A REPORT OF MEDECINS DU MONDE

Assessment of risk practices and infectious disease among drug users in Temeke District, Dar es Salaam, Tanzania

Prepared by the Centre for Population Health, Burnet Institute for Médecins du Monde – France

2011

A Rapid Assessment and Response

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MÉDECINS DU MONDE

Preface

About Médecins du Monde

HEALTHCARE PLUS

Médecins du Monde is an international humanitarian organisation providing medical care to vulnerable populations affected by war, natural disasters, disease, famine, poverty or exclusion. Originally established in France in 1980, the Médecins du Monde international network now extends to 16 countries in Europe, Asia and the Americas. Médecins du Monde's work depends on the efforts of nearly 3,000 medical and logistics professionals who volunteer their time. Thanks to their dedication and expertise, we are able to run emergency and development programmes in more than 60 countries while minimising costs.

BEYOND MEDICAL CARE

Although Médecins du Monde's primary aim is to provide medical care, our work goes further to ensure long-lasting effectiveness. We draw on our experience on the ground to bear witness to obstacles to healthcare and to advocate for change.

AT HOME AND ABROAD

Our projects take place in both developing and developed countries. Across the countries where the Médecins du Monde network is present, our medical teams provide healthcare to the most vulnerable groups in their society.

HARM REDUCTION

MDM has been running Harm Reduction programs since 1987 in France, Russia, Serbia, China, Myanmar, Vietnam and Afghanistan. MDM has built a strong medical and human expertise on HIV prevention and treatment with high risk groups, and harm reduction approaches.

Research team

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Ethics

Ethical approval was provided by the National Institute for Medical Research of Tanzania.

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Abbreviations

AIDS..... Acquired Immunodeficiency Syndrome

ART ..... Antiretroviral therapy

BBV..... Blood-borne virus

CBO ..... Community based organisation

HCV..... hepatitis C virus

HIV..... Human Immunodeficiency Virus

IDU ..... Injecting drug use

MAT..... Medication-assisted treatment

MdM-F ..... Médecins du Monde – France

NGO..... Non-government organisation

NIMR ..... National Institute for Medical Research

NSP ..... Needle and syringe program

OST ..... Opioid substitution therapy

PEPFAR ..... The US President's Emergency Plan for AIDS Relief

PWID ..... People who inject drugs

RAR..... Rapid assessment and response

SAAHRN..... Sub-Saharan African Harm Reduction Network

sh..... Tanzanian shilling (1€=~2200sh and US$1=1,600sh at time of writing)

STI..... Sexually transmitted infection

TACAIDS ..... Drug Control Commission of Tanzania

THMIS..... Tanzania HIV/AIDS and Malaria Indicator Survey

UNAIDS..... Joint United Nations Programme on HIV/AIDS

VCT ..... Voluntary counselling and testing

Other definitions

Camp ..... Open air spaces, including street corners, football fields, parking lots, or other secluded spaces, where drugs are commonly taken (also *maskani)*

Cocktail..... Preparation of heroin mixed with tobacco and marijuana which is smoked

"Doctor" ..... An experienced injector who may inject for others who are uncomfortable or inexperienced injecting themselves

Flashblood..... The injection of a syringe full of blood from someone else who has just injected heroin

Frontloading..... Measuring drug solution in one syringe, which is then used to transfer solution to a second syringe

Geto..... Private rented rooms, usually shared by a number of tenants, where drugs may be injected

Kete ..... Unit of heroin sold in Tanzania (equivalent of one dose; there are 36 *ketes* in one gram)

Mageto..... Plural for *geto*

Maskani..... Open air spaces, including street corners, football fields, parking lots, or other secluded spaces, where drugs are commonly taken (also camp)

vipoint ..... whereby injectors share the contents of a syringe by only injecting a measured amount of heroin before passing on the syringe to the next injector. Also known as "half/half".

Executive Summary

Background and rationale

Although HIV in mainland Tanzania is characterised as a generalised epidemic, there is evidence that injecting drug use is contributing to high rates of HIV transmission among drug using groups,[1, 2] with growing concerns of the potential for onward transmission of HIV to non-drug using populations. Evidence to date estimates that HIV prevalence is around 40% in people who inject drugs (PWID) in Tanzania,[1] compared to approximately 6-7% in the general population.[3] Gender disparities in population HIV prevalence are also evident within groups of PWID, reaching as high as 64% among female PWID.[4]

A small number of studies documenting injecting drug use in mainland Tanzania[1, 4-9] have consistently found that PWID routinely engage in high risk injecting and sexual risk behaviours, with consequences for infectious disease transmission, including HIV and hepatitis C (HCV). Many female drug users are also involved in transactional sex work. Currently there is limited access to comprehensive and effective harm reduction services in Dar es Salaam, and drug users remain highly stigmatised.

Médicins du Monde – France (MdM-F) began introducing a harm reduction program within Temeke District, Dar es Salaam in late 2010. Temeke is the poorest of the three urban Districts of Dar-es-Salaam and drug use is visible and widespread in the community. The MdM-F program includes access to basic health and social services for PWID through a drop-in centre, outreach activities, provision of sterile injection equipment and behaviour change communication. It is likely that a scale-up of drug use harm reduction services will be needed to meet the demands of drug users in the district and reduce the transmission of HIV and HCV and other drug use-related morbidity.

The aim of this rapid assessment and response (RAR) is to identify and understand the main health risk behaviours, health care needs, and HIV and HCV prevalence of PWIDs and other drug users in Temeke District, in order to inform an adapted operational response through the MdM-F harm reduction program.

Methods

This RAR was structured in three consecutive phases employing a mixed methods approach.

1) A short **qualitative** assessment included interviews with key informants and drug users, ethnographic observations, and meetings with local and national stakeholders. Detailed information on drug use patterns, distribution of drug use in Temeke District, access to prevention and care services, and HIV and HCV related knowledge was gathered. Results informed the sampling strategy and survey questions of the quantitative component and provided context for interpretation of quantitative results.
2) A **quantitative** survey was administered in June 2010 by trained interviewers to PWID and other drug users (non-injecting), who were recruited through a combination of snowball and targeted sampling. The survey asked questions on socio-demographics, drug use patterns, injecting risk behaviours in previous month and at last injection, history of arrest and imprisonment, sexual

risk behaviours, awareness of HIV and HCV, knowledge of HIV transmission, testing history and self-reported infection status, and services desired.

All participants were tested for HIV and HCV using rapid diagnostic antibody tests. Successive rapid tests were used for confirmatory testing.

3) A preliminary **response** phase included the provision of information and prevention materials to each participant. In addition, participants had the option of learning their HIV and HCV test results, and were referred to a health care centre or hospital if required.

Quantitative data analysis

Hard-copy surveys were entered into an electronic database and data entry was checked against the original questionnaire by two additional investigators. Quantitative data analysis was conducted in Stata 10 by a team of epidemiologists from the Burnet Institute, Melbourne, Australia.

HIV and HCV prevalence with associated 95% confidence intervals were calculated using standard formulas for the whole sample and by drug using populations (PWID and other drug users) and gender. Descriptive analysis was used to describe and compare responses by sex, using chi-squared tests of proportion. Univariable and multivariable logistic regression was used to assess demographic, drug use, sexual risk behaviour, knowledge, and service access associations with HIV seropositivity, newly diagnosed HIV, and HCV seropositivity in three separate models. All models were based on PWID only. Newly diagnosed HIV was defined as those testing positive for HIV who self-reported their HIV status as negative, unknown, or had not been previously tested. In addition, univariable logistic regression was used to assess association with HIV seropositivity among other drug users only.

Results and Discussion

Qualitative results

Twenty-five interviews were conducted with 19 injectors, four heroin smokers, and two Tanzanian key informants (members of the MdM outreach team).

The most commonly reported routes of heroin administration in Temeke were intravenous injection and smoking. The median estimate of the number of heroin users in Temeke by heroin users was 1,100; 650 PWID, 600 smokers and 313 sniffers. Initiation to heroin was most commonly reported to be through smoking; commonly reported reasons for transitioning to injecting reported were increased tolerance, the desire for a quicker and more powerful high, comparative cheaper cost, and increased availability of white heroin.

The current injecting drug sharing behaviours used in Temeke were: lending and borrowing a syringe previously used by another injector; sharing the same container; using a hidden or thrown away previously used syringe; frontloading (using one syringe to transfer drug solution to another syringe); sharing one after another "half/half" with the same syringe; using one syringe to divide the heroin bought jointly; sharing the preparation and washing water; and sharing or using the same razor blade for cutting heroin doses package and plastic containers. Qualitative interviewees reported high perceived risks associated with needle sharing, but perceived the risk attributed to sharing preparation and rinse waters and containers as low.

Quantitative survey sample population

In total, 430 drug users were recruited; 357 (83%) males and 73 (17%) females with a median age of 30 years overall. All drug users reported using heroin. Based on drug use in the previous month, 231 (65%) males and 36 (49%) females reported injecting heroin and were classified as PWID. The remaining 163 other drug users predominately smoked heroin as a "cocktail" with tobacco and/or marijuana.

HIV and hepatitis C seropositivity

Among PWID, overall 93 (34.8%; 95%CI 29.1-40.9) tested HIV positive, including 69 (29.9%; 95%CI 24.0-36.2) males and 24 (66.7%; 95%CI 49.0-81.4) females; overall 74 (27.7%, 95%CI 22.4-33.5) tested HCV antibody positive, including 64 (27.7%; 95%CI 22.0-34.0) males and 10 (27.8%; 95%CI 14.2-45.2) females. Concurrent HIV and HCV seropositivity was detected in 45 (16.9%; 95%CI 12.6-21.9) PWID overall, including 35 (15.2%; 95%CI 10.8-20.4) males and 10 (27.8%; 95%CI 14.2-45.2) females. Potential coinfection in these participants is of particular concern given known interactions between HIV and HCV and their affect on disease progression and transmission dynamics.

Among other drug users (non-injecting), overall 19 (11.7%, 95%CI 7.2-17.6) testing HIV positive, including 4 (3.2%; 95%CI 0.9-7.9) males and 15 (40.5%; 95%CI 24.8-57.9) females; no male and 3 (8.1%; 95%CI 1.7-21.9) female other drug users tested HCV positive. To our knowledge, these are the first estimates of HIV among non-injecting drug users in mainland Tanzania.

Socio-demographic factors

Gender played a significant role in the HIV prevalence and risk profile of injecting and non-injecting drug using participants. Female PWID had the highest HIV prevalence, but HIV prevalence among female other drug users in Temeke also exceeded recent general population estimates. Males and females did not report significantly different injecting risk behaviours, but females were more likely to have sold sex and have a higher number of sex partners.

Although injecting drug use appears to be driving HIV transmission among drug users in Temeke, these results suggests that transactional and other sexual risk practices may account for excess HIV prevalence among females and facilitate transmission to other populations. Furthermore, these findings highlight the need to consider tailored HIV and drug use harm reduction interventions for female drug users, taking account of broader cultural and socio-political factors affecting the health, well-being and HIV risk of women in Tanzania.

Most drug users appeared to be well established in Dar es Salaam; 80% of survey respondents had always lived there, with the remainder reporting living in the city for a median of 12 years. The stability of this population can potentially help facilitate the diffusion of harm reduction messages through connections with local communities, and provides supports for the introduction of peer-based education and outreach harm reduction programs (e.g., peer-based needle and syringe distribution).

Most drug users were involved in various forms of employment; most commonly through a spectrum of informal employment areas (e.g., transport, semi-skilled labour, petty trade, small business). Providing some drug use harm reduction programs through informal employment

locations such as transport hubs and market places may assist in broadening program reach and offer alternative locations for drug user engagement away from particular risk environments.

Patterns of drug use

All PWID and other drug users reported heroin use, with almost all respondents reporting using heroin daily.

Study results suggested a trend towards earlier heroin initiation in Temeke; participants aged 25 years and under reported a younger age of initiation (median age 17 years) and a shorter lag period between first use of heroin and first injection of heroin (median two years) compared to older participants (median age 20 years and median five year lag). These findings support the targeting of drug education and prevention programs to younger populations, including programs designed to avoid transition from smoking to injecting heroin.

The social and structural environment of injecting drug use (IDU) in Temeke warrants consideration of peer networks in relation to reducing HIV transmission and peer outreach models for needle and syringe distribution and education. The most common locations of injecting reported by survey respondents was at home (54%) or in a camp (33%). Males were most likely to report injecting alone (40%), with a group of people in a camp (34%), or with at least one other person (25%). Females were most likely to report injecting with at least one other person (42%) followed be alone (28%) or with a group of people in a camp (25%). People who injected in a group within a camp or who injected with at least one other person reported higher injecting risk practices than those who usually injected alone.

One quarter of PWID reported being helped by someone to inject at last injection; these people were also significantly more likely to have taken solution from a shared container at last injection and to have practiced frontloading at last injection. Peer education models and the influence of peer networks on blood-borne virus (BBV) risk should also explore the role of the "doctor" – an experienced injector who injects others, particularly those who have deep veins, those whose veins are in poor conditions or new injectors – within injecting networks.

Injecting risk behaviours

Reported rates of sharing of needles was low in this study (17% reusing a needle or syringe used by someone else in the previous month; 8% using an unsterile needle at last injection) and not associated with HIV or HCV positivity in this study; these variables may have been affected by response bias.

The importance of risks associated with sharing other equipment was highlighted in the survey data. Contrasting with the low rates of needle sharing, 42% of respondents reported injecting with a used syringe that was first cleaned at last injection, which was associated with a two-fold increase in HCV seropositivity in multivariable analysis. Also at last injection, 19% reported sharing a razor blade, 17% reported sharing other equipment, and 14% reported taking solution from a shared container. Sharing a mixing container was associated with increased risk of HIV in multivariable analysis. An additional 77% usually reused their own needle and syringe at least once and 23% of PWID reported using a syringe that was kept hidden at least once in the previous month, with consequences for non-transmissible infection and abscesses, as well as inadvertent needle sharing.

The practice of ever withdrawing blood in the syringe after having injected and giving it to somebody else to inject in place of heroin ('flashblood'), which has been previously documented, was only reported by 21 (8%) of PWID and predominately reported by males.

Although the importance of using clean needles for injecting should remain the focus of harm reduction programs in Tanzania, these data also highlight the importance of educating PWID about the risks of reusing other equipment. While the cleaning of used syringes potentially reflects motivations towards risk reduction, current practices imply a misconception that sterility can be judged on the visibility of blood.

History of arrest and imprisonment

Fifty-eight percent of all drug users reported drug-related arrest in the previous 12 months and more than a third reported ever having been imprisoned. Of males who had ever been imprisoned, 31% reported using drugs in prison but only 5% reported injecting drugs. Although incarceration and arrest were not associated with HIV, surprisingly, we found that those reporting previous arrest were significantly less likely to test positive for HCV. As causality in a cross-sectional survey cannot be determined, this result may reflect that PWID who carried sterile injecting equipment and practiced safer injecting practices were at higher risk of arrest.

Sexual risk behaviours

There was no clear association between sexual risk behaviours and HIV among PWID, while having sold sex was associated with higher HIV risk in other drug users. Nonetheless, sexual risk and particularly transactional sex is a plausible explanation for the excess HIV observed in female drug users. Sexually-active female drug users were more likely than males to report having sold sex in exchange for money or drugs in the previous 12 months (51% and 15%, respectively). In addition, the reported number of sex partners was positively associated with transactional sex work in females. Inconsistent condom use was more prevalent among males than females with all partner types; among males, highest condom use was reported with transactional sex partners but was still only 37%.

Six percent of male survey respondents reported having ever engaged in male-to-male sex, of who 38% reported selling sex in the previous 12 months. These figures may be an underestimate due to the high levels stigma associated with homosexuality in Tanzania.

STI testing and treatment services and condom provision are important inclusions for harm reduction programs servicing drug users in Temeke. Sexual health information and harm reduction services should also consider HIV risk associated with drug users living with sex partners or in regular relationships. Among PWID reporting any regular sex partner, 85% of males and 53% of females indicated that their current or most recent partner did not inject drugs. Among PWID with non-injecting partners, 89% of males and 75% of females reported inconsistent condom use with their regular partner.

Knowledge of HIV and hepatitis C and access to harm reduction services

Nearly all respondents had heard of HIV but only 35% were aware of hepatitis C. Given the aforementioned prevalence of hepatitis C among PWID and the known complications of HIV/hepatitis C co-infection, injecting drug harm reduction programs in Tanzania should urgently engage in hepatitis C education and risk reduction programs, particularly among PWID with HIV.

Although more females (70%) than males (43%) had ever been previously tested for HIV, only half of those ever tested reported that their last test was in the past two years. An overwhelming majority (73%) of PWID testing HIV positive in this study were probable new diagnoses and had been potentially engaging in injecting and sexual risk practices that were unknowingly placing others at risk. HIV voluntary testing and counselling services targeting PWID should be considered a key component of harm reduction programs and these testing services need to be expanded to ensure high frequency testing among high risk drug using populations.

Less than half (46%) of surveyed PWID reported receiving a sterile needle or syringe in the previous 12 months. The receipt of sterile needles and syringes in the previous 12 months was associated with higher likelihood of being newly diagnosed with HIV and HCV positivity. Because causality and the frequency and number of needles received cannot be quantified, this result may indicate that prevention services are reaching and being accessed by those at highest risk, or alternatively, that needle and syringe program coverage to high risk PWID is not sufficient to prevent infection.

Although nearly two fifths of respondents reported ever having tried to stop using drugs, only a small minority reported receiving any formal help to do so. In addition, drug dependence services (help to quit drugs, primary health care, rehabilitation centres, and opioid substitution therapy) were commonly nominated by PWID as desired services. Local demand reduction and treatment services should be considered a key element of HIV and HCV prevention among PWID.

Conclusion and recommendations

These results of this rapid assessment identify several high-risk drug-related and sexual risk behaviours reported by both PWID and other drug users in Temeke district. Prevalence of HIV among drug users in Temeke district was most consistently associated with IDU. HIV prevalence was substantially higher among both male and female PWID and female other drug users compared to general population estimates. While risky injecting practices are likely to continue to drive HIV transmission among PWID, the very high rates of HIV in this population combined with high risk sexual practices may also increase HIV transmissions from this population to the general population. Scale-up of needle and syringe programs, OST and services to support frequent HIV and hepatitis C testing among PWID should be a priority for HIV and HCV prevention and control in the region. Recommendations for harm reduction programming include:

1) Adapted, high coverage needle and syringe programs, with outreach to camps within Temeke district and potential for home visits and secondary distributions
2) Expanded access to opioid substitution therapy;
3) Regular testing for HIV, HCV and STIs and clear referral pathways into tailored health services;
4) Targeted prevention education, including risks associated with particular injecting behaviours, HCV, and overdose response;
5) Continued focus on women, including tailored services;
6) Increased access to basic needs and primary health care services;
7) Address sexual risk practices, including education and condom provision;
8) Interaction with heroin smokers to try and prevent transition to injecting drug use;
9) Increased advocacy of the needs of PWIDs and benefits of harm reduction strategies; and
10) The introduction of ongoing surveillance of injecting practices, sexual risk behaviours, HIV and HCV infections in drug users.

1 .....Background

While the prevalence of HIV is declining in Tanzania, there is emerging evidence that a concentrated epidemic is developing among people who inject drugs (PWID),[1, 2] and injecting drug use (IDU) presents an important challenge to future national HIV prevention and control efforts. The majority of HIV infections in Tanzania mainland are spread through heterosexual sex, and accordingly, most prevention efforts to date have concentrated on the general population, particularly the promotion of safe sex and the prevention of mother-to-child transmission.[3] Knowledge of IDU in Tanzania is based on a small number of cross-sectional studies and anecdotal reports; although data are limited, it is suggested that the number of people who inject drugs (PWID) is increasing and high risk injecting and sexual risk behaviours are common, [1, 4-9] with consequences for infectious disease transmission, including HIV and hepatitis C (HCV). Therefore, there is a need for more information on this population, their risk practices, and the prevalence of blood-borne viruses (BBVs) in order to inform HIV prevention and treatment programs.

National prevalence and incidence of HIV

Since 1983, HIV steadily increased in mainland Tanzania, driven primarily by transmission through heterosexual sex. Prevalence peaked at 8% in 1997 but has since declined and stabilised around 6-7%.[3] However, there are regional, urban-rural, and gender disparities. In 2007, prevalence was estimated at 8.9% in Dar es Salaam, with a female-to-male gender ratio of 1.4:1.[3] Incidence is estimated to be 0.8-0.9% nationally, and 1.4% in urban areas.[3] An increase in rural HIV incidence and expansion of ARV treatment may see a secondary increase in national prevalence, but generally the epidemic is thought to have stabilised. [3, 10]

Whereas mainland Tanzania is characterised by a generalised HIV epidemic, in Zanzibar prevalence of HIV is low (0.6-0.9),[11] and HIV is concentrated in the most at risk populations: men who have sex with men (MSM), PWID, and sex workers.[11]

HIV prevalence estimates among PWID

While national HIV prevalence continues to stabilise, new HIV infections associated with IDU are increasing and IDU is expected to account for an increasing proportion of national HIV burden. IDU is a highly efficient mode of HIV transmission – providing direct blood exposure if sharing a needle with someone who is HIV infected – and it is common for HIV prevalence to be much higher in networks of PWID compared to general population. A limited number of cross-sectional studies have measured HIV prevalence in small samples of PWID in Tanzania; in Dar es Salaam, estimates are as high as 64% among women[1, 4, 9] 28% among men,[1, 9] and 42% overall,[1] while in a study of used syringes 57% tested positive for HIV.[5] In Zanzibar, estimates of HIV prevalence in PWID range from 12-26%.[11-13] In Tanzania, HIV prevalence is higher among women than men; this disparity is also reflected in studies of HIV among PWID.[14]

IDU also poses high risk of hepatitis C (HCV) transmission. There is a dearth of information on HCV among PWID in Tanzania, but given its shared route of transmission with HIV, it is potentially similarly prevalent among PWID. In one study of 509 MSM in Zanzibar, 15% were infected with HCV, 12% with HIV, and 5% were coinfected.[11] Coinfection with HIV and HCV was more common in MSM

who injected drugs compared to non-injectors.[12] It is important to explore HCV epidemiology in PWID, including the advent of both HCV monoinfection and HCV/HIV coinfection. In particular, coinfection has implications on disease progression, morbidity, and treatment outcomes.[15-17]

Injecting drug use

IDU is a relatively new phenomenon in Tanzania, as well as more broadly in Sub-Saharan Africa.[2] Tanzania's position as a trafficking point for heroin between Asia and North America and cocaine between South American and Europe has led to a local market for drug consumption since the mid 1980s.[2] Initially heroin was only smoked, sniffed, or inhaled (chased), but changes in the market – namely a shift from brown to white heroin availability – introduced the practice of injecting heroin between 1998 and 1999.[5] Brown heroin can either be smoked or injected, but requires cooking prior to injecting. In contrast, white heroin does not require cooking so is simpler and faster to inject and is considered more cost-effective and efficient by this route.[2, 6] A rapid assessment of drug use across five regions identified that the areas of highest heroin use are Arusha, Dar es Salaam, and Zanzibar, and increasing use in Mwanza.[9] There is currently estimated to be 25,000-50,000 PWID in Tanzania,[18] although anecdotally this number is placed even higher. Heroin tends to be the sole drug injected,[7] although in a sample of MSM-PWID based in Zanzibar one third used cocaine the last time they injected.[12]

Dar es Salaam is divided into three urban districts, of which Temeke district is both the largest and poorest district.[19 20] Temeke district is further divided into 30 wards. The major economic activities in Temeke are informal sector labour, fishing, and petty trade.[5, 19] In Temeke, drug use is visible and widespread in the community.[20] However, in a previous study of HIV and IDU within neighbourhoods of Dar es Salaam, PWID from Temeke district were not represented due to concern about police activity.[5]

While PWID in Tanzania are mostly at risk of HIV through risky injecting practices, the concurrent engagement in high risk sexual behaviours and transactional sex may exemplify their risk and initiate onwards transmission. This leads to the possibility that PWID will serve as a bridging population between a sub-group of those most at risk and the general population, further undermining recent gains in stabilising national HIV prevalence.

