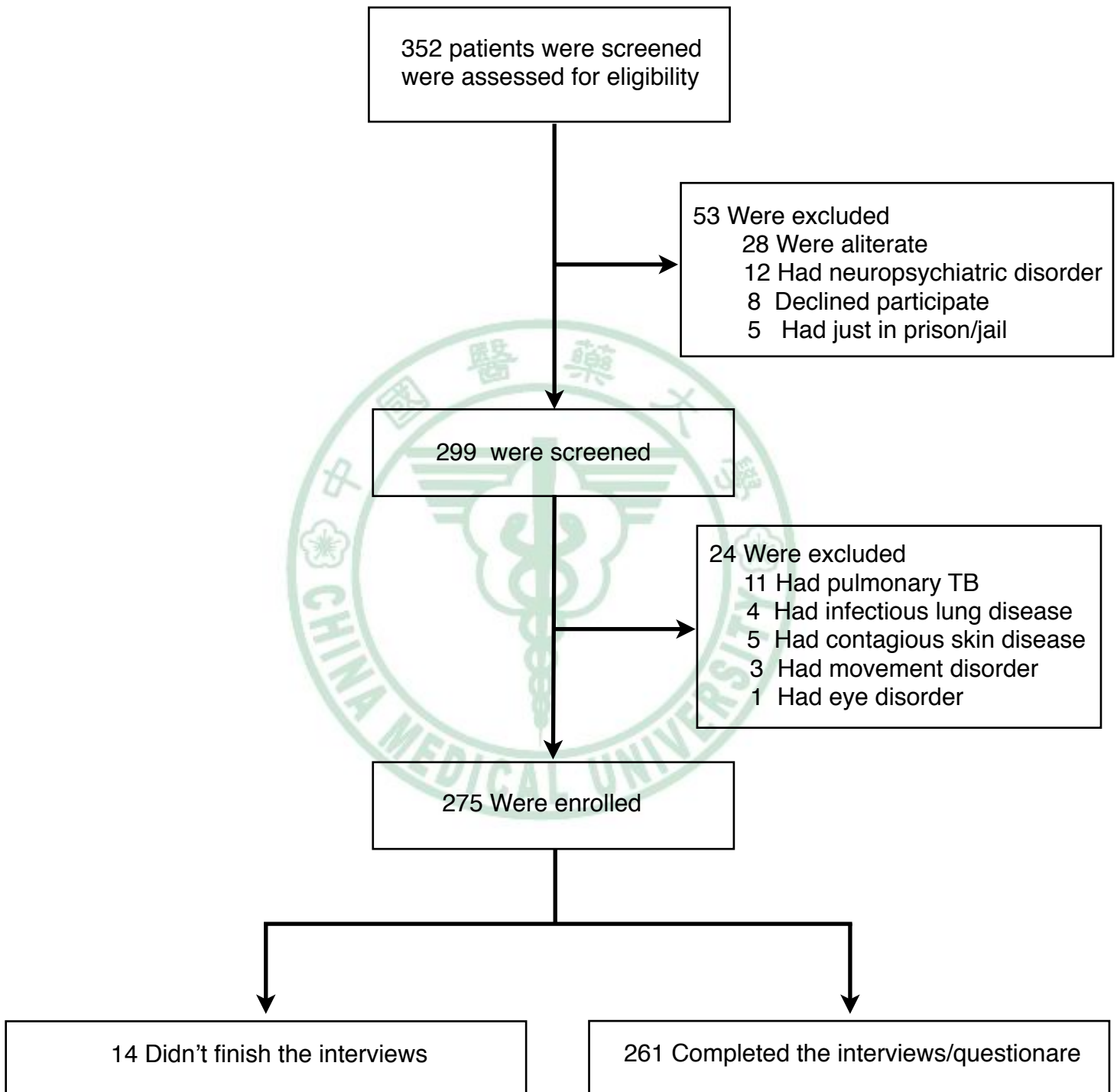
† denote information before incarceration ; \* P < 0.1, \*\* P < 0.05, \*\*\* P < 0.01

Table 10. Multivariate regression models of WHOQOL-BREF environment domain

		Model 1	Model 2	Model 3	Model 4	Final Model
		N	$\beta$	$\beta$	$\beta$	$\beta$
<b>Age, years</b>						
	≤ 30	44	-0.02			
	30 ~ 40	131	-0.41			
	> 40	86	Ref.			
<b>Gender</b>						
	Man	195	0.45	0.19	0.55	0.54
	Woman	66	Ref.	Ref.	Ref.	Ref.
<b>Education</b>						
	≥ High school	101	0.27			
	< High school	156	Ref.			
<b>Marital status</b>						
	Divorced/widowed/separated	71	0.07			
	Current married	34	-0.22			
	Single (never married)	156	Ref.			
<b>Living Status †</b>						
	Living alone	56	-0.28			
	Not living alone	205	Ref.			
<b>Sexual activity †</b>						
	Yes	213	0.19			
	No	48	Ref.			
<b>Employment †</b>						
	Yes	222	-0.29			
	No	39	Ref.			
<b>Income source †</b>						
	Work	209	0.64	0.61		
	Other	50	Ref.	Ref.		
<b>CD4 cell count per uL</b>						
	< 350	68		-0.41	-0.20	-0.08
	350-500	86		0.14	-0.20	-0.04
	>500	105		Ref.	Ref.	Ref.
<b>Notify HIV, years</b>						
	> 4	82		0.41		
	≤ 4	139		Ref.		
<b>IDU</b>						
	Yes	249			-0.12	
	No	12			Ref.	
<b>Rehabilitation</b>						
	Yes	204			0.21	
	No	57			Ref.	
<b>Age at initial illicit drug use, years</b>						
	> 30	34			0.87	
	15 - 30	205			0.36	
	≤ 15	15			Ref.	
<b>Drug usage duration, years</b>						
	> 6.5	126			0.76 **	0.58
	≤ 6.5	128			Ref.	Ref.
						0.69 **
<b>Daily drug expense, NTD. †</b>						
	> 2000	101			0.19	
	≤ 2000	133			Ref.	
<b>Sentence periods, years</b>						
	> 5	101				-0.49
	≤ 5	126				Ref.
<b>Imprisonment periods, years</b>						
	>1	103				0.20
	≤ 1	69				Ref.

† denote information before incarceration ; \* P < 0.1, \*\* P < 0.05, \*\*\* P < 0.01

Fig.1. Patient enrollment



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