In Tanzania, heroin is sometimes injected in *mageto* (plural for *geto*), or private rented rooms.[6, 7] *Mageto* may be paid for in drugs, cash, or be free, and are often overseen by a *"*docter*"* – someone experienced in injections who can inject for others who are uncomfortable or inexperienced injecting themselves.[6] In a study of PWID carried out in 2005-2006, one in six injected in a *geto*. Alternatively, injection often occurs in *maskani* – open air spaces where youth meet, including football fields, parking lots, or other secluded spaces.[6] In response to increased policing of drugs in Tanzania, it is noted that many injectors have moved away from *mageto.*[21] As has been demonstrated elsewhere, the physical environments in which people inject and the factors that drive injecting in these environments are likely to impact on the risks of disease transmission among PWID.[22]

It is suggested that a third of PWID in Tanzania are aged 25 or under.[7] It is common for PWID in Tanzania to begin using heroin when they are young, often being introduced to the drug through marijuana or tobacco cigarettes laced with heroin. Reports from young people have described

deliberate deceit by friends and not knowing they were smoking heroin at the time, while others have referenced peer pressure or desire.[6] Research findings have shown that women use heroin for a shorter period (mean=3 years) on average compared to men (5 years on average) before injecting.[7]

High risk injecting behaviours in PWID

Although research findings suggest that many PWID are aware of HIV and the risk associated with sharing needles,[6, 23] sharing needles and other works has been commonly reported among a significant proportion of PWID in Tanzania. Among a sample of young PWID in Dar es Salaam, 31% had injected with used needles at least once in the previous month, although the majority reported using a new needle the last time they injected.[7] In another study, one third of PWID reported injecting with a used needle, while 67% reported never injecting with a used needle and 55% had never passed on a used needle to someone else.[9] Men were reportedly more likely to share needles, inject with others, reuse rinse water, and pass on used needles to others.[7, 8] In Zanzibar, just under half of male and female participants reported needle sharing,[11] while among MSM in this study, 60% reported using shared needles.[12] It has also been reported that PWID who inject in *getos* commonly return later and reuse needles they had left or hid there without knowing if the needle is used in their absence.[6, 7] Another reported risk practice is *vipoint*, whereby injectors share the contents of a syringe by only injecting a measured amount of heroin before passing on the syringe to the next injector.[5, 6, 21] Although rinsing out needle and syringes with water is often practiced as a protection strategy,[6] only a small proportion use bleach.[23]

In Tanzania, a unique practice of injecting carrying exceedingly high risk of blood-borne virus transmission has been documented. "Flashblood" is the injection of a syringe full of blood that has been passed on from someone else who has just injected heroin.[4] The practice is reportedly more common in female injectors, and particularly sex workers.[4] The flashblood is injected in lieu of heroin under the premise that the blood contains enough heroin to prevent withdrawal symptoms in someone who is unable to procure his/her own heroin. The practice is thought to have arisen from increased policing of heroin and associated with reductions in supply, price rises, and decreased heroin quality.[4, 21] In a study of 169 females, 28 (17%) reported ever using flashblood.[4] In another study based in Dar es Salaam, less than 1% had injected flashblood in the previous month, but 28 (11.2%) of females and 1 (0.3%) males and ever injected flashblood.[7] In Zanzibar, 18 (9.1%) of male participants had used flashblood.[11]

Data on injecting networks among PWID in Tanzania suggest that men most commonly inject with 2-3 other people, while women are more likely to inject with only one other person.[7] As already alluded too, men are more likely to inject with used needles and shared their injecting equipment with others.[7]

Risky sexual behaviour

A number of high-risk sexual practices have been reported from PWID in Tanzania. Sexual contact during drug taking appears common, particularly in *mageto,*[5-8] with one study reporting an average of three sexual partners among women during a injecting binge.[7] Among males and females participating in a study based in Zanzibar, 16% participated in group sex, and half of participants had witnessed group rape of an overdosed drug user.[11]

Reports of condom use among drug users in Tanzania is variable. Research findings convey half or more of drug users reporting never using a condom during sexual encounters in past 7 days[9] or ever[1], and approximately 20-25% of PWID reporting always using a condom.[1, 9] Women are more likely to report condom use than men[8] and condom use may also differ by partner type; such that women are more likely to use condoms during transactional sex, but may use condoms less frequently with regular partners and with friends and associates in *mageto.*[6] Transactional sex, including having sex in exchange for gifts, drugs or money, is frequently reported among females who inject drugs in Tanzania. Across six studies, at least 78% of women reported transactional sex. [1, 4, 5, 7-9]

Prevalence of unprotected sex is also evident in reports of sexually transmitted infections other than HIV among PWID. Up to one third of study participants have reported ever being diagnosed with gonorrhoea,[5, 8, 9] and more than 20% of women reported a history of syphilis.[5, 8] Women tend to report higher rates of STIs than men, but this gender disparity may be associated with women being more aware of their risk and being more likely to access care and be tested for STIs rather than a reflection of real difference in STI incidence by gender.[8] As well as the specific morbidities associated with individual infections, there is a well established link between STI and increased HIV infectivity and risk of infection.[24-26]

Given the propensity of women who inject drugs to also be involved in sex work, or transactional sex, most women have significantly more sexual partners than men and earn more money than men.[7] In turn, having sex more than 81 times in the past 30 days has been identified as an independent risk factor for HIV infection.[1]

Women are particularly vulnerable to harms associated with IDU, through the likelihood of engaging in transactional sex to support drug use, and risk of gender-based violence. A lack of programs tailored to women's needs and health issues has also been identified – including drug care and treatment during pregnancy and breastfeeding, barriers to attending drug and/or ARV treatment programs due to child care responsibilities, and other issues of stigma and discrimination.[5, 14] Women who inject drugs in Tanzania are also more likely to be living in a guesthouse or on the street, and are more likely to identify as homeless.[8, 9]

Other drug use

Most studies of drug use in Tanzania have specifically recruited PWID, so information about drug users who do not inject is limited. Non-injecting drug use, particularly use of cocaine and methamphetamines, may also associated with increased risk of HIV infection, largely due to increased likelihood of engaging in high-risk sexual practices.[2] Among PWID in Tanzania, other commonly reported drugs used are cannabis,[1, 7] khat,[7] Mandrax,[7] and alcohol,[1, 8] while a smaller proportion report taking valium[1]. Some PWID reporting using valium or phenergan (promethazine hydrochloride) while injecting in order to intensify the psychoactive effect.[6, 7, 12] In neighbouring Kenya, some cocaine use is also reported,[27] and Tanzania also serves as a route for cocaine trafficking from South America to Europe.[2] In a study of MSM in Zanzibar, 14% reported injecting drugs in the past three months, and 60% reported any drug use. Non-injecting drug use also includes smoking or inhaling heroin, and many injectors are introduced to heroin through smoking.[6, 7, 9, 23] Ross et al. found that male and female current injectors were, on average, using heroin for five and three years, respectively, before injecting heroin.[7]

Current prevention and treatment programs

There are currently a limited number of harm reduction programs and services for drug users in Tanzania, run by a collection of non-government organisations (NGOs), community-based organisations (CBOs), and district health services.[5] Most are geared towards counselling and rehabilitation, including a two month program run by an NGO and that running out of the Muhimbili National Hospital in association with the Drug Control Commission of Tanzania, TACAIDS, and Muhimbili University of Health and Allied Sciences.[4, 18, 23]

In late 2010, Médecins du Monde- France (MdM-F) initiated a comprehensive harm reduction program in Temeke district, Dar es Salaam. Temeke is the poorest of the three urban Districts of Dar-es-Salaam and drug use is visible and widespread in the community. The MdM-F program includes access to basic health and social services for PWID through a drop-in centre, outreach activities, a needle and syringe program (NSP), and behaviour change communication.[28] Opioid substitution therapy (OST) has only recently became available in Tanzania through the Muhimbili University Hospital, but expansion to other sites is planned.[14, 29] These harm reduction programs are in the early stages of development and still have a small reach; as of September 2011, the MdM team has made 1,307 contacts with PWID (1,849 drug users in total), and 32,700 needle and syringes have been distributed. In addition, 175 PWID had received treatment through the Muhimbili University Hospital OST program.[30] There are currently no programs providing antiretroviral therapy (ART) that are tailored specifically to PWID' needs.[29]

Increasing attention to IDU in Eastern Africa, including Tanzania, has been supported by changes in PEPFAR guidance[31] and locally by the Tanzanian Drug Control Commission leading a national strategic framework for 2010-2014.[14] In 2007, the Sub-Saharan Africa Harm Reduction Network (SSAHRN) was established to promote awareness and facilitate the adoption of harm reduction response in the region.[32] It is increasingly recognised that the number of people who inject drugs and the burden of HIV in this population is increasing. Nonetheless, PWID are not counted in national surveys of HIV.[30 10, 33]

Despite progress, government policy and policing practices still have the potential to undermine harm reduction practices. Policy on the possession of needles varies across jurisdictions, and in some jurisdictions possession is criminalised; this discourages users from using clean needles and syringes, increases risky practices, and impedes access to harm reduction services.[4, 5, 14, 21] Some drug users avoid policing by hiding their used needles in *mageto*.[6]

Implementing appropriate harm reduction programs for PWID in Tanzania is further hampered by other health and social priorities, which compete for funds and resources. Although harm reduction and other public health programs strongly support the promotion of safe sex and the protection of women and children,[5, 34] it is difficult to harness equal support for prevention in PWID, who are often blamed for self-inflicting their problems. Another recognised barrier is limited funds and resources to systematically monitor trends in drug use and HIV, thus affecting the capacity to target and monitor the effectiveness of interventions and to provide evidence to support advocacy on drug use harm reduction for HIV prevention.[23]

2 .....Aims and objectives

The principle aim of the Rapid Assessment and Response (RAR) was to identify and understand the main health risk behaviours and health care needs of the PWID and other drug user populations in Temeke District to support an adapted operational response through a MdM-F Harm Reduction Programme.

Specifically, objectives of the RAR were to:

1. Describe the social and demographic patterns of PWID and other drug users ;
2. Study the detailed practices concerning the use of psychoactive substances;
3. Identify the main risk behaviours in regard to infectious diseases;
4. Estimate the knowledge of PWID and other drug users concerning their HIV status and their access to HIV care;
5. Identify the effective prevention services offered to this population;
6. Determine the HIV and hepatitis prevalence among PWID and other drug users in Temeke District; and
7. Analyse the risk factors for HIV, HCV, and HIV/HCV co-infection through analytical statistics.

3 .....Methods

3.1 Overview

The RAR is structured in three consecutive phases employing a mixed methods approach, with the results from each phase informing the subsequent component. Phase one was a short qualitative assessment conducted to to gather detailed information on drug use patterns, access to prevention and care services and HIV and hepatitis related knowledge. Phase two was a quantitative survey administered by an interviewer. Phase three is the preliminary response, including the provision of information and prevention materials to all participants and referral to a health centre or hospital if required.

All research was conducted in Temeke District, Dar es Salaam.

3.2 Qualitative component

Three qualitative data collection tools were used:

1. Interviews with drug users and key informants

   Twenty three recorded interviews were conducted with drug users (19 injectors and four heroin smokers) and two Tanzanian key informants (member of MdM-F outreach team). Interviews were conducted in the MdM-F centre based in Temeke using an interview guide. Interviews were summarised and thematically categorised using QSR Nvivo8 qualitative software.

2. Ethnographic participatory observations

   No less than ten ethnographic observations were performed "on the spot" in some open and hidden drug scenes for injectors, smokers, or mixed drug users. These observations were

essential to better understand the rationale behind drug user's motivations and consumption modalities.

3. Meetings with local and national stakeholders

Two meetings were held with Dr Joseph Mbatia, head of Mental Health and Substance Abuse Department, Ministry of Health and Social Welfare and Dr. Mamkwe, the Temeke district medical officer. These meetings aimed to build an overview of the national and local situation and to exchange ideas about the feasibility of some recommendations included in this report; namely the integration of OST and drug free treatment into MdM-F's current Temeke project.

3.3 Quantitative component

Investigators

A selected team received four days training on the principles underlying a rapid assessment, the structure of the RAR guide, proper use of the questionnaires, and IDU. Following training, four investigators were selected to administer questionnaires, including two MdM-F outreach workers and two external investigators.

Sample size

Initial mapping of the Temeke District estimated that at least two hundred PWID and other drug users resided in the district. Based on this information, the survey aimed to include at least 200 PWID, including 40 females, and 100 other drug users, including 25 females. In addition, sampling aimed to capture a minimum of 60 PWID and 20 other drug users aged 25 years or less. The sampling strategy also aimed to identify drug users from all wards identified in the mapping exercise.

Sampling methodology

Sampling methodology was conducted in two phases:

1. Snowball sampling

Eight key informants, including five males and three females, were selected based on being leaders and influential members in networks of PWID and other drug users. Each key informant was asked to refer as many drug users as possible to the MdM-F drop-in centre. Each person referred was then asked to refer more drug users. The drop-in centre was open for two weeks for this first phase.

2. Targeted sampling

In order to diversify the sample to include drug users from under-represented camps and meet the sample size requirements for gender, age, origin, and injecting/non-injecting drug use, targeted sampling was employed in the second phase. In this case, certain people were invited by the investigating team to participate. An outreach investigator visited camps to look for eligible women and other targeted groups who had not already participated. Outreach workers specifically visited camps located far away from the drop-in centre to identify drug users from these camps and provide transport back to the drop-in centre.

Sampling and survey administration occurred over four weeks, from 6 June 2011 to 1 July 2011. Four investigators conducted all interviewers under the direction of two main supervisors.

Inclusion criteria

Inclusion criteria were defined as PWID (having injected psychoactive substances at least once in the last month) and non-injecting heroin and/or cocaine users (other drug users) who live in Temeke District, speak and understand Swahili, and who agree to be included in the study after having signed their consent. Testing for HIV and HCV were mandatory but participants could choose whether or not to learn their results.

Quantitative survey

The quantitative survey was administered face-to-face by trained interviewers at the MdM drop-in centre. The survey consisted of 53 items and approximately 70 questions on different aspects of drug use, risk behaviours, sexuality, prevention and treatment access, and HIV and HCV knowledge (appendix 1). Most questions were asked in a closed format. Interviewers were instructed to read out each question as written in the survey and not to give any explanation or directly influence the answers.

The inclusion criteria were tested before acquiring consent and administering the questionnaires.

As incentive for participation, reimbursement was provided to all participants in the form of a transport allowance of 1000 shillings, a nutritional pack (including rice, red beans, sugar and a drink), and a safe injecting kit. In addition, all female participants also received a mobile phone voucher of 2000 shillings.

The questionnaire was first written in English based on international and validated tools. After review from technical experts and the field team, the questionnaire was translated and back translated by two independent interpreters. The final draft in Swahili was field tested with 10 drug users in a different district of Dar es Salaam. These pilot data and input from the translators and experienced peers and drug users collectively informed a final version of the questionnaire.

Consent

Written consent was required for participation and HIV and HCV testing. Parental or guardian consent was required for participants under 18 years.

Biological testing

An HIV and HCV test were obligatory for all participants included in the study. Pre and post-test counselling was provided and testing administered by a trained nurse. Participants had the option of receiving their result straight away or receiving a code to access their results at a later date. Participants were referred to a health care centre or hospital if required. Rapid diagnostic tests were used. Testing was based on national protocol and international guidelines for testing strategy in surveillance research (see below).

HIV: HIV tests were performed with Determine® HIV ½ whole blood assay 20 tests. If the initial test was positive, testing was repeated using SD Bioline®. If both tests were positive, the result was interpreted as a confirmed positive. If the second test was negative, a third test was available – UniGold® – but was not required in the course of the study.

HCV: Testing for HCV was first performed with OraQuick® rapid antibody test HCV. In case of positive result, confirmation was done by SD Bioline® HCV.

Data management

Surveys were filled out by interviewers in hard-copy format and entered electronically into Sphinx software by a data clerk from the National Institute for Medical Research (NIMR). The primary investigator electronically entered all HIV and HCV test results. Two other investigators were responsible for double checking data entry against the original questionnaires.

Data analysis was conducted by a team of epidemiologists from the Burnet Institute, Melbourne, Australia. Data was transferred to Stata 10 for analysis.[35]

Quantitative data analysis

HIV and HCV prevalence with associated 95% binomial exact confidence intervals were calculated for the whole sample and by drug using populations (PWID and other drug users) and sex. Descriptive analysis was used to describe all variables by sex and IDU, with differences assessed using chi-squared tests of proportions, to 0.05 significance. Continuous variables were assessed for normality using a skewed test of normality; Wilcoxon rank-sum test or t-tests were used to compared median or means of continuous variables by sex, accordingly.

Univariable logistic regression was used to assess demographic, drug use, sexual risk behaviour, knowledge, and service access associations with HIV seropositivity, newly diagnosed HIV, and HCV seropositivity among PWID. Predictors of HIV seropositivity among other drug users was also assessed.

Multivariable logistic regression was used to assess demographic, drug use, sexual risk behaviour, knowledge, and service access associations with HIV seropositivity, newly diagnosed HIV, and HCV seropositivity in three separate models. All models were based on PWID. Newly diagnosed HIV was defined as those testing positive for HIV who self-reported their HIV status as negative, unknown, or had not been previously tested.

Multivariable models were first run in blocks grouped by theme (demographics, drug use etc). Variables that were significant in each block, as well as variables shown to be highly relevant in previous research were used to initiate each multivariable logistic regression model. The final model was determined through backwards stepwise elimination using a significance level of 0.05. A number of variables were kept in all models *a priori*: sex; age; years since injecting daily; ways used heroin in last month (if only inject, or if inject plus smoke); and an indicator of injecting with an unsterile needle. For this last variable, either *ever injected with a needle/syringe previously used by someone else in previous month* or *used a sterile needle/syringe at last injection* was kept in all models, depending which variable was more strongly associated with the outcome and provided a stronger model (determined by variance explained (R^2) and hosmer-lemeshow).

Measures

Measures of *socio-demographics* considered were sex, age, years living in Dar es Salaam, highest level of education, marital status, living place, and main source of income. Areas of income were categorised as: petty trade or small business, mostly involving selling food or other goods in the market; skilled labour, including carpenters, construction workers, electricity and mechanical

technicians, craftsmen, farmers, and fishery workers; unskilled labour, including basic manual labour, collecting and selling scrap metal, and porters; housewife; commercial sex worker; unemployed; stealing; and other, including artists, musicians, drug dealer and otherwise uncategorised.

Measures of *drug use* considered were: if injected in previous month, use of heroin, marijuana, alcohol, crack, and valium in previous month, frequency of alcohol consumption, years since first using heroin, all routes of heroin administration in previous month, frequency of heroin use in previous month, number of "kete" of heroin used per day on average. Measures of drug abuse and dependence considered were if overdosed in previous 12 months and if have ever tried to stop using drugs.

Among *PWID only, measures of drug use and injecting risk behaviours* considered were: years since injecting daily, where usually inject, who usually injects with, number of times use the same needle and syringe to inject in previous month, if ever injected with a needle/syringe previously used by someone else in previous month, whose needle and syringe have reused in the previous month, use of a needle/syringe that was kept hidden in previous month, if ever practiced withdrawing blood in syringe after injected and giving it to someone else to inject in previous month. In addition, injecting risk behaviours at last injection were considered: if helped by someone to inject, if used an unsterile needle and syringe, if practiced frontloading, if used a shared bottle, spoor container or water (other works), if shared razor blade, if took solution from a shared contained, if injected with a used syringe not cleaned, and if injected with a used syringe that was first cleaned.

Measures of *prison and arrest history* considered were: if arrested in association with drugs in previous 12 months, if ever imprisoned, if used any drugs in prison and if injected any drugs in prison.

Sexual behaviour and risk measures considered were: age at first sex, if sexually active in previous 12 months, number of sex partners in previous 12 months, if used condom at last sex, if ever been raped, and if ever had male-to-male sex. Among sexually active respondents, further measures considered were: if had sex in previous month, if had any regular sex partner/s in previous 12 months, if had any transactional sex partner/s in previous 12 months, if had any casual sex partner/s in previous 12 months, and if bought/sold sex in exchange for money or drugs in previous 12 months. For respondents reporting a regular, transactional, and/or casual sex partner, proportion reporting consistent condom use with that partner type and number of partner type was considered. A regular sex partner is defined as a spouse or live-in partner with whom the respondent has had sex with in the previous 12 months. A transactional sex partner is defined as a partner with whom the respondent has bought or sold sex in exchange for money or drugs in the previous 12 months; it includes but is not limited to persons identifying as commercial sex workers. A casual sex partner is defined as sex partner from the previous 12 months with whom the respondent is not married to, does not live with, as has not had sex with in exchange for money or drugs. Consistent condom use is defined as reporting always using a condom; inconsistent condom use is defined as not always using a condom.

Measures of *knowledge and awareness* of infectious disease considered were: if have heard of HIV/AIDS, number of HIV knowledge questions answered correctly (out of five). Specific knowledge questions assessed were: that having one faithful, uninfected partner can reduce risk of HIV, that

one cannot get HIV from sharing a meal, that a health looking person can have HIV, than one cannot get HIV from mosquito bites, and that condom use reduces risk of HIV.

Measures of *access to treatment and prevention services* considered were: if ever tested for HIV, years since last test for HIV, self-reported HIV status among those previously tested, if ever tested for HCV, self-reported HCV status among those previously tested, if know where to get tested for HIV, if have been given any condoms in previous 12 months, if have been given any sterile needle and syringes in previous 12 months, if have consulted a doctors for HIV in previous 12 months among those self-reporting HIV positive, and if treatment has been prescribed among those self-reporting positive.

Measures of *health care and harm reduction needs* assessed were: media used to get information on HIV/AIDS, priority services desired in Temeke District, and services desired from MdM-F drop-in centre.

Based on self-reported and serological test results, measures of *infection* assessed were: proportion HIV positive, proportion HCV antibody positive, proportion with probably newly diagnosed HIV, and proportion with potential HIV and HCV coinfection. Potential HIV and HCV coinfection was defined as those testing positive for both HIV and HCV.

3.4 Response phase

The response phase is ongoing and consists of four different activities:

1. Initial provision of a sterile injection equipment kit to PWID that participated in the survey.
2. Performing safe injection sessions in the drop-in center of MdM in Tandika, Temeke district. Sessions include prevention messages and details of safe injection practices with the support of a movie about safe injection.
3. Establishment of a referral system to health care services for PWID, for any health problems related to drug injection and/or infectious diseases. The referrals can be done with the presence of MdM outreach workers or beneficiaries are able to go by themselves with a MdM voucher to be given to the relevant health centre. Referrals for antiretroviral treatment are provided to individuals who test HIV positive.
4. Other drug users (non-injecting) are able attend the MdM drop-in centre to receive comparable services proposed for PWID, with the exception of sterile equipment for injection. Services include facilities to shower and wash clothes, snacks, counselling sessions with an outreach worker, medical advice and/or treatment from the MdM nurse, and condom provision. Group education and discussion will be organized in order to try to circumvent the transition to injecting.

4 .....Qualitative Results

See appendix 2 for full qualitative results.

4.1 Sample characteristics

Sixteen men and seven women participated in qualitative interviews. The median age of participants was 28 years; 31.5 years among males, and 26.0 years among females.

The main income sources for males was *Dala dala* bus stop "Shouters"; collection and selling of plastic bags; pickpocket; theft and street dealing of heroin. For females, the most frequent income sources reported were sex work or sharing a life with a dealer and being sustained by a dealer.

4.2 Diffusion of heroin use in the Temeke district

The oldest first heroin use experience in Temeke among interviewees was in 1990. Currently heroin seems to be readily available in the district, and there is some suggestion that it may be more widely available in Temeke than in the others districts: "*there are more heroin smokers than marijuana alone smokers. Every one becomes heroin smoker. It become more fashionable to use heroin than marijuana*" (male, 18 years old).

4.3 Transition from smoking to injection

The most common routes of heroin administration currently found in Temeke are intravenous injection and smoking in combination with marijuana and tobacco, known as a "cocktail". Inhaling heroin, also called "chasing the dragon", involves heating heroin on a piece of aluminium paper, which turns the powder into a liquid and then a gas, which is inhaled through the mouth. This method was not apparent in Temeke district.

Transition to injection is still an ongoing process among Temeke heroin smokers. It seems that an increasing number of users are compelled to adopt injection as primary route of administration. Factors that have lead to the diffusion of the injection route of administration are numerous, but, four chief factors seem to have played a predominant role: injection ensures a quick and/or more powerful high; injection requires a smaller quantity of heroin and is much cheaper than smoking; increasing tolerance to opiates among older heroin users for whom smoking is not adequate to get "high"; and the shift to availability of white heroin in Temeke which is easily prepared for injection and cannot be smoked.

All interviewees were initiated to heroin through smoking, but it was noted that younger heroin users are more frequently being initiated to heroin directly through injection. The transition to injection occurred after a mean of 4.4 years, ranging from six months to 14 years. Transition seems not to be age-dependant. The youngest injector (20 years) shifted to injection after a three years smoking period while the oldest injector (48 years) began injecting after six years of smoking. The smallest transition period (six months) concerned a 24 years old individual while the longest (14 years) concerned a 39 years old one.

4.4 Heroin market

According to interviewees, the dealing structure of heroin has remained stable since the early 1990s, and is dominated by nuclear dealing organisation. It is composed of more or less independent individuals or small inner families dealing networks. Each of these individuals or families sells in a fixed ward or camp. The most well known dealing sites in Temeke are: Sharif, Shelaton, Kwa, Zakhem, Maputo, Charambee, Stereo, Kwaa Zizali, Temeke hospital and Tandika. A street dealer estimated that up to a hundred of small dealers like him work out of Tandika ward.

The most widely used heroin in Temeke is white heroin (heroin hydrochloride), which is sold in rock form in single dose packages. It is prepared for injection by dissolving in water, often using the part of the plastic packets from a sterile syringe as a container. The current standard price for one white heroin dose is 1,000 shilling in Temeke (1,500 in the city centre of Dar Es Salaam). The single dose package is called *kete*. A street dealer calculated that his net profit per gram of heroin sold amounts to around 14,000 shillings.

4.5 Estimation of heroin users and heroin injectors

The size of the heroin user population in Temeke district is unknown. Interviewees were asked to estimate this population. Twenty heroin users were able to give a rough estimate of the total population. The median estimation of the number of heroin users was 1,100 (mean 2,597); 650 injectors, 600 smokers, and 313 sniffers. Six interviewees also estimated the number of heroin users by sex, suggesting a median of 567 males and 33 females in Temeke district.

The median age of the first heroin experience among current users interviewed was 16 years old, ranging from eight to 31 years. Some interviewees suggested that the age of first heroin experience is decreasing in the current generation.

4.6 Sharing injection equipment

The sharing methods currently used in Temeke observed and described by interviewees are: lending and borrowing a syringe previously used by another user; sharing the same container; using a hidden or thrown away previously used syringe; frontloading; share one after another "half/half" with the same syringe; using one and the same syringe to divide the heroin bought jointly; sharing the preparation and washing water; sharing or using the same razor blade for cutting heroin doses package and plastic containers.

4.7 Social networks of heroin users

Many heroin users are part of a network of drug users, varying in size, that pool money and buy and use drugs together. Such networks help to maintain heroin accessibility if a drug user has insufficient funds to buy heroin on some days. In Temeke, the most common pattern of organisation is the "camp" or *maskani*. Among 51 injectors, 48 (94%) said that they use heroin either in the street or in a group. Only three users (6%) declared that they used drugs alone or in private places.

Some injectors reporting using a "doctor" to assist with injection. A doctor is an experienced injector who injects others, mainly those who have deep veins, those who have exhausted their venous

capital or new injectors. Usually a doctor is paid either in drug or in money. The average price for one shot is 200 to 500 Shillings.

4.8 Mapping

There are 30 wards in Temeke District. The outreach team identified 60 camps, or *maskani*, varying in size and including both open and hidden drug scenes (appendix 3). The identified camps varied in size from less than 10 persons (approximately 45 camps) to around 50 injectors (approximately five camps). Mapping identified 47 camps with less than ten males and ten camps with more than ten males; four camps with less than five females and six camps with more than five females. The outreach team estimates that there are 200-250 camps in total used by heroin smokers in the Temeke district.

Camps are mainly places for buying and using drugs among a given user's network. A camp can also be a socialisation place for marginalised drug users. A camp is a risky place in terms of HIV and HCV transmission. In a camp there is a high probability of being in a situation of sharing injecting equipment with a large number of others injectors.

4.9 HIV and HCV knowledge

Knowledge about the risks of infectious disease transmission through IDU differs greatly depending on the virus or paraphernalia being questioned. The perceived hierarchy of HIV risk was as follows: needle sharing, admitted by the majority of users, was perceived as at the top of the risk scale; bottom of the risk scale was reported to be the preparation and rinse waters and container. The links between sharing injection equipment and HCV transmission was totally absent from users' discourse since the majority of interviewees acknowledged that they were not aware of the existence of such illness.

5 .....Quantitative Results

5.1 Sample demographics

During the quantitative surveying period, six people left without being tested and were excluded from the sample. One refusal to participate was noted. One woman was excluded based on residence in a district other than Temeke. One participant was identified as participating in the survey twice, and the second survey was excluded.

General sample demographics are described in Table 1.

Table 1 Sample characteristics - demographics

	Male		Female		Total		p-value
	n	%	n	%	n	%	
Total	357	83	73	17	430		
Median age (IQR)	30	(26-35)	29	(25-32)	30	(25-34)	0.07
Time living in Dar es Salaam							
Always	285	80	56	77	341	80	0.52
If not always, median years (IQR)	12	(8-20)	14	(10-16)	12	(8-20	0.78
Highest level of education							0.68
Primary school or less	305	85	61	84	366	85	
Secondary	52	15	12	16	64	15	
Marital status							**<0.01**
Married, living with spouse[1]	27	8	3	4	30	7	
Living with other sex partner	104	29	38	52	142	33	
Not living with spouse or other sex partner[2]	226	63	32	44	258	60	
Living place							**<0.01**
Own private dwelling	103	29	31	42	134	31	
At parents' home	173	48	25	34	198	46	
At relatives place	58	16	5	7	63	15	
At friends' place	14	4	9	12	23	5	
In the street, homeless, no fixed address	9	3	3	4	12	3	
Main source of income							**<0.01**
Currently unemployed	15	4	8	11	23	5	
Bus shouter/driver	108	30	1	1	109	25	
Petty trade/small business[3]	108	30	15	21	123	29	
Skilled labour[4]	48	13	3	4	51	12	
Unskilled labour[5]	50	14	0	0	50	12	
Housewife	0	0	28	39	28	7	
Commercial sex worker	0	0	13	18	13	3	
Stealing	23	6	1	1	24	6	
Other[6]	5	1	3	4	8	2	

NB. Proportions are based on number of participants responding to question, and in case of missing data numbers may not add up to totals.

1 Includes those that are married, but living with other sexual partner (n=4)

2 Includes those that are married, but not living with a spouse or sexual partner (n=11)

3 Trade or small business positions mostly involved selling food or other goods in the market.

4 Skilled labour roles included carpenters, construction workers, electricity and mechanical technicians, craftsmen, farmers, and fishery workers.

5 Unskilled labour roles included basic manual labour, collecting and selling scrap metal, and porters.

6 The other category includes artists, musicians, drug dealer (n=1) and otherwise uncategorised.

A total of 430 drug users were recruited and completed the quantitative survey component of the RAR; 357 (83%) males and 73 (17%) females. Age ranged from 15 to 52 years; the median age was 30 years among males and 29 years among females (p=0.07).

The highest level of education reported was secondary school (15%), and 366 (85%) reported that their highest level of education was primary school or less.

Only five percent of respondents described themselves as unemployed. The remainder described sources of income from various forms of informal and semi-formal employment. Among males, 30% worked at a bus stop or as a driver, 30% worked in petty trade or small business; 14% worked in unskilled labour, and 13% worked in skilled labour positions. Among women, 28% were housewives, 21% worked in trade or small business, and 11% were unemployed. Thirteen women (18%) described themselves as commercial sex workers. Only one person identified as a drug dealer, and 6% reported income through stealing.

A variety of living arrangements were reported by respondents and differed by sex. Among males, nearly half lived at their parents' home (48%), a further 16% lived with relatives, and 29% lived at their own private dwelling. Among females, 42% lived at their own private dwelling, 34% lived at their parents' home, and 11% lived with friends. Only 12 (3%) of all respondents reported living on the street, being homeless, or have no fixed address.

The majority of males (63%) were not married and did not live with a sexual partner, while 29% lives with a sex partner who was not a spouse. Eight percent of males were married and lived with their spouse. Half of females lived with a sexual partner who they were not married to, and 44% were not married and did not live with a sexual partner. Only five females reported being married, and only three (4%) lived with their spouse.

The majority of respondents (80%) had always lived in Dar es Salaam. Among those who had not always living in Dar es Salaam, the median years residing in the city was 12 years among males and 14 years among females.

5.2 Patterns of drug use

Descriptions of drug use patterns are described in Table 2.

Heroin use

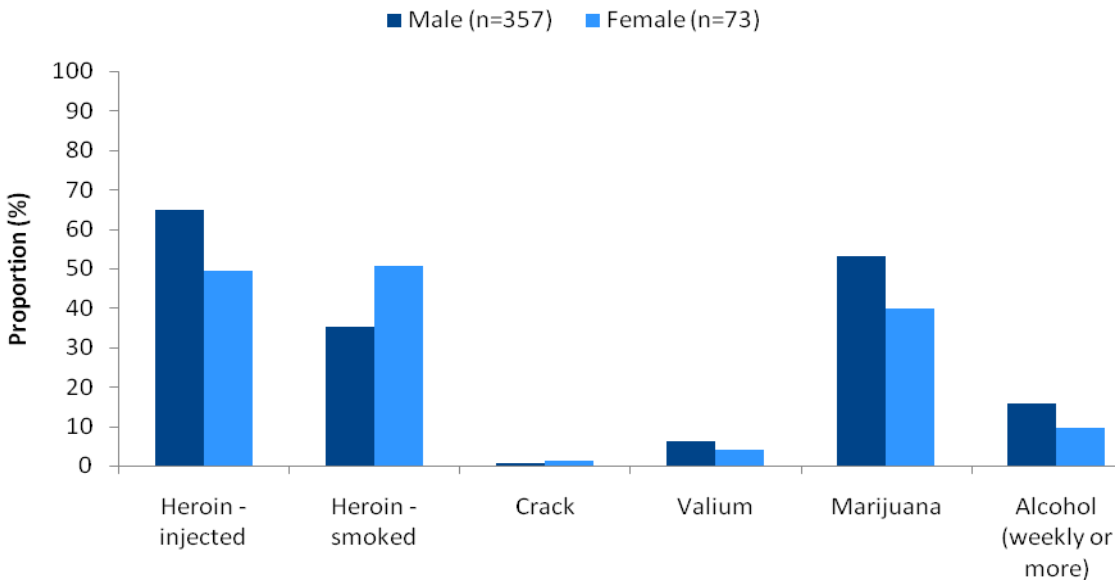
All respondents reported using heroin in the previous month. Sixty-two percent reported having injected heroin the previous month and are referred to hereafter as people who inject drugs (PWID). More males (65%) than females (49%) had injected drugs in the previous month (p=0.01). The remaining 163 respondents reported that they had not injected heroin in the previous month, only smoking (98%) or sniffing (2%) the drug, and are referred to hereafter as other drug users. Nearly all (99%) respondents reported using heroin every day.

The basic unit of heroin in Tanzania is known as a *kete*. PWID reported using a median of nine *kete* per day while other drug users reported using a median of 10 *kete* per day (p=0.03). By sex, males reported using a median of 10 *kete* per day compared seven *kete* in females (p=0.16).

Other drug use

The most common other drugs used reported by heroin users were marijuana and alcohol (Figure 1). More males (53%) than females (40%) reported using marijuana (p=0.05), but there was little difference between PWID (52%) and other drug users (48%). The majority of marijuana users reported using marijuana every day (81% of male and 76% of female users). A similar proportion of males and females (both 29%) reported consuming any alcohol in the previous month; 16% of males consumed alcohol at least weekly compared to 10% of females (p=0.18). Valium use was reported by 22 (6%) males and three (4%) females. Only three respondents reported using crack in the previous month. Among drug users who did not inject heroin, the median number of cigarettes smoked per day was 5 (inter-quartile range 3-10).

Figure 1. Drug use reported in previous month



Transition of heroin use over time

The median age of first using heroin (by any means) was 19 years, but differed by current age. Among drug users currently aged 25 years and under, the median age of first heroin use was 17 years (IQR 15-9). Comparatively, among drug users currently aged over 25 years, the median age of first heroin use was 20 years (IQR 16-25; p<0.01). Among all drug users, males had been using heroin for longer than females, with males using for a median of 11 years and females using for a median of seven years (p<0.01). Of individuals currently injecting heroin, 217 (81%) reported first smoking heroin at an earlier age than first injecting, while eight percent did not report ever smoking heroin. The median age of first experience with heroin was 19 years (range 7-43). Among drug users reporting having ever smoked heroin, the median age of first smoking was 19 years; the minimum age reported to start smoking was nine years and the maximum was 38 years. Among those who smoked heroin for at least a year before injecting, the time lag between smoking and starting injecting had a median of five years for males and a median of four years for females. Stratifying by

age group, the median lag time between smoking and first injecting was two years in PWID aged 25 years and under and five years is PWID aged over 25 years (p<0.01).

Table 2. Sample characteristics - drug use patterns and risk behaviours

	Male		Female		Total		p-value
	n	%	n	%	n	%	
Total	357	83	73	17	430		
Drug injecting *in previous month*							**0.01**
Injected	231	65	36	49	267	62	
Never injected	126	35	37	51	163	38	
Heroin use *in previous month*	357	100	73	100	430	100	
Route of heroin administration *in previous month*							**0.03**
Inject	206	58	34	47	240	56	
Inject + sniff or smoke	25	7	2	3	27	6	
Only sniff or smoke	126	35	37	51	163	38	
Frequency of heroin use *in previous month*							0.98
Everyday	352	99	72	99	424	99	
Less than daily	5	1	1	1	6	1	
Median number of *kete* of heroin used per day *on average* (IQR)	10	(6-12)	7	(4-15)	9	(6-12)	0.16
Other drugs used *in previous month*							
Crack	2	1	1	1	3	1	0.45
Valium	22	6	3	4	25	6	0.50
Marijuana	190	53	29	40	219	51	**0.05**
Alcohol	102	29	21	29	123	29	0.97
Alcohol (weekly or more)	56	16	7	10	63	15	0.18
Overdosed *in previous 12 months*	130	37	13	18	143	33	**<0.01**
Ever tried to stop using drugs	127	36	30	41	157	37	0.37
Drug use patterns in PWID only	231		36		267		
Years since injecting daily							0.72
≤1 year	30	13	6	17	36	14	
2-5 years	93	40	16	44	109	41	
5-10 years	57	25	9	25	66	25	
11+ years	50	22	5	14	55	21	
Where inject							0.45
In camp	81	35	8	22	89	33	
At home	122	53	23	64	145	54	
Wherever scored drugs from	19	8	4	11	23	9	
Other	9	4	1	3	10	4	
Who injects with							**0.02**
Alone	93	40	10	28	103	39	
At least 1 other person	58	25	15	42	73	27	
With a group of people in the camp	78	34	9	25	87	33	
Other	2	1	2	6	4	2	
Number of times use same needle/syringe to inject *in previous month*							0.22
Once (never reuse)	50	22	11	31	61	23	
Twice	42	18	10	28	52	19	
3 times	77	33	8	22	85	32	
4 or more times	62	27	7	19	69	26	

NB. Proportions are based on numbers responding to question, and in case of missing data numbers may not add up to totals.

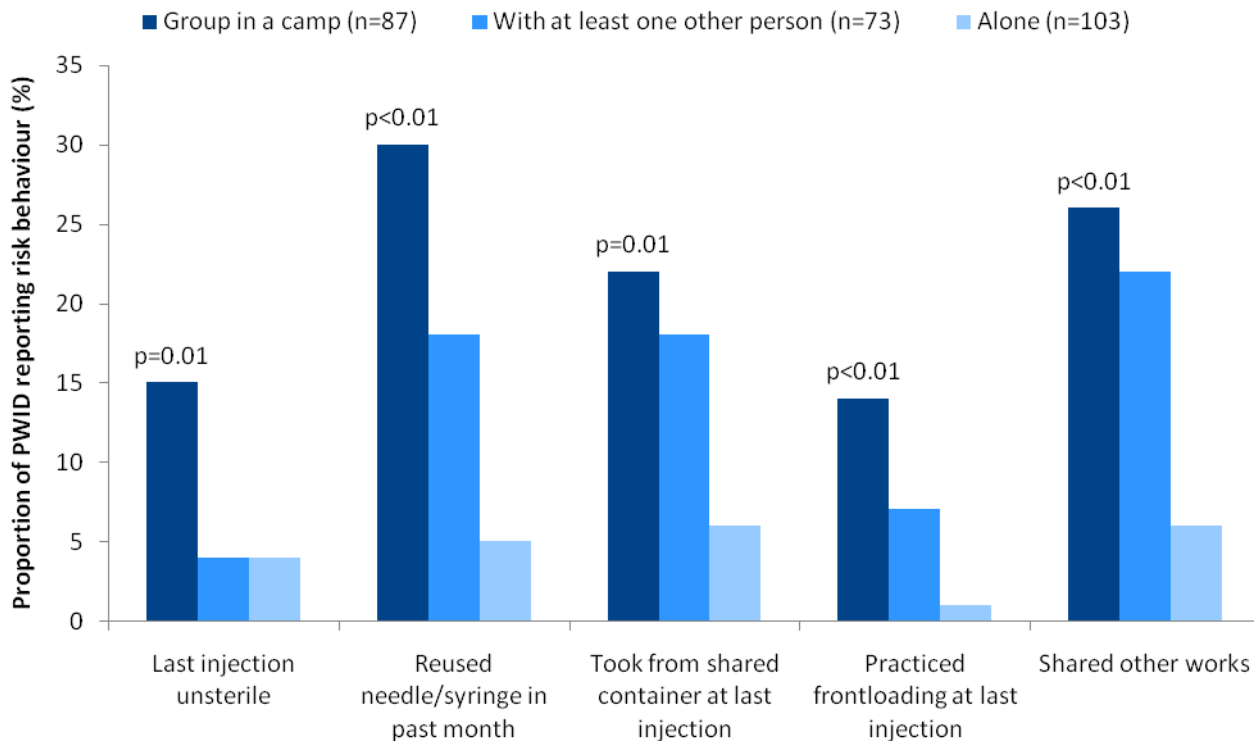
Among PWID, the mean age of first injecting was 24.3 years (standard deviation 5.9 years); the minimum age of injecting initiation was 10 years and the maximum was 42 years.

Location of injecting drug use

The most commonly reported location to inject was at home (54%), reported by 53% of males and 64% of females PWID (Table 2, pg.33). A further 33% (35% males and 22% females) reported injecting in a camp, and 9% indicated injecting wherever they scored drugs from. Males and females differed in terms of who they usually injected alongside (p=0.02). Males were most likely to report injecting alone (40%), with a group of people in a camp (34%), or with at least one other person (25%). Females were most likely to report injecting with at least one other person (42%) followed by alone (28%) or with a group of people in a camp (25%).

Risky injecting behaviours were associated with usual injecting locations, whereby those injecting in a camp or wherever they scored drugs from were more likely to report risk practices. Similarly, risky injecting practices were associated with usual company when injecting. People who injected in a group within a camp were the most likely to report high risk injecting practices, followed by those who injected with at least one other person (Figure 2); those who usually injected alone reported the least risk practices. For example, 26 (30%) of those injecting in a group reused a needle/syringe in the previous month compared to 13 (18%) of those injecting with at least one other person and five (5%) of those injecting alone (p<0.01); 19 (22%) of those usually injecting a group took from a shared container at last injection compared to 13 (18%) of those who usually injected with at least one other person and 6 (6%) of those who usually injected alone (p=0.01); 12 (14%) of those usually injecting in a group practices frontloading at last injection compared to 5 (7%) of those injecting with at least one other person and 1 (1%) of those usually injecting alone (p<0.01).

Figure 2. Risky injection practices according to who usually inject with among PWID



5.3 Risk behaviours

Drug-related harms and risk behaviours

Descriptions of injecting risk behaviours are described in Table 3.

In the last month, 38 (11%) PWID reported having injected once or occasionally with a needle or syringe used by someone else, 2 (2%) reported reusing shared needle/syringes most times they injected, and 222 (83%) reported not having injected with a shared needle/syringe. Of respondents who ever injected with a shared needle or syringe in the previous month (n=44), 76% reported reusing a friend's needle or syringe and 17% had reused someone's needle/syringe from a shooting gallery. Only 5% reported reusing a needle/syringe from a casual sex partner and no respondents reported reusing a needle/syringe from their usual sex partner.

Separate to reusing someone else's needle or syringe, 206 (77%) PWID reported usually reusing their own needle/syringe to inject more than once. Specifically, 20% of PWID reported usually using the same needle/syringe twice, 32% usually using the same needle/syringe three times, and 26% usually used the same needle/syringe four or more times.

Table 3. Injecting risk behaviours among PWID (n=267)

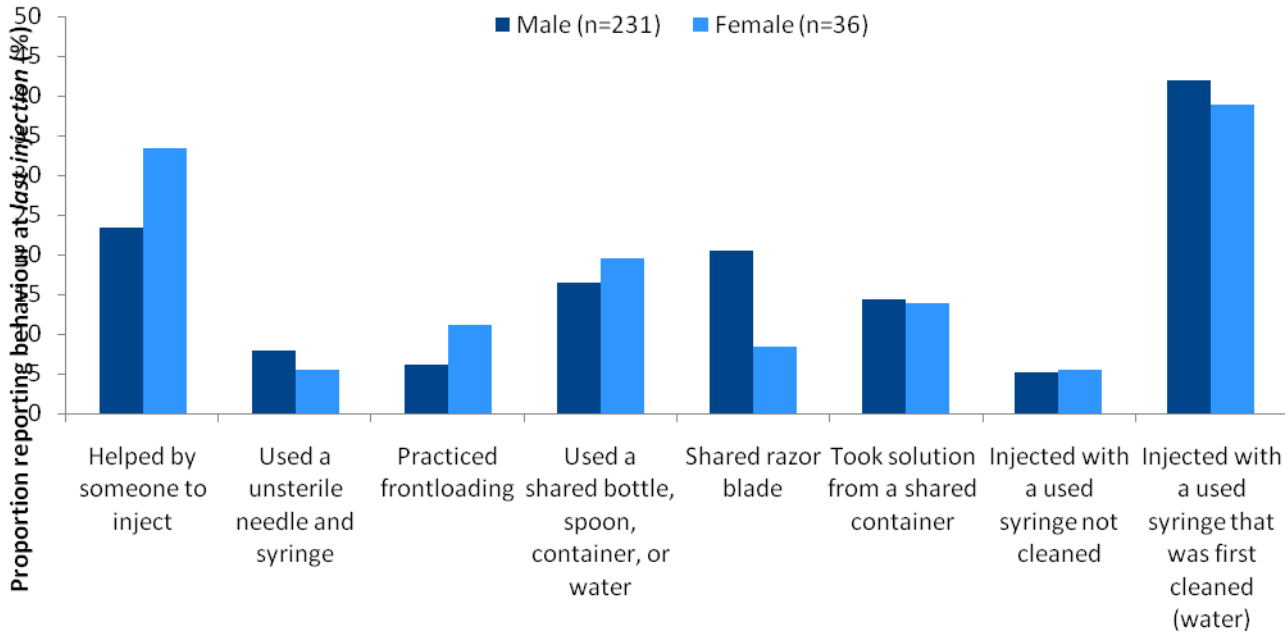
	Male		Female		Total		p-value
	n	%	n	%	n	%	
Total	231	87	36	13	267		
Ever injected with a needle/syringe previously used by someone else *in previous month*							0.15
No	189	82	33	92	222	83	
Yes	41	18	3	8	44	17	
If yes, whose needle reused:							0.11
Usual sexual partner	0	0	0	0	0	0	
New sexual partner	1	3	1	33	2	5	
Friend	29	76	2	67	31	76	
Drug Dealer	1	3	0	0	1	2	
Someone in a shooting gallery	7	18	0	0	7	17	
Used syringe that was kept hidden *in previous month*	53	23	7	19	60	23	0.63
Ever practice withdrawing blood in syringe after injected and giving it to someone else *in previous month* ("flashblood")	20	9	1	3	21	8	0.22
Drug risk behaviours *at last injection*							
Helped by someone to inject	54	23	12	33	66	25	0.20
Used a unsterile needle and syringe	18	8	2	6	20	8	0.61
Practiced frontloading	14	6	4	11	18	7	0.26
Used a shared bottle, spoon, container, or water	38	16	7	19	45	17	0.66
Shared razor blade	47	20	3	8	50	19	0.08
Took solution from a shared container	33	14	5	14	38	14	0.95
Injected with a used syringe not cleaned	12	5	2	6	14	5	0.93
Injected with a used syringe that was first cleaned (water)	97	42	14	39	111	42	0.73

NB. Proportions are based on number of participants responding to question, and in case of missing data numbers may not add up to totals.

The practice of ever withdrawing blood in the syringe after having injected and giving it to somebody else to inject in place of heroin ("flashblood") was reported by 21 (8%) of PWID; 20 (9%) males and 1 (3%) females (p=0.22).

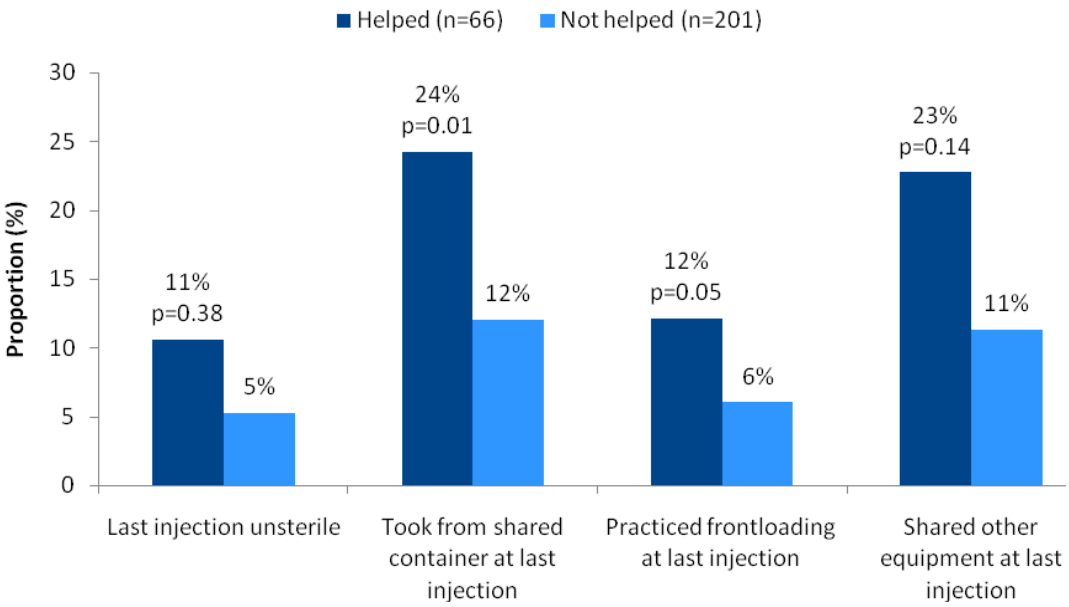
When asked about their last injection, the most commonly reported sharing behaviours were (Figure 3): injecting with a previously used syringe that was first cleaned (42%); sharing a razor blade (19%); sharing other equipment – bottle, spoon, container, or water (17%); and taking solution from a shared container (14%). Only 20 (8%) PWID reporting using an unsterile needle and syringe at last injection.

Figure 3. Drug risk behaviours at last injection, among people who inject drugs (n=267)



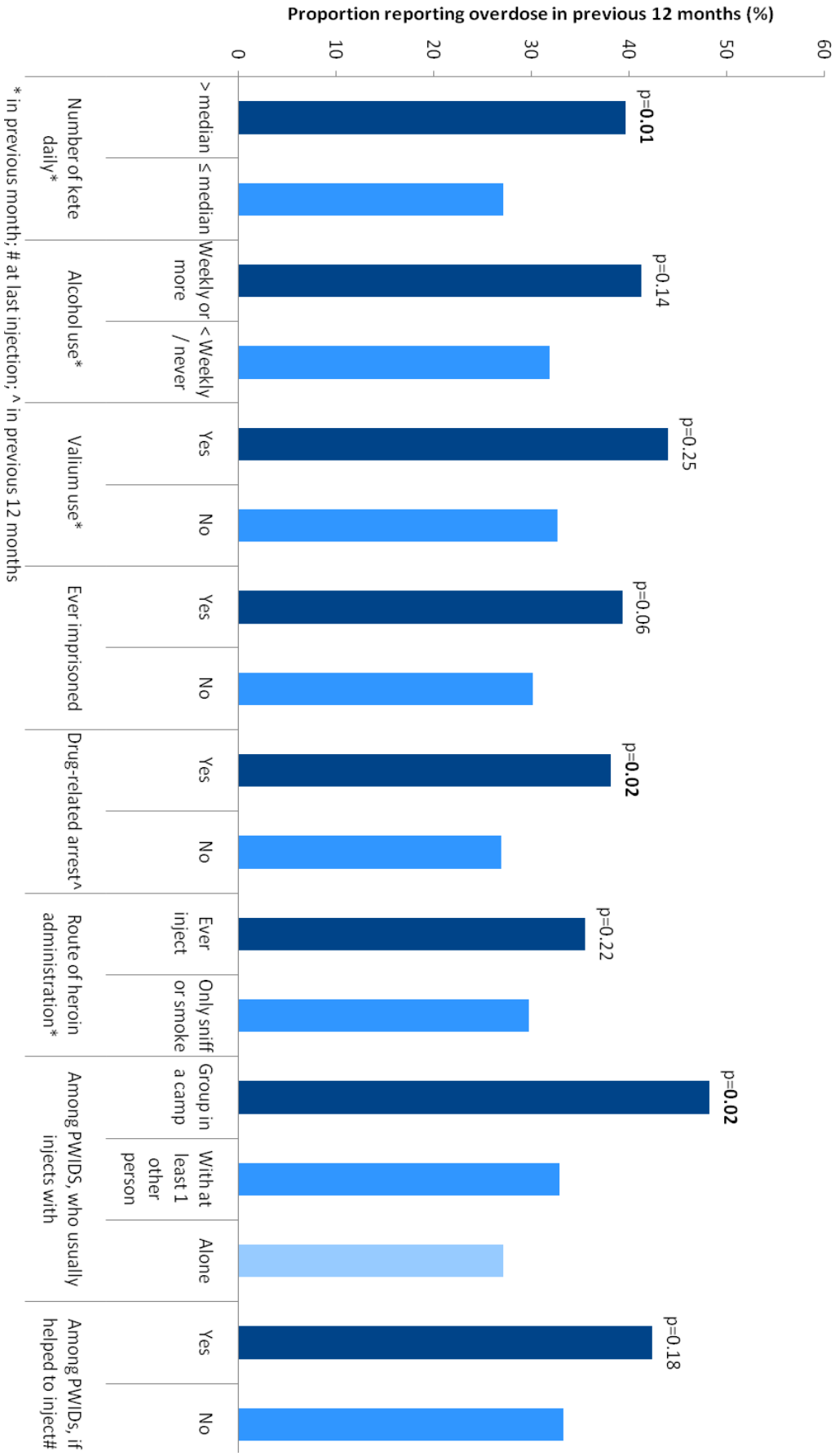
One quarter of PWID reported that they were helped to inject at last injection: 23% of males and 33% of females (p=0.20). Those who were helped to inject at last injection were significantly more likely to have taken solution from a shared container at last injection (24% vs 11%, p=0.01) and marginally more likely to have practiced frontloading at last injection (12% vs 5%, p=0.05), but there was no meaningful association detected between being helped to inject and unsterile injection or sharing other equipment at last injection (Figure 4).

Figure 4. Risky injection practices among PWID according to if helped at last injection (25%)



Over one fifth of all heroin users reported having ever overdosed: 36% of males and 18% of females ($p<0.01$). There were significant associations with reporting greater than the median of number of *kete* daily, having been arrested in previous 12 months in relation to drugs, and who usually injects with and report of overdose, as well as trends with other drug use behaviours and overdose (Figure 1). In addition, 83% of those reporting as homeless or with no fixed address reporting having overdosed, compared to 32% of those reporting living in their own place, with family or relatives, or a friend's place ($p<0.01$).

Figure 5. Report of overdose in previous 12 months among drug users, in association with drug use behaviours and prison history



Sexual risk behaviours

Sexual risk behaviours are described in Table 4.

Ninety-seven percent of females and 78% of males reported having sex in the previous 12 months and are considered sexually active; more females (73%) than males (40%) reported having sex in the previous month (p<0.01). Among females, the number of sexual partners was strongly associated with involvement in transactional sex. Based on report of having or not having sold sex in the previous month, the median number of sexual partners reported was 5.5 (IQR 2-1080) and 1 (IQR1-1), respectively. Among males who were sexually active in the previous 12 months (n=277), the median number of sex partners reported was two (IQR 1-4). The median age of first sex was 17 years in males and 16 years in females.

Among all females, approximately half (55%) reported one to two sex partners in the previous 12 months, 15% reported three to five partners, and 15% reported more than 20 partners. Based on only sexually active females, 30 (43%) reported more than two sex partners in the previous 12 months. In the previous 12 months, 87% of sexually active females reported any regular sex partner, 54% reported any transactional sex partner that they bought or sold sex to in exchange for money or drugs, and 28% reported any casual sex partner. Among females, consistent condom use was highest with transactional sex partners (81%) followed by casual sex partners (50%); 18% reported always using a condom with a regular sex partner.

Among all males, 23% reported no sex partners in the previous 12 months, 43% reported having one to two partners, 23% reported three to five partners, and 8% reported six to ten partners. Based on only sexually active males, 122 (45%) reported more than two sex partners in the previous 12 months. Twenty (6%) males reported ever having sex with another man, and 16 (4%) reported male-male sex in the previous 12 months. Based on the previous 12 months, 68% of sexually active males reported any regular sex partner, 41% reported any transactional sex partner, and 52% reported any casual sex partner. Among males, consistent condom use was highest with transactional sex partners (37%), followed by casual sex partners (27%); 13% always used a condom with regular sex partners. Of all sexually active males, 37% reported having bought sex and a further 15% reported have sold sex in exchange for money or drugs in the previous 12 months. Males reporting any male-male sex were more likely to report having sold sex in the previous 12 months (38% vs. 11 %, p<0.01).

When comparing condom use by sex, females were more likely than males to report consistent condom use with a transactional sex partner (81% vs. 37%; p<0.01) and casual sex partner (50% vs. 27%, p=0.05), but there was no difference in condom use with a regular partner (p=0.29). More females (36%) than males (20%) reported using a condom the last time they had sex (p<0.01).

Of all drug users reporting a regular partner in the previous 12 months, 73 (39%) males and 31 (50%) females also reported any transactional sex partners in this time period (p=0.15), and 81 (43%) males and 16 (26%) females also reported any casual sex partners (p=0.02).

When considering PWID reporting any regular sex partner (n=145), 96 (83%) of males and 16 (53%) of females reported that their current or most recent partner does not inject drugs; of those with partners who do not inject, 85 (89%) of males and 12 (75%) of females reported inconsistent condom use with their regular partner.

In total seven respondents – 5 (7%) females and 2 (1%) males– reported having ever been raped. `

Table 4. Sample characteristics - sexual risk behaviours

	Male		Female		Total		p-value
	n	%	n	%	n	%	
Total	357	83	73	17	430		
Median age first sex (IQR)	17	(15-18)	16	(15-18)	17	(15-18)	0.16
Number sex partners *in previous 12 months*							**<0.01**
None	80	23	2	3	82	19	
1 to 2	152	43	39	55	191	45	
3 to 5	82	23	11	15	93	22	
6 to 10	28	8	5	7	33	8	
11 to 20	9	3	3	4	12	3	
More than 20	3	1	11	15	14	3	
Had sex *in previous month*[1]	142	40	53	73	195	45	**<0.01**
Used condom *at last sex*	70	20	26	36	96	23	**<0.01**
Regular sex partner/s *in previous 12 months*[1,2]	188	68	62	87	250	72	**<0.01**
If yes- consistent condom use[3]	24	13	11	18	35	14	0.29
If yes- inconsistent condom use	163	87	49	82	212	86	
If yes, median number (IQR)	1	(1-1)	1	(1-1)	1	(1-1)	0.51
If yes, does regular partner inject							**<0.01**
Yes	24	13	22	35	47	19	
No	160	87	40	65	200	81	
Transactional sex partner/s *in previous 12 months*[1,4]	110	41	38	54	148	43	0.05
If yes- consistent condom use[3]	38	37	30	81	68	48	**<0.01**
If yes- inconsistent condom use	66	63	7	19	73	52	
If yes, median number (IQR)	3	(2-4)	3.5	(2-1000)	3	(2-5)	**0.01**
Bought sex in exchange for money or drugs *in previous 12 months*[1]	100	37	6	8	106	31	**<0.01**
Sold sex in exchange for money or drugs *in previous 12 months*[1]	42	15	36	51	78	23	**<0.01**
Casual sex partner/s *in previous 12 months*[1,5]	144	52	20	28	164	47	**<0.01**
If yes- consistent condom use[3]	36	27	9	50	45	30	0.05
If yes- inconsistent condom use	95	73	9	50	104	70	
If yes, median number (IQR)	2	(1-2.5)	1	(1-2.5)	2	(1-2.5)	0.40
Ever been raped	2	1	5	7	7	2	**<0.01**
Ever had male-male sex	20	6					

NB. Proportions are based on numbers responding to question, and in case of missing data numbers may not add up to totals.

[1] Based on the proportion of males (n=277, 78%) and females (n=71, 97%) reporting being sexual active in previous 12 months

[2] A *regular sex partner* refers to a spouse or live-in sex partner

[3] *Consistent condom use* is defined as using a condom every time; *inconsistent condom use* is defined as not using a condom every time had sex with partner/s

[4] A *transactional sex partner* refers to a partner from who sex was bought or sold in exchange for money or drugs

[5] A *casual sex partner* refers to a sex partner that is not a spouse, live-in partner or transactional sex partner

5.4 History of arrest and imprisonment

Over half of all respondents reported having been arrested in association with drugs in the previous 12 months: 59% of males and 55% of females (Table 5). In addition, more than a third overall reported ever having been imprisoned. Of males who had ever been imprisoned, 31% reported using drugs in prison, compared to only one female (p=0.01). Only five percent of males and no females

who had been imprisoned reported injecting drug use in prison. When assessing previous arrest in association with injecting risk behaviours, report of using a hidden syringe in the previous month were higher among PWID reporting drug-related arrest in the previous 12 months compared to those not arrested (29% vs 14%, p<0.01).

Table 5 Sample characteristics - arrest and imprisonment history

	Male		Female		Total		p-value
	n	%	n	%	n	%	
Total	357	83	73	17	430	100	
Drug-related arrest *in previous 12 months*	210	59	40	55	250	58	0.51
Ever imprisoned	129	36	22	30	151	35	0.33
Number who have used any drugs in prison	38	31	1	5	39	27	**0.01**
Number who have injected drugs in prison	6	5	0	0	6	4	0.05

5.5 Prevention and harm reduction services

Infectious disease knowledge, awareness, testing history and access to services is described in Table 6.

Awareness and knowledge of infectious diseases

Nearly all respondents had heard of HIV/AIDS, but knowledge of HIV transmission was lower; 68% answered four or five out of five knowledge questions correctly (Table 6). The question associated with the lowest knowledge amongst both males and females was association of mosquito bites with HIV transmission. Females (75%) were significantly less likely than males (87%) to acknowledge that condoms reduce the risk of HIV (p=0.01). Knowledge of other transmission risks was similar.

In contrast to HIV, only 35% of respondents had ever heard of hepatitis C.

Testing history

More females (70%) than males (43%) had ever been previously tested for HIV (p<0.01). Although not significant, more females (74%) than males (64%) reported knowing where they could be tested for HIV (p=0.10). There was no difference in proportion ever tested between PWID (47%) and other drug users (48%, p=0.80). Among males previously tested for HIV, 15% reported being HIV positive, 73% reported being HIV negative, and 10% did not know their HIV status. Among females previously tested for HIV, 25% reported being HIV positive, 67% reported being HIV negative, and 8% did not know their HIV status. In total, six percent of males and 18% of females self-reported as HIV positive; of these, 17 (74%) males and eight (62%) females had consulted a doctor for HIV in the previous 12 months, and treatment had been prescribed to 78% of males and 62% of females.

In total, only eight respondents (1.9%) had even been test for hepatitis C, of whom 2 (25%) self-reported positive.

Table 6. Sample characteristics - knowledge, testing history, and access to treatment & prevention services

	Male		Female		Total		p-value
	n	%	n	%	n	%	
Total	357	83	73	17	430		
Knowledge & awareness							
Heard of HIV/AIDS	348	97	70	96	418	97	0.45
Number of HIV knowledge questions answered correctly							0.84
1, 2 or 3	113	32	24	33	137	32	
4 to 5	244	68	49	67	293	68	
Answered question correctly regarding risk of HIV transmission							
Having one faithful, uninfected partner can reduce risk	299	84	61	84	360	84	0.97
Cannot get HIV from sharing a meal	290	81	59	81	349	81	0.94
A healthy looking person can have HIV	306	86	60	82	366	85	0.44
Cannot get HIV from mosquito bites	209	59	51	70	260	60	0.07
Condom use reduces risk	310	87	55	75	365	85	**0.01**
Heard of hepatitis C	123	34	26	36	149	35	0.85
Current access to treatment and prevention services							
Years since last tested for HIV							**<0.01**
Never tested	203	57	22	30	225	53	
<1 year	20	6	14	19	34	8	
1 year	51	14	16	22	67	16	
2-3 years	47	13	14	19	61	14	
4 or more years	34	10	7	10	41	10	
If previously tested, self-reported HIV status							0.25
Positive	23	15	13	25	36	18	
Negative	113	75	34	67	147	73	
Don't know	15	10	4	8	19	9	
Ever tested for HCV	7	2	1	1	8	2	0.73
If previously tested, self-reported HCV status							
Positive	2	29	0	0	2	25	0.54
Negative	5	71	1	100	6	75	
Know where to get tested for HIV	228	64	54	74	282	66	0.10
Been given condoms *in previous 12 months*	161	45	29	40	190	44	0.39
Been given sterile needle/syringes *in previous 12 months*	130	37	22	31	152	36	0.34
Years since last tested for HIV							**<0.01**
Never tested	203	57	22	30	225	53	
Service access among those self-reporting positive (n=36)							
Consulted a doctor for HIV *in previous 12 months*	17	74	8	62	25	69	0.44
Treatment for HIV prescribed	18	78	8	62	26	72	0.28

NB. Proportions are based on numbers responding to question, and in case of missing data numbers may not add up to totals.

Current access to services

In terms of other health and harm reduction services, 45% of respondents reported having ever been given condoms in the previous 12 months (Table 6). Overall 37% reported having ever received sterile needles/syringes in the previous 12 months: 46% of PWID and 18% of other drug users ($p<0.01$).

Thirty-seven percent of all drug users had ever tried to stop using drugs. Of these, the most frequent sources of help reported were family & relatives (22%), hospital (14%) and a friend (10%), while 45% reported not being helped by anyone else.

Services desired

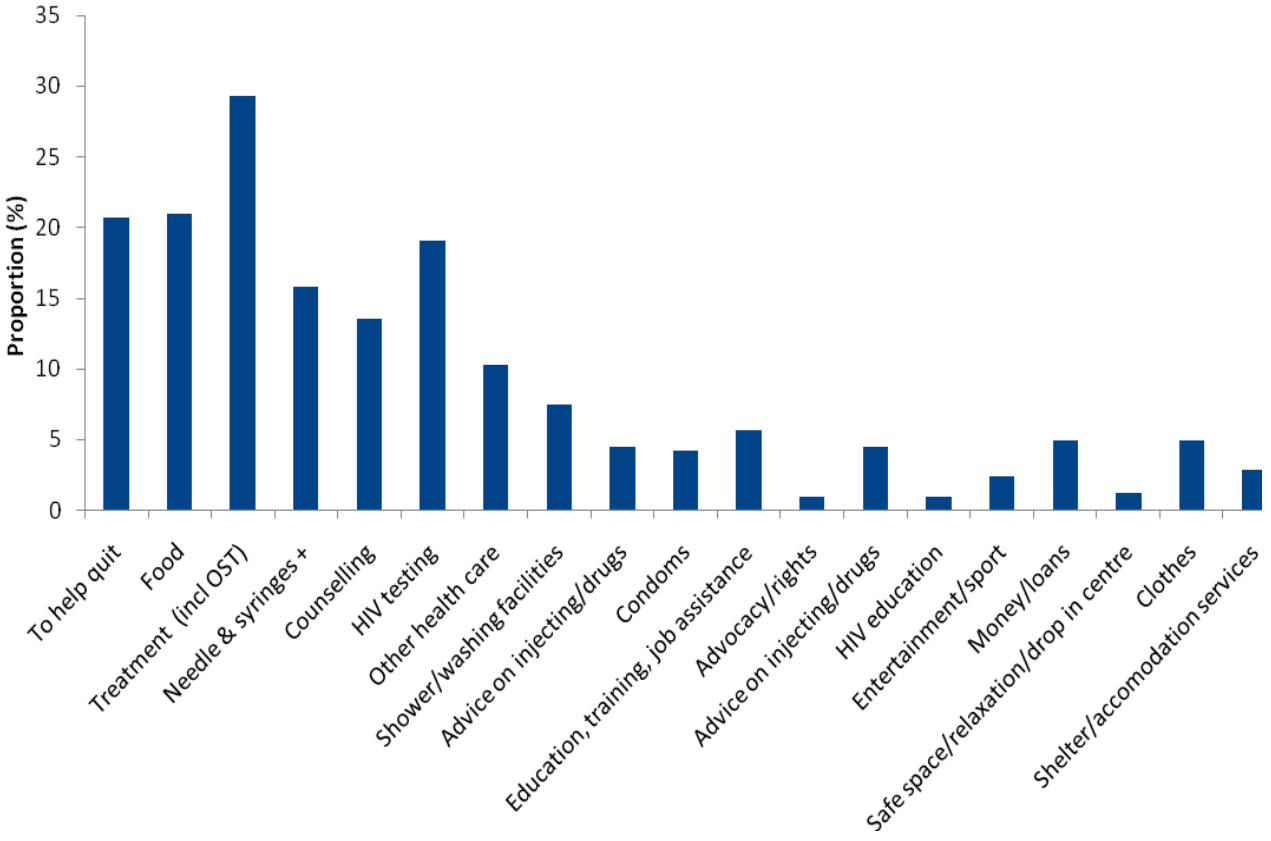
The preferred media outlets to access information of HIV and AIDS were radio (78%), television (68%), and newspaper (34%).

The most commonly reported priority services to be offered within the Temeke district, as identified by heroin users were: help to quit drugs (53%), primary health care (21%), rehabilitation centres (15%), and OST (11%).

When asked to describe services wanted from MdM-F, the most common responses were (Figure 6): food (21%), help to quit using drugs (21%), treatment (29%), HIV/HCV testing (19%), clean needle/syringes or other injecting equipment (16%), counselling (13%), and other health services (10%). In total 34 (8%) respondents specifically mentioned OST, counted under treatment, while a small number of respondents specifically mentioned HIV treatment (n=6) and pain relief (n=8).

Other services mentioned included showering or washing facilities (7%), education/vocational training/employment services (6%), advice on drugs and injecting (4%), condoms (4%), money or loans (5%), clothing (5%), entertainment or sport activities (2%), shelter or accommodation services (3%), and a safe place to rest and relax (1%).

Figure 6. Services desired from MdM-F from all respondents (n=430)



5.6 Prevalence of HIV and hepatitis C

Of the 430 respondents, 367 (85%) opted to receive their test results after testing and were post-counselled accordingly. Sixty-three respondents did not want to know their result immediately; the counsellor kept a record of results with study code, and participants were able to access their results at a later date using this code. Only three out of 63 came back for their results. Proportion of PWID and other drug users testing positive for HIV, HCV, and coinfection are described in Table 7 and Figure 7.

Table 7. Prevalence of HIV and hepatitis C among PWID and other drug users in Temeke district

		HIV positive			Newly diagnosed HIV[1] infections			HCV positive			HIV and HCV positive			Total
		n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	n	%	(95% CI)	
PWIDs	Male	69	29.9	(24.0-36.2)	51	23.9	(18.4-30.3)	64	27.7	(22.0-34.0)	35	15.2	(10.8-20.4)	231
	Female	24	66.7	(49.0-81.4)	17	58.6	(38.9-76.5)	10	27.8	(14.2-45.2)	10	27.8	(14.2-45.2)	36
	All PWIDs	93	34.8	(29.1-40.9)	68	28.1	(22.5-34.2)	74	27.7	(22.4-33.5)	45	16.9	(12.6-21.9)	267
Other drug users	Male	4	3.2	(0.9-7.9)	2	1.6	(0.2-5.7)	0	0.0	(0.0-2.9)[2]	0	0.0	(0.0-2.9)[1]	126
	Female	15	40.5	(24.8-57.9)	10	31.3	(16.1-50.0)	3	8.1	(1.7-21.9)	2	5.4	(0.7-18.2)	37
	All other drug users	19	11.7	(7.2-17.6)	12	7.7	(4.0-13.1)	3	1.8	(0.4-5.3)	2	1.2	(0.1-4.4)	163
All drug users	All males	73	20.4	(16.4-25.0)	53	15.7	(12.0-20.1)	64	17.9	(14.1-22.3)	35	9.8	(6.9-13.4)	357
	All females	39	53.4	(41.4-65.2)	27	44.3	(31.5-57.6)	13	17.8	(9.8-28.5)	12	16.4	(8.8-27.0)	73
	Total	112	26.0	(22.0-30.5)	80	20.1	(16.3-24.4)	77	17.9	(14.4-21.9)	47	10.9	(8.1-14.3)	430

[1] Newly diagnosed HIV excludes those who self-reported positive and were aware of their HIV infection from the denominator. Based on a total n=398 (337 males and 61 females) – respondents self-reporting negative, don't know or previously untested

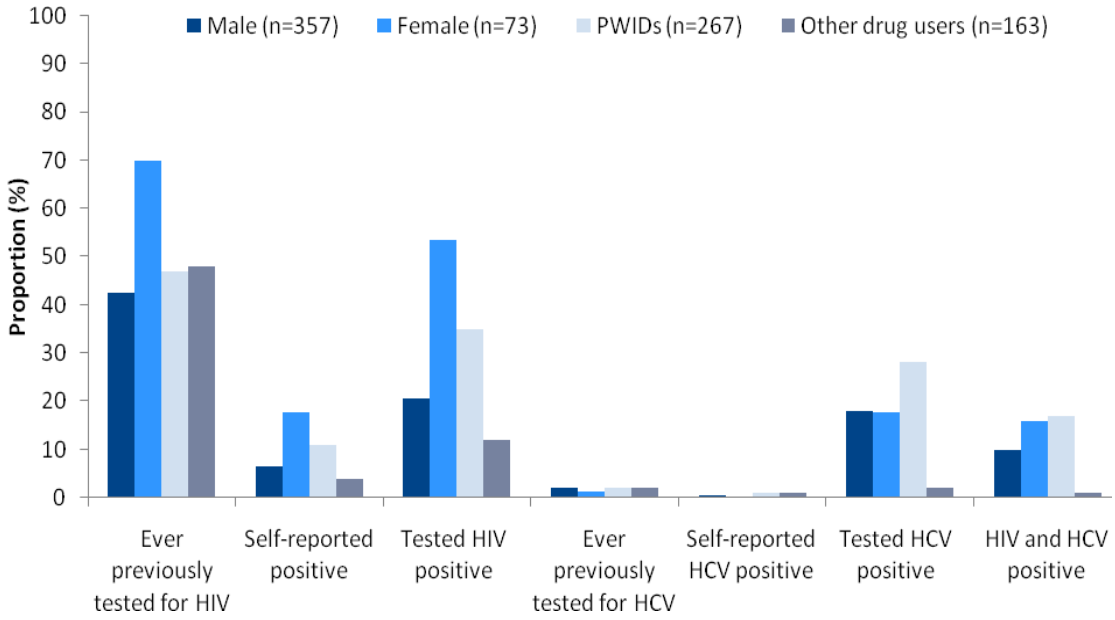
[2] One-sided, 97.5% confidence interval

In total, 112 (26.0%) of study respondents tested positive for HIV; positivity was higher in PWID (34.8%) compared to other drug users (11.7%; p<0.01) and higher in females (53.4%) compared to males (20.4%; p<0.01). Of PWID who tested HIV positive, it is estimated that 74% of infections in males and 71% of infections in females represent newly diagnosed HIV infection (p=0.77). Of other drug users who tested HIV positive, it is estimated that 63% represent newly diagnosed HIV infections.

In total 77 (18%) of study respondents tested antibody positive for HCV, indicating evidence of previous exposure to HCV. HCV positivity was substantially higher in PWID (28%) compared to other drug users (2%; p<0.01) with only three other drug users testing positive. There was no difference in proportion positivity between males and females (p=0.98). Seventy-five (97%) HCV positive results represent probable new diagnoses of HCV.

In addition, a total of 47 (11%) of respondents tested positive for both HIV and HCV, indicating potential coinfection: 10% of males and 16% of females (p<0.01). Comparing by mode of drug use, 17% of PWID were potentially coinfected compared to only 1% of other drug users, but two out of three other drug users who were HCV positive were also HIV positive. When considering PWID who tested positive for HIV, 35 (51%) males and 10 (42%) females were also positive for HCV exposure.

Figure 7. HIV and hepatitis C (HCV) testing history, self-reported status and seropositivity at time of study

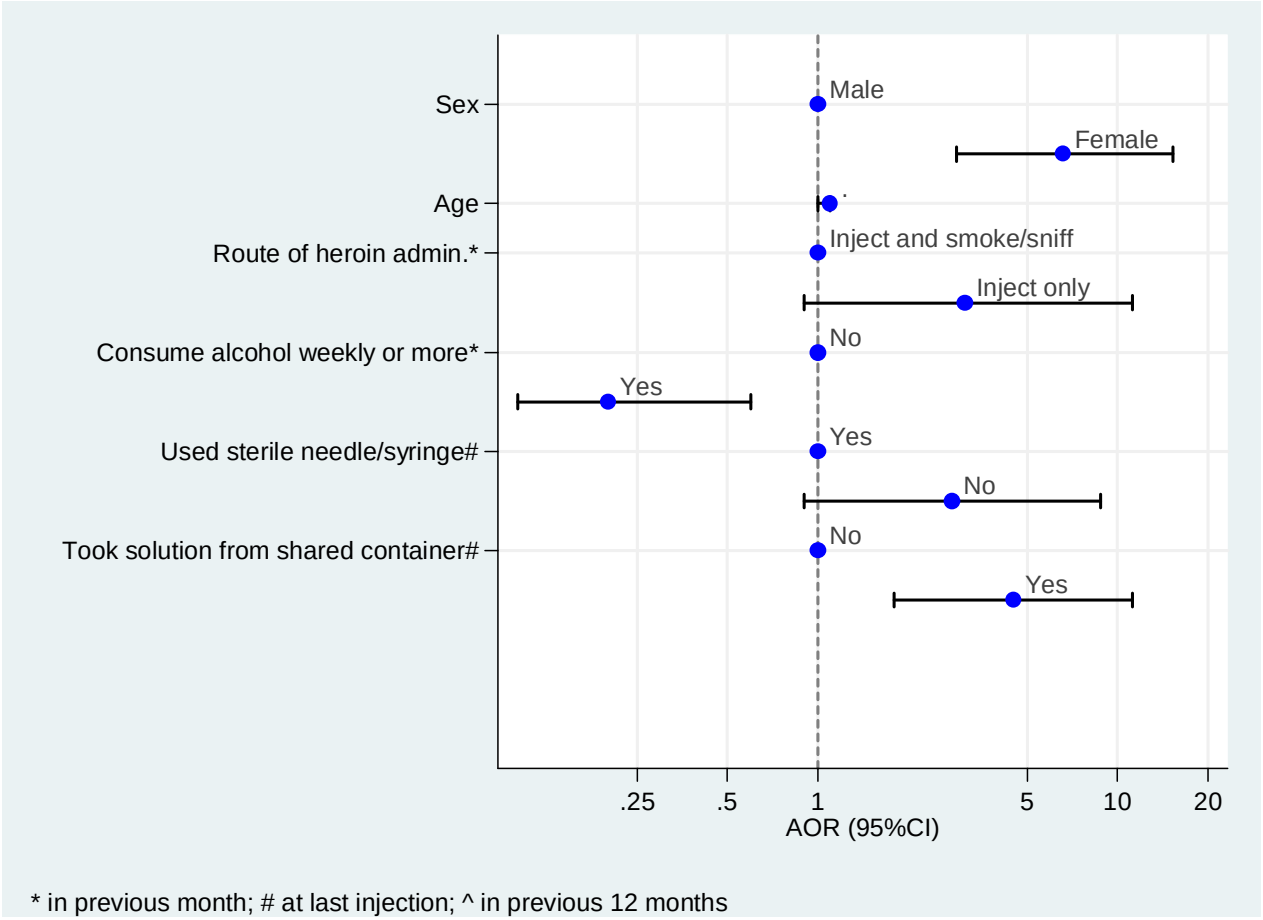


Correlates of HIV positivity among PWID

Among PWID, in univariable analysis factors significantly associated with greater likelihood of HIV seropositivity were: being female, older age, a housewife compared to income through skilled labour, injecting daily for more years, practicing frontloading at last injection, taking solution from a shared container at last injection, having no casual sexual partners in previous 12 months, and knowing where to get tested were significantly associated with greater likelihood of HIV seropositivity. Factors associated with lower likelihood of HIV seropositivity were: consuming alcohol weekly or more in previous month, having bought sex in previous 12 months, inconsistent condom use with any partner, and drug-related arrest in previous 12 months (Table 8). See appendix 4 for full results.

In multivariable analysis, factors significantly associated with greater likelihood of HIV seropositivity, when controlling for if used a sterile needle and syringe at last injection and routes of heroin administration in previous month, were: being female, older age, more years since injecting daily, and taking solution from a shared container at last injection. Consuming alcohol weekly or more in previous month was associated with lower likelihood of HIV seropositivity (Table 8 and Figure 8).

Figure 8. Adjusted odds ratios and 95% CI for associations with HIV seropositivity in PWIDs



* in previous month; # at last injection; ^ in previous 12 months

Table 8. Factors associated with HIV seropositivity among PWID (n=267)

	HIV Positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
	93	35						
Sex								
Male	69	29.9	*			*		
Female	24	66.7	4.7	**<0.01**	2.2-9.9	6.9	**<0.01**	3.0-16.0
Age			1.1	**<0.01**	1.0-1.1	1.1	**0.03**	1.0-1.1
Main source of income								
Skilled labour	8	24.2	*					
Trade/small business	25	35.7	1.7	0.25	0.7-4.4			
Stealing	3	23.1	0.9	0.93	0.2-4.3			
Housewife	9	75.0	9.4	**<0.01**	2.0-43.3			
Bus stop/driver	23	27.1	1.2	0.76	0.5-2.9			
Unskilled labour	12	42.9	2.3	0.13	0.8-7.0			
Other	5	45.5	2.6	0.19	0.6-10.9			
Currently unemployed	7	50.0	3.1	0.09	0.8-11.6			
Route of heroin administration *in previous month*								
Inject and smoke/inhale	4	14.8	*			*		
Inject only	89	37.1	3.4	**0.03**	1.1-10.1	2.9	0.10	0.8-10.0
Consume alcohol weekly or more *in previous month*								
No	87	38.2				*		
Yes	6	15.4	0.3	**0.01**	0.1-0.7	0.2	**0.01**	0.1-0.6
Years since injecting daily			1.1	**<0.01**	1.0-1.2	1.1	**0.01**	1.0-1.2
Used a sterile needle and syringe *at last injection*								
Yes	81	33.5	*			*		
No	11	55.0	2.4	0.06	1.0-6.1	2.4	0.13	0.8-7.1
Practiced frontloading *at last injection*								
No	82	32.9	*					
Yes	11	61.1	3.2	**0.02**	1.2-8.6			
Took solution from a shared container *at last injection*								
No	71	31.0	*			*		
Yes	22	57.9	3.1	**<0.01**	1.5-6.2	3.7	**<0.01**	1.5-9.0
Bought sex in exchange for money or drugs *in previous 12 months*								
No	79	39.5	*					
Yes	12	19.7	0.4	**0.01**	0.2-0.7			
Casual sex partner/s *in previous 12 months*[2]								
Yes - consistent condom use[3]	6	21.4	*					
Yes - inconsistent condom use	15	25.0	1.2	0.72	0.4-3.6			
No	71	42.3	2.7	**0.04**	1.0-7.0			
Inconsistent condom use with any partner[3]								
Always consistent condom use	44	44.0	*					
Inconsistent condom use with any partner	49	29.9	0.6	**0.03**	0.3-1.0			
Drug-related arrest *in previous 12 months*								
No	45	41.7	*					
Yes	47	29.7	0.6	**0.05**	0.4-1.0			
Know where to get tested for HIV								
No	24	26.7	*					
Yes	69	39.2	1.8	**0.04**	1.0-3.1			

[1] Hosmer-lemeshow: 0.80; r2: 0.19

[2] *Casual sex partner* refers to a partner that is not a spouse, live-in partner or transactional sex partner

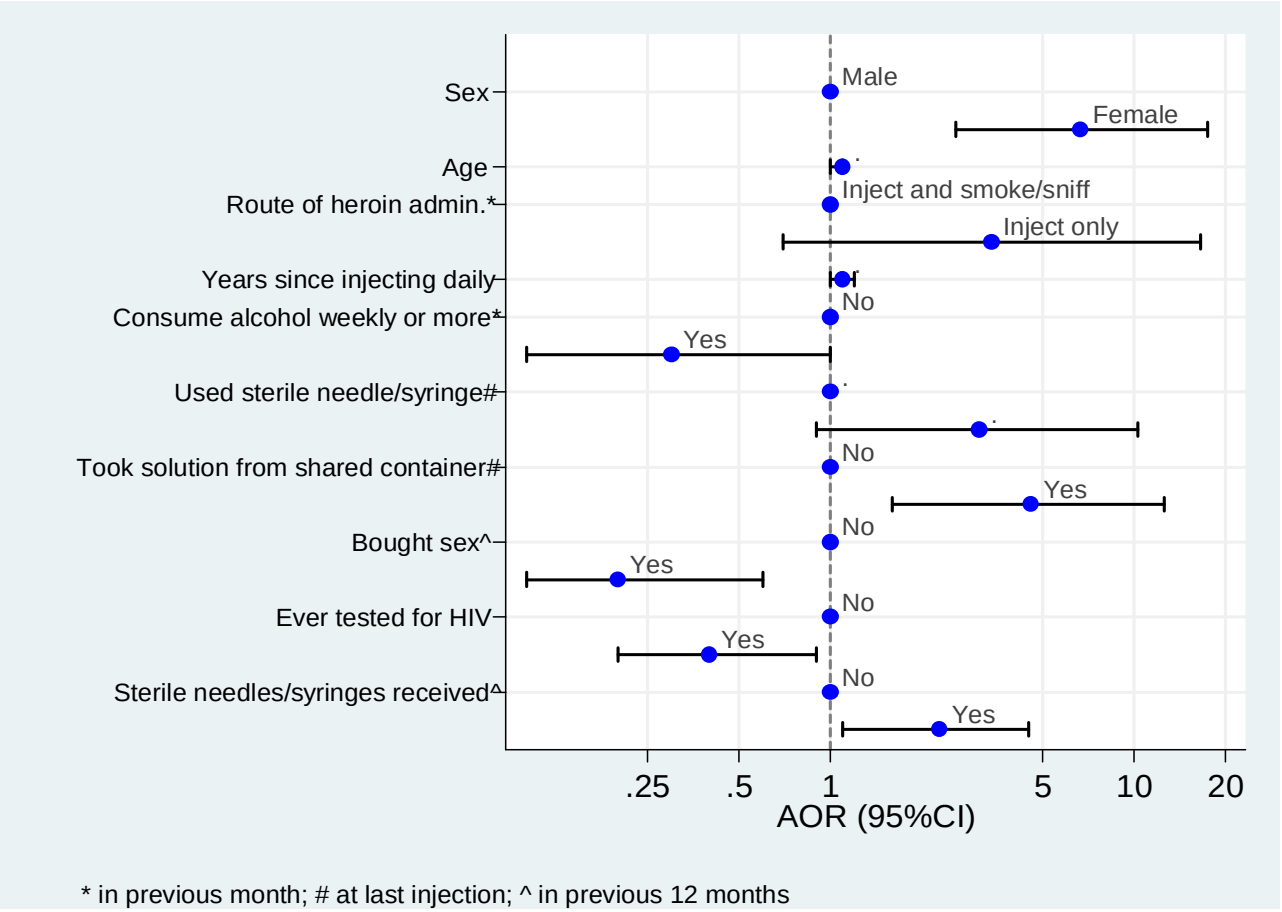
[3] *Consistent condom use* is defined as using a condom every time; *inconsistent condom use* is defined as not using a condom every time had sex with partner/s

* Reference group

Correlates of newly diagnosed HIV among PWID

Newly diagnosed HIV excludes those who self-reported positive and were aware of their HIV infection. Among PWID, in multivariable analysis factors significantly associated with greater likelihood of newly diagnosed HIV, when controlling for if used a sterile needle and syringe at last injection, routes of heroin administration in previous month and age, were: being female, been injecting daily for more years, taking solution from a shared contained at last injection, and having ever received sterile needle and/or syringes in previous 12 months. Factors significantly associated with lower likelihood of newly diagnosed HIV were: consuming alcohol weekly or more, having bought sex in previous 12 months, and having ever tested for HIV (Table 9 and Figure 9). See appendix 5 for full results.

Figure 9. Adjusted odds ratios and 95% CI for associations with newly diagnosed HIV in PWIDs



* in previous month; # at last injection; ^ in previous 12 months

Correlates of HIV positivity among other drug users

Among other drug users (did not inject drugs in the previous month), factors significantly associated with greater likelihood of HIV seropositivity in univariable logistic regression were: female sex; living at a friends' place compared to living in own private place; being a housewife or reporting "other" source of income compared to trade or small business; having ever tried to stop using drugs; reporting using a condom at last sex; reporting ever having been raped; having sold sex in exchange for money or drugs in previous 12 months; and not having heard of hepatitis C. Not reporting a

transactional sex partner in the previous 12 months was associated with lower likelihood of HIV seropositivity (Table 10, pg. 50). See appendix 6 for full results.

Table 9. Factors associated with newly diagnosed HIV among PWID (excludes those who self-reported and tested positive, n=242)

	Newly diagnosed HIV positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
	80	20						
Sex								
Male	51	24	*			*		
Female	17	59	4.5	**<0.01**	2.0-10.0	6.7	**<0.01**	2.6-17.5
Age (continuous)			1.0	0.07	1.0-1.1	1.1	0.09	1.0-1.1
Main source of income								
Skilled labour	6	12	*					
Petty trade/small business	19	30	1.8	0.29	0.6-5.0			
Stealing	3	23	1.3	0.78	0.3-6.0			
Housewife	5	63	6.9	**0.02**	1.3-37.5			
Bus stop/driver	19	23	1.3	0.64	0.5-3.6			
Unskilled labour	8	33	2.1	0.24	0.6-7.1			
Currently unemployed	5	42	3.0	0.14	0.7-12.7			
Other	2	25	1.4	0.73	0.2-8.7			
Routes of heroin administration *in previous month*								
Inject and smoke/inhale	2	8	*			*		
Inject only	66	30	5.0	**0.03**	1.2-21.9	3.4	0.13	0.7-16.6
Consume alcohol weekly or more *in previous month*								
No	63	31	*			*		
Yes	5	13	0.3	**0.03**	0.1-0.9	0.3	**0.05**	0.1-1.0
Years since injecting daily			1.1	**0.01**	1.0-1.2	1.1	**0.03**	1.0-1.2
Used a sterile needle and syringe *at last injection*								
Yes	59	27	*			*		
No	9	50	2.7	**0.04**	1.0-7.2	3.1	0.06	0.9-10.3
Practiced frontloading *at last injection*								
No	60	26	*					
Yes	8	53	3.2	**0.03**	1.1-9.1			
Took solution from a shared container *at last injection*								
No	53	25	*			*		
Yes	15	48	2.8	**0.01**	1.3-6.0	4.6	**<0.01**	1.6-12.6
Bought sex in exchange for money or drugs *in previous 12 months*								
No	60	33	*			*		
Yes	7	13	0.3	**<0.01**	0.1-0.7	0.2	**<0.01**	0.1-0.6
Ever tested for HIV								
No	43	30	*			*		
Yes	25	25	0.7	0.33	0.4-1.3	0.4	**0.02**	0.2-0.9
Sterile needles/syringes received *in previous 12 months*								
No	27	21	*			*		
Yes	41	36	2.1	**0.01**	1.2-3.7	2.3	**0.02**	1.1-4.5

[1] Hosmer-lemeshow: 0.43; r^2: 0.24

* Reference group

Table 10. Factors associated with HIV seropositivity among other drug users (n=163)

	HIV Positive		Univariable		
	n	%	OR	p-value	95% CI
	19	12			
Sex					
Male	4	3.2	*		
Female	15	40.5	20.8	**<0.01**	6.3-68.5
Age			1.0	0.41	1.0-1.1
Living place					
Own private place	3	6.3	*		
At parents' home	7	8.9	1.5	0.60	0.4-5.9
At relatives place	2	9.1	1.5	0.67	0.2-9.7
At friends' place	6	50.0	15.0	**<0.01**	2.9-76.3
In the street, homeless/no fixed place	1	50.0	15.0	0.08	0.7-303.7
Main source of income					
Petty trade/small business	4	7.5	*		
Other	7	70.0	28.6	**<0.01**	5.3-155.5
Housewife	5	31.3	5.6	**0.02**	1.3-24.2
Unskilled labour	2	9.1	1.2	0.82	0.2-7.2
Currently unemployed	1	11.1	1.5	0.72	0.2-15.5
Stealing	0	0.0			
Skilled labour	0	0.0			
Bus stop/driver	0	0.0			
Ever tried to stop using drugs					
No	6	6.0	*		
Yes	13	20.6	4.1	**0.01**	1.5-11.4
Used condom *at last sex*					
No	10	8.1	*		
Yes	9	24.3	3.7	**0.01**	1.4-9.9
Ever been raped					
No	16	10.1	*		
Yes	3	75.0	26.8	**0.01**	2.6-273.2
Transactional sex partner/s *in previous 12 months*[1]					
Yes - consistent condom use[2]	8	24.2	*		
Yes - inconsistent condom use	6	17.1	0.6	0.47	0.2-2.1
No	4	4.3	0.1	**<0.01**	0.0-0.5
Sold sex in exchange for money or drugs *in previous 12 months*					
No	5	4.1	*		
Yes	14	35.9	13.2	**<0.01**	4.4-40.0
Heard of Hepatitis C					
Yes	2	3.4	*		
No	17	16.2	5.4	**0.03**	1.2-24.3

[1] A *transactional sex partner* refers to a partner from who sex was bought or sold in exchange for money or drugs

[3] *Consistent condom use* is defined as using a condom every time; *inconsistent condom use* is defined as not using a condom every time had sex with partner/s

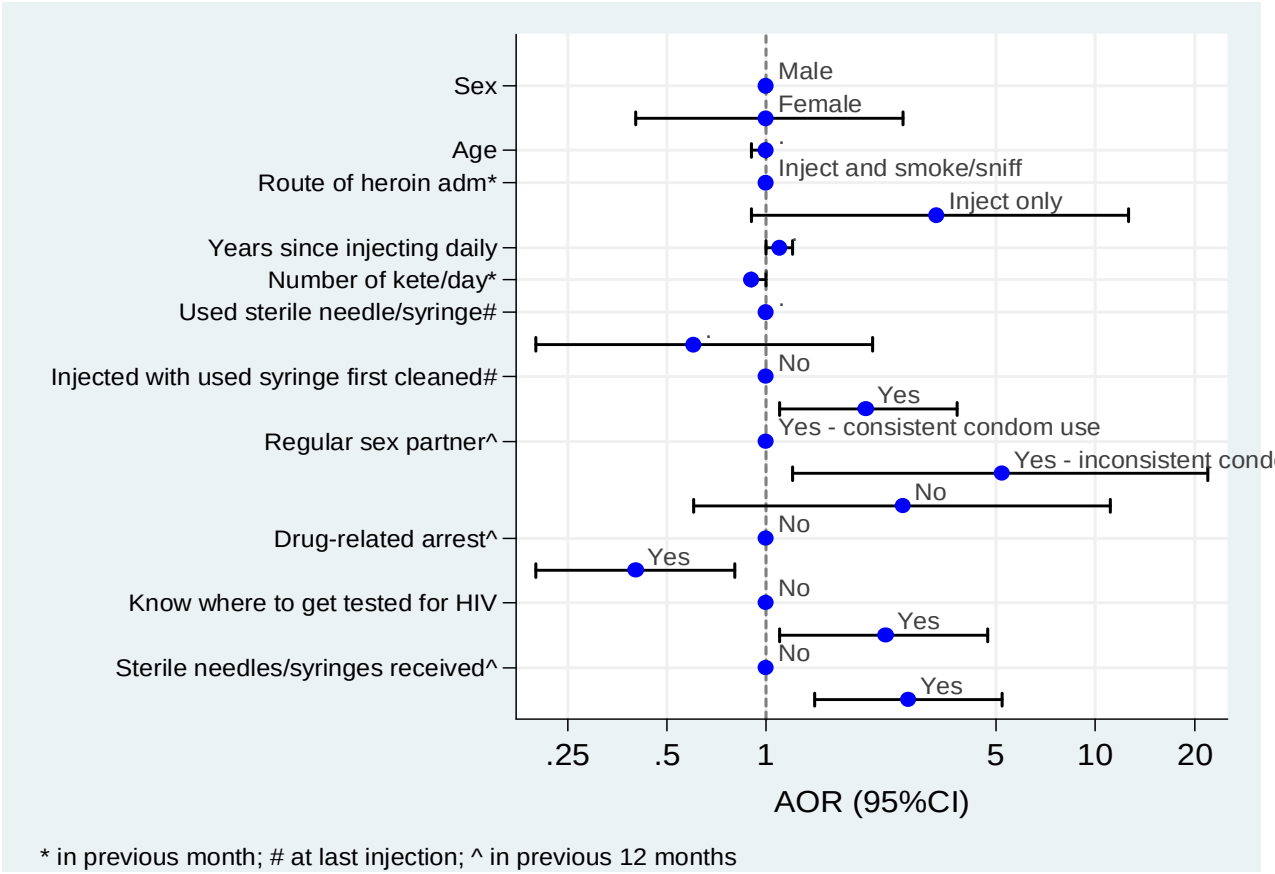
* Reference group

Correlates of HCV positivity

Among PWID, in univariable analysis factors significantly associated with greater likelihood of HCV seropositivity were: main source of income from unskilled labour compared to skilled labour; only injecting heroin; more years since injecting heroin daily; knowing where to get tested for HIV; having received condoms in previous 12 months; and having received sterile needles/syringes in previous 12 months. Factors associated with lower likelihood of HCV seropositivity were: using more *kete* of heroin per day on average and having been arrested in association with drugs in previous 12 months (Table 11).

In multivariable analysis, factors significantly associated with greater likelihood of HCV seropositivity among PWID, when controlling for sex, age, ways of heroin use in previous month, and if used a sterile needle and syringe at last injection, were: more years since injecting daily; inconsistent condom use with a regular sex partner in previous 12 months; knowing where to get tested for HIV; and having received sterile needles/syringes in previous 12 months. Factors associated with lower likelihood of HCV seropositivity were: using more *kete* of heroin per day on average and having been arrested in association with drugs in previous 12 months (Table 11 and Figure 10). See appendix 7 for full results.

Figure 10. Adjusted odds ratios and 95% CI for associations with HCV seropositivity in PWIDs



* in previous month; # at last injection; ^ in previous 12 months

Table 11. Factors associated with hepatitis C seropositivity among PWID (n=267)

	HCV Positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
	74	28						
Sex								
Male	64	28	*			*		
Female	10	28	1.0	0.99	0.5-2.2	1.0	0.92	0.4-2.6
Age (continuous)			1.0	0.24	1.0-1.1	1.0	0.67	0.9-1.0
Main source of income								
Skilled labour	4	12	*					
Petty trade/small business	20	29	2.9	0.07	0.9-9.3			
Stealing	1	8	0.6	0.67	0.1-6.0			
Housewife	4	33	3.6	0.11	0.7-17.8			
Bus stop/driver	21	25	2.4	0.14	0.7-7.6			
Unskilled labour	16	57	9.7	**<0.01**	2.7-35.0			
Currently unemployed	4	29	2.9	0.18	0.6-13.8			
Other	3	27	2.7	0.25	0.5-14.7			
Routes of heroin administration *in previous month*								
Inject plus sniff/smoke	3	11	*			*		
Inject only	71	30	3.4	0.05	1.0-11.5	3.3	0.08	0.9-12.6
Years since injecting daily			1.1	**0.01**	1.0-1.1	1.1	**0.01**	1.0-1.2
Number of *kete* (dice) of heroin used per day *on average*			0.9	**0.04**	0.9-1.0	0.9	**0.04**	0.9-1.0
Used a sterile needle and syringe *at last injection*								
Yes	68	28	*			*		
No	5	25	0.9	0.77	0.3-2.4	0.6	0.41	0.2-2.1
Injected with a used syringe that was first cleaned (water) *at last injection*								
No	37	24	*			*		
Yes	37	33	1.6	0.09	0.9-2.8	2.0	**0.03**	1.1-3.8
Regular sex partner/s *in previous 12 months*[2]								
Yes - consistent condom use[3]	3	15	*			*		
Yes - inconsistent condom use	38	31	2.5	0.16	0.7-9.1	5.2	**0.03**	1.2-21.9
No	32	26	2.0	0.28	0.6-7.4	2.6	0.18	0.6-11.1
Drug-related arrest *in previous 12 months*								
No	42	39	*			*		
Yes	32	20	0.40	**<0.01**	0.2-0.7	0.4	**<0.01**	0.2-0.8
Know where to get tested								
No	16	18	*			*		
Yes	58	33	2.3	**0.01**	1.2-4.2	2.3	**0.03**	1.1-4.7
Condoms received *in previous 12 months*								
No	30	22	*					
Yes	44	34	1.8	**0.03**	1.1-3.2			
Sterile needles/syringes received *in previous 12 months*								
No	29	20	*			*		
Yes	45	37	2.3	**<0.01**	1.3-4.0	2.7	**<0.01**	1.4-5.2

* Reference group

[1] Hosmer-lemeshow: 0.60; r^2: 0.16

[2] A *regular sex partner* refers to a spouse or live-in sex partner

[3] *Consistent condom use* is defined as using a condom every time; *inconsistent condom use* is defined as not using a condom every time had sex with partner/s

6 .....Discussion

This section highlights specific findings and reflects on their implications and potential for informing local injecting drug harm reduction responses in Temeke District, Dar es Salaam.

6.1 HIV and hepatitis C seropositivity

HIV seropositivity was detected in 20% of males and 53% of females and was higher in PWID (35%) compared to other drug users (12%). Consistent with previous reports,[1, 4, 9] the highest positivity rate was seen in females who inject drugs (67%). These rates are unacceptably high and add to the evidence that a concentrated HIV epidemic exists in drug users in Tanzania. In comparison, general population HIV prevalence is estimated at 10% in females and 8% in males in Dar es Salaam (2007) and 6-7% in mainland Tanzania.[3, 33]

In this population of drug users in Temeke, higher baseline prevalence, ongoing ties between drug users and non-drug users, and high transmission between PWID are likely to account for the high HIV prevalence. Studies based in Zanzibar have estimated that HIV prevalence among PWID is approximately 25%, but general population prevalence is less than 1%.[11, 12] Higher positivity among PWID on mainland Tanzania observed in the present study based may relate to the higher proportion of females participants or be attributed to higher baseline prevalence in the general population, and associated HIV transmission through risky sexual practices.

Newly diagnosed HIV is of great significance because people who are aware of their infection are more likely to modify their risk behaviours to prevent transmission to others,[36] while late-diagnoses and presentation to medical care is associated with poorer treatment response and health outcomes.[37] Indeed, HIV epidemic modelling suggests that undiagnosed HIV is likely to make disproportionate contributions to onward transmission.[38] We estimated that of HIV infections detected among males and females, 73% and 69%, respectively, represent probable new diagnoses of HIV. Rates of newly diagnosed HIV are affected by the frequency of HIV testing, so our findings support the up-scaling of routine voluntary counselling and testing (VCT) programs for PWID in Dar es Salaam. The urgency for scale-up is reaffirmed by the report by some PWID interviewed of basing their risk practices on the disclosed HIV status of their injecting peers – a highly fraught strategy given the high rates of undiagnosed HIV.

This is the first study to estimate HCV exposure among PWID in mainland Tanzania, but our findings are limited as we were only able to test for HCV antibodies. HCV antibody tests only indicate past exposure, not current infection. Nevertheless, 28% of PWID tested antibody positive for HCV, which is relatively low compared to samples recruited in other countries (e.g. Estonia, Thailand, and Pakistan).[40, 41] This figure presents a unique opportunity; rapid scale-up of prevention and treatment interventions such as NSP may prevent a more widespread HCV epidemic.

As we only tested for HCV antibodies, we were not able to measure HIV-HCV co-infection definitively. Nevertheless, potential HIV-HCV coinfection was frequently identified. Among all PWID, 15% of males and 28% of females were positive for both HIV and HCV antibodies. When considering only PWID testing positive for HIV, 51% of males and 42% of females with HIV were also positive for HCV. In studies based in Zanzibar between 2005 and 2007, the prevalence of potential HIV-HCV coinfection (based on antibody detection) among drug users ranged from 5-11% as a proportion of

all drug users.[11-13] Higher rates of potential coinfection in our study may reflect more prevalent risk practices among drug users in Temeke or indicate that HCV has become more established in networks of PWID in Tanzania since 2007. Irrespective, these findings again highlight the importance of scaling up interventions in order to avoid a more widespread HCV epidemic.

6.2 Socio-demographic factors

We identified a range of socio-demographic factors with implications for intervention. First, gender played a significant role in the HIV prevalence and risk profile of injecting and non-injecting drug using participants. Female PWID had particularly high HIV rates, but female other drug users in Temeke were also at higher risk of HIV than the general population. Female drug users may face increased risks for HIV, through both injecting and sexual risk practices which may be augmented by gender roles, including economic deprivation, propensity to also be involved in transactional sex, experience of sexual violence, and sometimes compromised capacity to negotiate condom use.[3, 42] In other settings it is often reported that women are more likely to selectively reuse needles and syringes after their sexual partner, which is related to gender and relationship dynamics.[43, 44] In summary, these findings highlight the importance of tailored interventions for women in which the broader cultural and socio-political factors affecting the health and well-being of women in Tanzania should be accounted for in such programs.

Only three percent of the non-injecting male drug users in this study tested positive for HIV, which is lower than general population prevalence.[3, 33] When viewed alongside the high prevalence of HIV among injecting and non-injecting female drug users these results suggests that injecting drug use is driving HIV transmission among drug users in Temeke, with transactional and other sexual risk practices possibly augmenting transmission among females. These data highlight the interaction between drug users and the general population though sexual partnerships, including potential HIV transmission from high risk populations to the general community. To our knowledge, these are the first estimates of HIV among non-injecting drug users in mainland Tanzania.

Second, most drug users were well established in Dar es Salaam; 80% had always lived there, and among the remainder, the median time living in the city was 12 years. This stability means that long-term connections with local communities can be developed that can aid in the diffusion of harm reduction messages and underpin the potential introduction of peer-based education and outreach harm reduction programs.

Third, although no respondents were formally employed, most income was reportedly derived from a spectrum of informal employment areas (e.g., transport, semi-skilled labour, petty trade, small business). While harm reduction and BBV prevention programs often target locations and neighbourhoods where drug use occurs, the targeting of informal employment locations, such as transport hubs and market places, may assist in broadening program reach and offer alternative locations for drug user engagement away from particular risk environments.

The only significant associations of socio-demographic factors with HIV and/or HCV infection in multivariable regression models were with sex and age. The descriptive results around sex have been discussed above and the implications of sex in relation to BBV risk and transmission are described in detail in Section 6.8. Age was controlled for in all models of infection risk, but was only significantly associated with HIV seropositivity among PWID. The association of age, independent of

time since injecting, is likely to reflect the generalised HIV epidemic in Tanzania and cumulative risk exposure associated with sexual practices, rather than effects of injecting drug use per se.

6.3 Patterns of drug use

Our study suggests that heroin initiation is occurring earlier in Dar es Salaam; younger participants reported a younger age of initiation and a shorter lag period between first use of heroin and first injection of heroin compared to older participants (see Section 5.2). In addition, a small number of injectors reported having never smoked heroin, and participants in qualitative interviews suggested an increasing trend towards being introduced to heroin directly though injecting. These findings suggest that service providers should consider the implementation/expansion of drug education and prevention programs targeting younger populations, including programs designed to avoid transition from smoking to injecting heroin.

Intervention programs designed to prevent people transitioning into IDU and to transition PWID away from injecting should note the potential facilitators and barriers to IDU that emerged from the qualitative accounts of PWID. The most commonly reported reasons for transitioning from smoking to injection in qualitative interviews were: a quick and/or more powerful "high"; cheaper comparative cost; increased tolerance to opiates; and shift in availability of brown to white heroin. These accounts are consistent with the survey data showing that PWID used less *kete*, the unit of heroin sold in Tanzania, on average per day than other drug users and additional qualitative accounts (e.g., "*If you smoke you need 8 ketes and if you inject you need 3 ketes only and you get much better high because it goes straight to the brain")*. A handful of heroin smokers indicated that they would not shift to injection due to the risk of abscesses, harm from sharing needles, and overdose (e.g., "*Injectors could by die from overdose but not smokers. That is why a lot of people are afraid of being injectors*"). The drivers and barriers to injecting should also be considered in relation to preventing young people initiating drug use through injecting.

For men, the four main reasons for first experimenting with injecting were peer incitement/pressure; through a drug using family member; through a drug using sexual partner; and, consistent with above, to get a better "high". Although there was no gender difference in reported years since first injecting heroin and similar lag periods between first use and first injection of heroin between males and females, qualitative interviewees indicated that females were often introduced to heroin when becoming sexually involved with a drug dealer: *"I shared a room with a sex worker ten years ago. I start hanging with her. Her brother, who is pusher* [sic]*, falls in love with me. And I was poor and desperate I accept to be his girlfriend and start to prepare heroin packages for him. We ended by selling and smoking heroin and this for three years"* (female, 20 years old). These data suggest that prevention programs should take account of gender differences in factors driving people to inject drugs or preventing their ability to abstain or not initiate injecting, and take account of the variety of networks of significant others that may influence these outcomes.

The concurrent use of alcohol and other central nervous system depressants is associated with overdose risk among PWID.[45, 46] Tanzanian studies have detected variable valium use in conjunction with heroin use;[1, 6, 7] only six percent of our sample reported using valium in the previous month, which is similar to that reported by Williams et al.[1] In contrast, qualitative reports suggested that valium may be routinely taken in combination with heroin: "*First you take 5 tablets and you drink*

something warm in your body (Tea) and after that you take heroin. When you take Valium you take heroin." Although not statistically significant, higher rates of overdose were reported by participants reporting higher frequency alcohol consumption and valium use in the past month.

BBV prevention and other harm reduction programs (e.g., overdose prevention) should consider risk in relation to location of drug use and individuals with whom people inject. Survey data showed that those who usually injected with a group of people in a camp or injected with at least one other person reported higher risk practices than those who usually injected alone. Previous studies of drug use in Tanzania have noted that the usual locations for injecting are either in open spaces, street corners and hangouts, collectively known as a camp or *maskani,* or private rented rooms, locally known as *mageto.*[6] The most commonly reported locations of injecting in our study were at home (54%) or in a camp (33%). This high proportion of PWID reported injecting at home warrants special attention as these people may be of greater risk of fatal overdose if they are injecting alone and may be harder for services to reach. During qualitative observations and interviews nearly all drug users practiced injecting in the street or in a group. In the context of the high proportion of new HIV diagnoses made in this study and the limited knowledge of HCV, education to encourage the universal use of clean injecting equipment, independent of users' perceptions of the BBV status of their peers, should be a priority for harm reduction programs. The social and structural environment of IDU in Temeke warrants consideration of peer networks and peer outreach models for needle and syringe distribution and education.

Peer education models and the influence of peer networks on BBV risk should also take account of the role of the "doctor"[6] – an experienced injector who injects others, particularly those who have deep veins, those whose veins are in poor conditions or new injectors – within injecting networks. In the quantitative survey, one quarter of PWID reported being helped by someone to inject at last injection. In the qualitative component it was theorised that "doctors" often share drugs with their clients after preparing it for injection, and higher sharing of needles, syringes and injecting equipment has been reported in other settings were assisted injections are common.[47, 48] Accordingly, in quantitative analysis those who were helped to inject at last injection were significantly more likely to have taken solution from a shared container at last injection and to have practiced frontloading at last injection. While these data implicate the potential role of the "doctor" in facilitating BBV transmissions, this important role within an injecting network provides key opportunities for intervention. Qualitative data suggested that some "doctors" play a prevention role by teaching injectors safe injecting practices. Although this was not apparent in our quantitative study, it remains an important consideration for future research and prevention efforts.

6.4 Injecting risk behaviours

Overall, reported sharing of needles was low in this study – only 17% reported reusing a needle or syringe used by someone else in the previous month, and only 8% reported using an unsterile needle at last injection. Previous estimates of needle sharing vary. Our result is similar to other studies reporting injection with used needles in the previous month[8] and use of unsterile needle at last injection in Dar es Salaam.[7] However, our estimate of the rate of needle sharing is considerably lower than reported among MSM-PWID in Zanzibar[11-13] and lower than one other study reporting on sharing behaviour in previous month among PWID in Dar es Salaam.[1]

The qualitative component and interviewer reports of this study suggest that the quantitative survey underestimated the extent of reuse of someone else's needle and syringe, which is likely due to response bias. In qualitative interviews PWID placed sharing needles and syringes at the top of the risk hierarchy, and the sharing of other paraphernalia (e.g., sharing water and containers) at the bottom. The variance in risk perception potentially explains why the report of sharing needles and syringes may have been more susceptible to social desirability bias than the sharing of other equipment. Alternatively, lower reported rates of sharing needles compared to other equipment may simply reflect risk mitigation based on the BBV risk assessments made by PWID or reflect increasing coverage of needle programs in Temeke district in 2011.[30]

In addition to a focus on the importance of using sterile needles and syringes, this study highlights the importance of educating PWID about the risks of reusing other equipment. In the quantitative component, the most commonly reported sharing methods in order of frequency were injecting with a used syringe that was first cleaned, sharing a razor blade, sharing other equipment, and taking solution from a shared container. Whereas having injected with a needle or syringe previously used by someone else in the previous month was not associated with risk of HIV in multivariable regression analyses (the aforementioned reporting limitations aside), sharing a mixing container contributed substantial increased risk. In Temeke, most users either mix heroin with water in a plastic container (a corner triangle cut from the plastic packaging of a new sterile syringe) or directly in the syringe itself. More than three quarters of PWID reported normally reusing the same needle and syringe at least once. If this was done in conjunction with taking solution from a shared container, then the solution may become contaminated by someone who is HIV positive. Taking drugs from a shared contained may also be influenced by the common practice of pooling money with other drug users in order to financially secure drug procurement,[6, 8] a practice also warranting consideration in harm reduction programs.

Of concern, two fifths of PWID survey respondents reported using a previously used syringe after cleaning it; all reported cleaning the syringe with water only. Although we did not detect an association with injecting with a used syringe first cleaned and HIV seropositivity or newly diagnosed HIV, it was associated with a two-fold increase in HCV seropositivity in multivariable analysis. This may be due to the fact that HCV is more readily transmitted through sharing injecting equipment than HIV.[49, 50] The practice of cleaning and reusing syringes should be considered an important risk behaviour in this population, and its association with HCV diagnosis in this study means that the continuation of such behaviours may in time influence HIV transmissions as well. While the cleaning of used syringes potentially reflects motivations towards risk reduction, current practices imply a misconception that sterility can be judged on the visibility of blood. These data, alongside the practices and perceptions of risk in relation to the sharing of various injecting equipment warrant comprehensive injecting harm reduction education programs and potentially the distribution of other injecting equipment (e.g., sterile water and mixing containers) through NSPs.

Our qualitative study showed that frontloading, or using one syringe to inject heroin mixture into a receiving syringe, was the most common method of sharing in Temeke. In contrast, only seven percent of the respondents to the quantitative survey recalled frontloading at their last injection. As described above, the low prevalence of frontloading reported by survey respondents may have been subject to response bias. Having practiced frontloading at last injection was associated with higher risk of HIV and newly diagnosed HIV among PWID in univariable analysis, but, potentially influenced

by the low reported prevalence, did not remain significant when controlling for other risk factors. Overall, these data suggest that the practice of frontloading still warrants close consideration in Temeke.

Contrary to previous reports of drug injecting behaviour in Dar es Salaam, the practice known as flashblood was not well known or commonly practiced in this sample of PWID. In qualitative interviews, the term "flashblood" as coined by McCurdy *et al* (2010) was not recognised.[4] Instead, the term was used to refer to the practice of an injector withdrawing and re-injecting his/her own blood, without sharing it with anyone else (a practice identified in other studies of PWID and commonly known as 'jacking', 'booting' or 'flushing').[51, 52] Only 21 (8%) PWID reported ever practicing withdrawing their own blood after injecting with heroin, and passing on the syringe of blood for someone else to inject. Whereas flashblood was previously documented to be predominantly practiced by females, all but one participant reporting the practice in this sample were male.

One fifth of PWID reported using a syringe that had been kept hidden at least once in the previous month. The survey did not distinguish between injecting with a syringe that had been hidden by the user or hidden by another drug user, reported previous as nine and eight percent, respectively, in relation to needle and syringes hidden in a *geto*.[7] Hiding syringes to reuse at a later time can impact health through two ways. First, hidden needles and syringes are exposed to unsterile environments and may increase likelihood of infection and abscesses. Unsterile injecting equipment increases risk of localised or systemic infection, abscesses, prominent scarring or bruising, or thrombosis,[53-56] particularly as the needle becomes blunter and is exposed to more potential pathogens.[57] Second, other drug users may find and inject with hidden needles, such as depicted in qualitative interviews: "*Injectors used to hide their used needles for future use. But if you do not have a syringe you always find one hided somewhere by someone else*" (male, 39 years). These practices support both the local expansion of needle and syringe distribution programs and also providing facilities and education around the appropriate disposal of used needles and syringes.

Reports of non-fatal overdose were common among surveyed PWID; one third of PWID had overdosed in the previous 12 months, which is consistent with cross-sectional studies of drug users in other populations.[58-61] Previous research, including cross-sectional and cohort studies, has found that heroin overdose may be related to route of administration, more frequent use of alcohol or use of benzodiazepines, requiring help when injecting, recent imprisonment, and street injecting.[45, 62-64] Although not significant for all variables, similar associations where observed in this study. Specific to PWID, people who injected with a group of people in a camp reported more non-fatal overdose compared to those injecting with at least one other person and those usually injecting alone. While this finding is encouraging in relation to preventing fatal overdose associated with injecting alone, it highlights the need for education programs for PWID to recognise the signs of overdose and respond appropriately.[61]

6.5 History of arrest and imprisonment

More than half of males and females in our study reported having been arrested in association with drugs in the previous 12 months. The criminalisation of carrying needles and syringes is commonly linked to increased injecting risk behaviours, given a disincentive to carry clean injecting equipment

for fear of arrest.[4, 14] Accordingly, in this study we found that PWID who had been arrested in the previous 12 months were more likely to report injecting with a needle and syringe that had been hidden in the previous month (with associated health outcomes described above). Although we expected previous drug-related arrest to be positively correlated to infectious disease due to fear of carrying clean injecting equipment, we found a negative association such that those reporting previous arrest were significantly less likely to test positive for HCV. Causality cannot be determined, and one possible explanation is that the PWID who carried sterile injecting equipment and practiced safer injecting practices were at higher risk of arrest. What is unknown in this situation is the effect of such an association on future injecting risk practices.

Prisons are a high risk environment for transmission of infectious disease including HIV, HCV, and tuberculosis, due to multiple factors.[65, 66] In this study, approximately a third of all drug users reported ever having been imprisoned. Reports of drug use in prison were frequent among males (31%), although only five percent of males with incarceration histories reported injecting in prison. Imprisonment provides potential opportunities to access high-risk populations with prevention and treatment services, including HIV and HCV information and education, voluntary counselling and testing, condom distribution, OST, sterile needle and syringe provision, and linking HIV positive prisoners with community services upon release.[57, 65] However, such services are often controversial in the prison context, although they have been delivered successfully in numerous settings.[67-69]

6.6 Sexual risk behaviours

In a country with a generalised HIV epidemic, and relatively high background prevalence of HIV, interactions between sexual risk practices and injecting risk practices have important implications for harm reduction.

Respondents to our survey reported having multiple partners, engaging in transactional sex, and non-injecting regular partners – behaviours noted in previous studies of PWID in Tanzania,[1, 5, 7-9] Sexually transmitted HIV risk in this population of other (non-injecting) drug users was mediated by reports of transactional sex. Having sold sex in exchange for money or drugs in previous 12 months was associated with higher HIV positivity, and not reporting a transactional sex partner was protective. Among all drug users, females (51%) were more likely than males (15%) to report having sold sex in exchange for money or drugs in the previous 12 months. Inconsistent condom use was more prevalent among males than females with all partner types. The prevalence of these high risk sexual practices strongly supports the implementation of routine sexual risk reduction education and condom distribution as part of any local harm reduction interventions. Risky sexual behaviour among drug users also needs to be considered in the context of the transmission of STIs other than HIV and the effect of STIs on enhancing HIV transmissibility.[70-73] STI testing and management are an important component of HIV control,[25] with demonstrated effectiveness in Tanzania.[74] Alongside providing opportunities for regular HIV testing and counselling, drug use harm reduction programs should also consider the provision of diagnostic testing and treatment services for other STIs.

In addition to a focus on casual and transactional sex partners, sexual health information and harm reduction services should also include consider drug users living with their sexual partners or in regular relationships. Consistent with findings reported elsewhere,[6, 75] we found differential rates of condom use by partner type, with lowest condom use reported with regular partners. In Sub-

Saharan Africa, a high proportion of HIV transmission is attributed to concurrent relationships.[76] High-risk regular sexual partnerships were manifest among those PWID whose partner did not inject drugs. Among PWID reporting any regular sex partner, 83% of males and 53% of females indicated that their current or most recent partner did not inject drugs. Among PWID with non-injecting partners, 89% of males and 75% of females reported inconsistent condom use with their regular partner. This result adds weight to the growing notion that PWID in Tanzania may act as a bridging population by increasing HIV infection in the general, non-injecting drug using, population.[2, 3, 9, 11, 23, 57, 77]

Six percent of male survey respondents reported having ever engaged in male-to-male sex, of whom 38% reported selling sex in the previous 12 months. These figures may be underestimated due to the condemnation and stigmatisation of homosexuality in Tanzania.[12, 78, 79] Despite being unable to detect an association between male-to-male sex and HIV positivity, males reporting sex with other males in Temeke may be at higher risk of HIV than the general population because of their greater likelihood of engagement in transactional sex and the relative risk of HIV transmission through anal compared to vaginal sex, as evident in other research.[12, 78] Local harm reduction programs should promote non-judgemental services targeting drug using MSM so that appropriate risk reduction services and strategies can be provided that meet the risk profile of these men.

6.7 Knowledge of HIV and hepatitis C

Levels of knowledge of sexual risks practices for HIV and associated misconceptions among survey respondents were similar to those found in the THMIS 2007-2008.[33] In these surveys HIV knowledge or risk perception were not asked in relation to IDU. As reported earlier, qualitative accounts demonstrated a hierarchy of HIV risk perception, from sharing needles through to other injecting equipment. A small proportion acknowledged that frontloading could be a potential risk. These results are particularly significant given that taking solution from a shared container was the most consistent correlate of infection and simultaneously regarded with the lowest risk, and suggest a need for comprehensive education regarding HIV risk through the sharing of other injecting equipment and the potential distribution of sterile injecting drug preparation equipment.

Across all arms of our study, nearly all participants reported that they had not heard of HCV. This means that they could not possibly recognise a link between sharing injection equipment and HCV transmission. Limited knowledge of HCV is a concern given the known interactions between HIV and HCV (e.g., increased HCV viral load in co-infected PWID;[80, 81] increased probability of mother-to-child HCV transmission;[82] accelerated HCV disease progression;[83] reduced probability of spontaneous HCV clearance in co-infected individuals;[84-86] reduced probability of developing protective immunity to HCV[85, 87]). The limited knowledge of HCV, coupled with the frequency of HCV exposure we observed in this study, suggests an urgent need for HCV education among PWID in Temeke. Such programs should consider targeting PWID with HIV who may be engaging in high risk injecting practices with known HIV infected injecting partners without considering the risks of HCV co-infection.

During the qualitative interviews, many drug users reported applying their knowledge of disease transmission as a means of protecting against HIV. There was a spectrum of both sound and problematic risk reduction strategies employed, including: stopping their most risky practices like sharing drugs from a shared syringe; never sharing syringes; always making an effort to get new

syringes; injecting alone; injecting first when sharing needles and syringes; sharing heroin in its powder form only; and frontloading with two new needles only. These reports suggest that PWID are receptive of harm reduction messages. Attempts to modify risk behaviours among PWID also provide support for peer models of risk reduction education and needle and syringe distribution.

There were also reports of selectively sharing needles based on other drug users self-reported HIV status or appearance: "*I avoid sharing with HIV people who either declare it themselves, or looks like HIV positive or other people tell me that they are HIV positive. That is how I avoid HIV*" (male, 28 years). Drug users may also use condoms selectively depending on partner type, such that they may be more likely to use a condom with a casual or transactional sex partner than regular sex partner: "*I do not use condom with my boyfriend but with others yes*" (female, 20 years), which was supported by comparatively high rates of consistent condom use reported with transactional followed by casual sex partners. These data, alongside the proportion of newly diagnosed HIV detected in this study and potentially limited access to regular HIV testing and counselling among PWID, support targeted education to PWID in Temeke about the risk associated with sharing injecting equipment and unprotected sex on the basis of self-reported HIV status and/or the appearance or HIV risk profiling of injecting partners.

6.8 Access to harm reduction and HIV prevention and treatment services

Less than half of the PWID surveyed in this study reported receiving a sterile needle or syringe in the previous 12 months. While these data suggest that local NSP coverage is inadequate, they provide little indication of quantity or frequency of service/equipment access among those who have received injecting equipment, which are also important determinants of impact. Technical guidelines suggest that a moderate target for syringe distribution is at least 100 per IDU per year to impact on HIV transmission, and that a much higher level is required to impact HCV transmission.[88] Clearly, such a target is not being met for a large proportion of IDU in Temeke.

The receipt of sterile needles and syringes in the previous 12 months was associated with higher likelihood of being newly diagnosed with HIV and HCV positivity. Because causality and the frequency and number of needles received cannot be quantified, interpretation of this result is difficult. This result may indicate that prevention services are reaching and being accessed by those at highest risk, or alternatively, that despite some access, NSP coverage to high risk PWID is not sufficient to prevent infection. Additional prospective research is needed to examine the impact of NSP access and HIV transmission.

Approximately half of all drug users reported having ever been tested for HIV, with considerably more females (70%) than males (43%) reporting HIV testing histories. These percentages are comparable to those reported in the general population.[10] However, half of those ever tested reported being tested two or more years ago. An overwhelming majority (73%) of PWID testing HIV positive in this study were previously undiagnosed and potentially engaging in injecting risk practices that were unknowingly placing their injecting partners at risk. These data suggest a need for additional testing and education campaigns and the up-scaling of HIV voluntary testing and counselling services targeting PWID. Testing services should be considered a key component, alongside harm and risk reduction programs, in preventing HIV transmissions among PWID in Tanzania.

Nearly two fifths of respondents reported ever having tried to stop using drugs, yet only a small minority reported receiving any formal help to do so. Among the priority services identified by drug users, drug dependence services (help to quit drugs, primary health care, rehabilitation centres, and OST) were prominent. The need for counselling services was nominated by both qualitative and quantitative respondents and female interviewees identified demand for self-help or support groups, particularly in relation to female drug users or ex-drug users. Local demand reduction and treatment services should be considered a key element of HIV and HCV prevention among PWID.

6.9 Limitations

Ours was a cross-sectional study meaning that it is not possible to determine causal relationships between reported behaviours and infection status. Indeed, it is possible that some of the associations detected in these analyses may reflect drug users modifying their behaviour after being diagnosed with HIV. While these types of limitations make findings difficult to interpret in any cross-sectional study, we have attempted to better understand these associations by estimating newly diagnosed HIV and exploring outcomes amongst those newly diagnosed HIV positive.

The sensitive nature of questions on drug use and sexual behaviour means that some behaviours may be under-reported. Response bias may be affected by the skill and experience of the interviewer as well as the circumstances and settings of data collection. In this study surveys were coordinated and administered through an NGO active in harm reduction in the local area. Responses may therefore have been affected by respondents' having had contact and used services from the organisation.

Snowball sampling was used is this study to enhance recruitment of hard-to-reach and otherwise hidden populations. As a non-probability sampling method, it is therefore not possible to determine the extent to which the sample was representative;[89] consequently, these results may not be generalisable. Snowball sampling relies on referrals from recruited drug users, and thus drug users who are part of social networks may be sampled more readily, potentially leading to under-sampling of drug users not readily involved with other drug users.[89] The final sample composition can be influenced by the choice of the initial recruitment seeds. In this study, both male and female seeds were selected on the basis of being influential members in networks of PWID. Although snowball sampling is routinely used to recruit drug using populations, several steps were taken to optimise representativeness of drug users residing in Temeke including targeted sampling based on ethnographic and mapping results and key informant advice (e.g., all identified camps in Temeke district were represented including outlying camps, recruitment of a pre-set proportion of female, young drug users, and non-injecting drug users). The high proportion of PWID who injected at home in this study indicates that the sampling method may have been successful in reaching more covert drug scenes. Based on median estimations from drug users and key informants, there are estimated 650 heroin injectors and 600 heroin smokers in Temeke district, in which case this study potentially sampled approximately 40% of local PWID.

HIV and HCV were detected using rapid antibody testing which may have missed individuals who had newly acquired HIV or HCV infection, pre-seroconversion.

7 .....Conclusion and recommendations

This rapid assessment provides important evidence of high risk injecting and sexual risk behaviours in a large sample of drug users, with immediate relevance to harm reduction services. The survey covered a spectrum of risk areas with significance to HIV and HCV transmission among drug users. Importantly, it also provides the first account of behaviour and health of other drug users in Tanzania, and is one of the first studies to test for HCV exposure. Temeke, one of the poorest districts of Dar es Salaam, has a considerable heroin market and has not been investigated in previous studies of PWIDs in Tanzania.[5] Based on estimates of the number of heroin users in Temeke district, provided by drug users and key informants, we believe we have sampled a considerable proportion of eligible candidates for this study.

Although IDU only emerged in Tanzania in year 2000, HIV prevalence among PWID has already well surpassed that of the general population; we found that 30% of male and 67% of female PWID were HIV positive, while estimated population prevalence was approximately 10% in females and 8% in males in Dar es Salaam (2007).[33] The disparity in HIV prevalence between male and female PWID is reflective of the gender ratio in the general population, albeit more pronounced. This gender disparity was also observed in other, non-injecting drug users, with considerably higher HIV prevalence in female non-injecting drug users compared to the general population. It is likely that the excess HIV positivity observed in female drug users, including injecting and non-injecting, is reflective of general population prevalence trends, and transmission between drug users and the general population is evident. In particular, while males and females did not significantly differ in their reports of injecting risk behaviours, sexual behaviour differed. A higher proportion of females were sexually active than males, reported more sex partners, and engaged in more transactional sex. The implied interaction between PWIDs and the wider population and the high prevalence in non-injecting female drug users reinforces the notion that injecting drug use should not be viewed in isolation, and two-way transmission of HIV between the general population and drug users through high risk sexual behaviour, including casual and transactional sex partnerships, is highly likely.

High risk injecting practices were evident in this population of PWID, even with suspected underreporting. Reported past-month injecting drug use was clearly associated with HIV and HCV positivity; positivity was three-fold higher in PWIDs compared to non-injecting drug users, while HCV was virtually non-existent in non-injecting drug users. In addition, specific associations with infection were detected for using solution from a shared container and injecting with reused needles that were first cleaned. Importantly, perception of risk associated with sharing containers and other paraphernalia was low and these behaviours were relatively common. Given the high proportion of PWIDs also reusing their own needles, shared containers may pose considerable risk of contamination and subsequent transmission of HIV and HCV.

The results of this rapid assessment lead to the following recommendations around programs, policies and practices to reduce the impact of HIV amongst drug users in the Temeke district.

1. Adapted, high coverage needle and syringe programs

- The *current coverage* of needle and syringe programs in Temeke district is limited. Given the high frequency of injecting among PWIDs, adapted scale-up of needle and syringe distribution is required. Expanded distribution including outreach to identified camps is necessary to ensure wider geographical coverage. In addition, the development of secondary distribution systems may be considered to ensure access to hidden sub-populations. This would involve identifying and training known injectors and regularly providing them with sufficient sterile injecting equipment to pass on to other users.
- Special consideration needs to be made to reach people who usually *inject at home and/or alone*. This rapid assessment has shown that they can be reached and identified, but in order to maintain engagement and access to NSPs, arrangements for home visits or other secondary distribution should be incorporated.
- Given the high proportion of PWID reporting sharing *other injecting paraphernalia*, these items, including clean water for drug preparation, should also be provided through NSPs.
- *Disposal boxes* for used needles and syringes should be available at major camps. Based on previous experience, the disposal boxes need to be small, puncture-proof, and locked to prevent drug users reusing needles than have been previously disposed.

2. Expanded access to opioid substitution therapy (OST)

- Problematic drug use in Temeke district is limited to heroin use, which means there is opportunity to reach all drug users through OST. Need for OST was commonly expressed by survey participants. *Expansion of current OST* is required. Prescription and dispensing through community-based organisations that are engaged with drug users should be considered.

3. Regular testing for HIV, HCV and STIs

- We found a high proportion *of* previously *undiagnosed HIV infection*. Promotion of routine testing for HIV, HCV, and STIs for drug users is essential. Services tailored to meet the needs of PWID should be identified, included adapted counselling. Community-based testing through organisations and outreach services that are already engaged with drug users may increase access and uptake of regular testing. Clear referral pathways into care and management services should be identified. In addition, there is a need for tailored health services, including provision of antiretroviral therapy.

4. Health education and support

- We identified poor knowledge of injecting risks beyond sharing needles and syringes. *Targeted education campaigns* should include specific messages about these risks. In addition, awareness of HCV was negligible in this population, and *education on HCV*, including the implications of coinfection, is crucial. There is also cause to educate drug users of recognising the *signs of overdose* and appropriate first aid response.
- In addition to education, a demand for counselling and other self-support groups was commonly requested and could be adapted to group support sessions through community organisations or in collaboration with existing medical services. These may be adapted for both current and former drug users.

5. A focus on women

- *The disproportionate burden of HIV in female PWID and other drug users* requires a special focus on the needs of these women. Women-only drop-in hours and women support groups may be appropriate. Particular attention should be given to engaging with women involved in transactional sex.

6. Increased access to basic needs and primary health care services

- Drug users in Temeke district need better access to *primary health care services*. Stigmatisation of drug users may prevent them from accessing mainstream services. Community-services that are engaged with drug users should consider incorporating nurse and/or physician care to help meet the medical needs of this population.
- Other basic needs were also identified as priority services by drug users, including: food, showering and washing facilities, clothes, and housing. In addition to basic needs, means of social reintegration, such as education, vocational training, and employment services were expressed priorities. Providing some of these facilities alongside traditional harm reduction services and identifying suitable services in the broader community may help to engage with a wider range of drug users and improve their general health and well-being.

7. Address sexual risk practices

- Given the frequency of sexual risk behaviours in this population, prevention efforts and education need to include condom provision and emphasise the importance of consistent condom use with casual, transactional, male-male, and potentially regular sex partners.

8. Interact with heroin smokers

- Harm reduction strategies, including prevention education and support services should actively try to engage with heroin smokers to circumvent the common transition from smoking to injecting heroin.

9. Increased advocacy

- Advocacy around the needs of PWIDs and benefits of harm reduction strategies is required. Specific action should include: organising a national advocacy workshop/training on OST for stakeholders and professionals in health and law enforcement sectors; engagement with law enforcement sectors should include advocacy for the decriminalisation of possession of needle and syringes, where applicable; to initiate training for national psychiatrics and primary health care services on managing drug abuse disorders; and to build links with SAAHRN harm reduction network and establish the Tanzanian harm reduction association as a focal point of this network.

10. Surveillance

- Surveillance of changing patterns in injecting practices, sexual risk behaviours, HIV and HCV infections, and testing behaviour in drug users is needed to inform and assist evaluation of harm reduction policy, programs, and interventions. Surveillance systems should be integrated into drug user service provision as these services are being scaled up, and should explore options for anonymous unique identifiers that will assist greatly in determining HIV and HCV incidence, associated risk and protective factors and service coverage.

11. Further research

- Some unexpected results for associations with HIV and HCV positivity reiterate that further in-depth research is required to understand and identify high-risk subpopulations and behaviours. In addition, further research on the role of "doctors" and their potential contribution to facilitation or protection against infectious disease transmission could inform future interventions.

8 .....Appendix

8.1 *Quantitative questionnaire*

Date
Participant Code
Interviewer Code

No	QUESTIONS

Knowledge about the person

1 **Record sex of respondent**
(circle the answer) Only 1 choice possible

1 Male
2 Female

2 **How old are you?**
(specify age in numbers) Only 1 choice possible

1 _____ Years old
88 Don't know
99 No response

3 **How long have you been living in Dar Es Salaam ?**
(circle the answer and specify year/month in numbers) Only 1 choice possible

1 Less than a year
2 _____ Years
3 Always (since birth)
4 Other *(please specify)* _____
99 No response

4 **Have you ever attended school?**
(circle the answer) Only 1 choice possible

1 Yes
2 No **Skip to Q6**
99 No response

5 **What is the highest level of school you completed:**

(circle the answer) Only 1 choice possible

1 Pre-school
2 Primary
3 Secondary
4 Higher
99 No response

6 **Are you currently married or living with a man/woman with whom you have a sexual relationship?**
(circle the answer) Only 1 choice possible

1 Currently married, living with spouse
2 Currently married, living with other sexual partner
3 Currently married, not living with spouse or any other sexual partner
4 Not married, living with sexual partner
5 Not married, not living with sexual partner
99 No response

7 **Where do you live?**
(circle the answer) Only 1 choice possible

1 At my own private place (flat, house, etc...)
2 At my parents' home
3 At some relatives' place
4 At friends' place
5 In the street, homeless / no fixed place
6 Other (*please specify*)
99 No response

8 **What is your main employment status?**
(circle the answer) Only 1 choice possible

1 Employed
2 Unemployed but already had worked
3 Unemployed and never worked
4 Housewife
5 Student
6 Informal work *(Please specify)* :
6.1- CSW
6.2- bus station
6.3- stealing
6.4- dealer
7 Impossible to work because of health reason
8 Other *(please specify)*_____
99 No response

Drug use

Now, we would like to ask you some questions on your drug use behaviours. Please try to give as accurate information as possible

9 **Products used: Several choices possible**
- *Name the products used during the last month*
- *Tick the products used (yes/no)*
- *In case of yes, fill in the other items*

Consumption during the last month	*Heroin*	*Crack*	*Valium*	Marijuana	Alcohol	Other
	1 yes	1 yes	1 yes	1 yes	1 yes	_____
	2 no	2 no	2 no	2 no	2 no	
a. Age of first use	|__|__|	|__|__|	|__|__|	|__|__|	|__|__|	|__|__|

b. Frequency of use

b1 - Less than once per week
b2 - One to several times per week
b3 - Everyday

c. Way(s) of use
(Several answers possible)

c1 - Oral (swallowed, drank)
c2 - Sniff
c3 - Injection
c4 - Inhaled, Smoked

If interviewee doesn't use heroin, skip to Q12 for NIDUs and Q13 for IDUs

10 **How old were you when :**

10.1 .You first smoked heroin? |__|__| years — Never smoke = 0 — **Skip to Q11**

10.2. You first injected heroin? |__|__| years — Never inject = 0

For NIDUs only

11 **How many cigarettes do you smoke per day?**

(circle the answer) Specify the numbers

1 _____

88 Don't know
99 No response

12 **Do you share razor blade?**
(circle the answer) Only 1 choice possible

1 Yes
2 No
99 No response

FOR IDUS AND NIDUS

If interviewee doesn't inject, skip to Q15 for NIDUs then skip to Q27

13 **How long have you been injecting drugs once a day or more?**
(circle the answer) Only 1 choice possible – Specify the numbers for months/years

1 _____ Months
2 _____ Years
3 _____ Others
99 No response

14 **When did you last inject drugs?**
(circle the answer) Only 1 choice possible – Specify the numbers for hours/days

1 _____ Hours ago
2 _____ Days ago
88 Don't remember
99 Refused to answer

If interviewee does not use heroin please skip to Q16

15 **If you use heroin, how many "kete" (dice) are you using per day on average?**
(circle the answer) Only 1 choice possible – Specify the numbers for "dice"

1 _____ Dice
99 No response

16 **When you last injected, did someone help you to inject?**

1 Yes
2 No
99 No response

Sharing syringes

17 **Think about the last time you injected drugs.**
The last time you injected drugs, did you use a sterile needle or syringe?
(circle the answer) Only 1 choice possible

1 Yes
2 No
88 Don't know
99 No response

18 **Please recall this same last injection and tell me:**
(circle the answer) Only 1 choice possible

a) Did you use a syringe after it was filled by somebody else from his/her syringe (front loading)?
1 Yes
2 No

b) Did you use a shared bottle, spoon, container, or water?
1 Yes
2 No

c) Did you take solution from the shared container?
1 Yes
2 No

d) Did you share razor blade?
1 Yes
2 No

e) Did you use a previously used syringe without cleaning it?
1 Yes
2 No

f) Did you use a previously used syringe with cleaning 1 Yes
If yes, with what?
_____

2 No

19 **During the last month, how often have you used a needle/syringe that nobody had used before?**

(circle the answer) Only 1 choice possible

1 Once
2 Every time
3 Almost every time
4 Sometimes
5 Never
88 Don't know
99 No response

20 **During the last month, how often have you used a needle/syringe which was kept in some hidden place (like a roof for example)?**
(circle the answer) Only 1 choice possible

1 Once
2 Every time
3 Almost every time
4 Sometimes
5 Never
88 Don't know
99 No response

21 **Normally, how many times do you use the same needle/syringe to inject?**
(circle the answer) Only 1 choice possible – Specify the numbers

1 _____ Times

88 Don't know
99 No response

22 **Did you ever practice withdrawing blood in the syringe after having injected and giving it to somebody else?**
(circle the answer) Only 1 choice possible

1 Yes
2 No
99 No response

23 **Think about the times you injected drugs during the past month (last 30 days).**
How often was it with a needle or syringe that had previously been used by someone else?
(circle the answer) Only 1 choice possible

1 Always
2 Most times
3 About half the time
4 Once
5 Occasionally
6 Never **Skip to Q25**
88 Don't know
99 No response

24 **Over the last month, whose needle did you re-use?**
(circle the answer) Several answers possible

1 Your usual sexual partner
2 Sexual partner with whom you had sex for the first time
3 Friend
4 Drug dealer
5 Professional injector ("doctor")
6 Someone in a shooting gallery
(place where several users meet and inject together)
7 Other *(Please specify)*
99 No response

25 **Where do you inject (location)?**

(circle the answer) Only 1 choice possible

1 In camp
2 At home
3 Wherever I am when I get drugs
4 Others (please specify) _____
99 No response

26 **With whom do you inject?**
(circle the answer) Only 1 choice possible

1 Alone
2 With at least 1 other person
3 With a group of persons in the camp
4 Others (please specify) _____
99 No response

Overdose and treatment

27 **Did you experience to have an overdose (loose of consciousness) during the last 12 months?**
(circle the answer) Only 1 choice possible

1 Yes
2 No
99 No response

28 **Did you ever try to stop using drugs?**
(circle the answer) Only 1 choice possible

1 Yes *(specify)*
If yes, how long did you remain abstinent the last time you have stopped?
_____

2 No **Skip to Q30**
99 No response

29 **If you ever tried to stop, by whom you have been helped?**
(circle the answer) Several choices possible

1 Traditional healer
2 Religious dispensary/services
3 A friend
4 Hospital
5 Private clinic
6 Other (*please specify)*
_____

99 No response

Sexuality

We will now change a bit the subject of the questions, and I would like to ask you questions regarding your sexuality. We are aware that some of the questions may be rather intimate. Please try anyhow again to answer as accurately as possible for you.

30 **How old were you when you had your first sexual intercourse?**
(circle the answer) Only 1 choice possible Specify the numbers

1 .....years old
2 Never had it **Skip to Q40**
88 Don't know
99 No response

31 **In the last 12 months, how many different people have you had sexual intercourse with?**
(circle the answer) Only 1 choice possible Specify the numbers

1 _____ people

2 Did not have sexual intercourse in the last 12 months
88 Don't know
99 No response

32 **Have you had sexual intercourse in the last month?**
(circle the answer) Only 1 choice possible

1 Yes
2 No
88 Don't know
99 No response

33 **For Women: Think about the male sexual partners you've had in the last 12 months**
For Men: Think about the female sexual partners you've had in the last 12 months

Among these partners that you have had in the last 12 months, how many were:

99. No response

33.1 Your spouse or live-in sexual partners

1 Regular_____ 1.2 Didn't have 88. Don't know 99. No response

33.1.1 Did you use a condom each time?
1 Yes
2 No
99 No response

99. No response

33.2 Commercial (partners with whom you bought or sold sex in exchange for money or drugs

2 Commercial_____ 2.2 Didn't have 88. Don't know 99. No response

33.3.1 Did you use a condom each time?
1 Yes
2 No
99 No response

99. No response

33.3 Sexual partners that you are not married to and have never lived with and did not have sex in exchange for money or drugs

3 Non regular_____ 3.2 Didn't have 88. Don't know 99. No response

33.2.1 Did you use a condom each time?
1 Yes
2 No
99 No response

34 **Think about the last time you had sexual intercourse. Did you or your partner use a condom the last time you had sexual intercourse?**
(circle the answer) Only 1 choice possible

1 Yes
2 No
88 Don't know
99 No response

If respondent has declared having had sexual intercourse with a regular sex partner in the last 12 months (cf. Q33.1) please ask, if not skip to Q34

35 **Does your regular partner (current or last regular partner) inject drugs?**
(circle the answer) Only 1 choice possible

1 Yes
2 No
88 Don't know
99 No response

If respondent has declared having had sexual intercourse with a commercial sex partner in the last 12

36 **If you had a commercial partner during the last 12 months, in total how many were:**
(circle the answer) Only 1 choice possible

36.1 Partners to whom you sold sex in exchange for money or drugs

1 **Sold:**
88 Don't know
99 No response

36.2 Partners from whom you bought sex in exchange for money or drugs

1 **Bought:**
88 Don't know
99 No response

Ask Q37 and Q38 to Men only and continue to Q39

If interviewee is a woman : go straight to Q39

37 **We've just talked about your female sexual partners. Have you ever had any male partners?**
(circle the answer) Only 1 choice possible

1 Yes
2 No **Skip to Q39**
99 No response

38 **With how many male partners have you had sexual/anal intercourse in the last 12 months?**
(circle the answer) Only 1 choice possible Specify the numbers

1 Male partners: (*Please Specify)*
_____

88 Don't know
99 No response

Ask men and women

39 **Have you ever been raped?**
(circle the answer) Only 1 choice possible Specify the numbers

1 Yes
If yes, by how many persons in total at once?
(please specify) _____

2 No
99 No response

Ask Q40 only to women
If interviewee is a man, skip to Q41

40 **Do you sometimes clean your vagina with soap or other products?**
(circle the answer) Only 1 choice possible

1	Never
2	Sometimes
3	Regularly
99	No response

HIV/AIDS knowledge

41 **Have you ever heard of a disease called AIDS?**
(circle the answer) Only 1 choice possible

1 Yes
2 No
99 No response

42 **Did you perform HIV Test?**
Circle the answer - only 1 choice possible

1 Didn't do a test
2 Did the test : Year of the last test |___|___|___|___|

a. *If test* has:
1 Result positive **Skip to 42-b)c)d)**
2 Result negative **Skip to Q43**
3 Don't know

b. *If result is positive, year of* discovering being HIV+ |___|___|___|___|

c. *If positive* : Have you had a consultation with a doctor during the last 12 months for this disease
1 yes
2 no

d. Treatment prescribed :
1 yes
2 no

Knowledge of HIV/AIDS transmission

43 **Please give me your opinion regarding the following:**

(circle the answer for each line)

1 a) Can having sex with only one faithful, uninfected partner reduce the risk of HIV transmission?
1 Yes
2 No
3 Does not know
2 b) Can a person get HIV by sharing a meal with someone who is infected
1 Yes
2 No
3 Does not know
3 c) Can a healthy-looking person have HIV?
1 Yes
2 No
3 Does not know
4 d) Can a person get HIV from mosquito bites?
1 Yes
2 No
3 Does not know
5 e) Can using condoms reduce the risk of HIV transmission
1 Yes
2 No
3 Does not know

44 **Have you ever heard about a disease and infection called "viral-hepatitis"?**
(circle the answer) Only 1 choice possible

Hep C
1 Yes
2 No
99 No response

45 **Have you ever gone to be tested for hepatitis?**
(circle the answer) Only 1 choice possible

Hep C
1 Yes
If yes, what was the result? *(please specify)*
_____
2 No
99 No response

Prevention services

46 **Do you know where you can go if you wish to receive an HIV test?**
(circle the answer) Only 1 choice possible

1 Yes
2 No
88 Don't know
99 No response

47 **In the last 12 months, have you been given condoms – for example through outreach services or reproductive health services?**
(circle the answer) Only 1 choice possible

1 Yes
2 No
99 No response

48 **In the last 12 months, have you been given sterile needles and syringes – for example by an outreach worker, a peer**
(circle the answer) Only 1 choice possible

1 Yes
2 No
99 No response

Prison

49 **Were you arrested during the last 12 months in link with drugs :**
(circle the answer) Only 1 choice possible

1 Yes
2 No
99 No response

50 **Were you ever imprisoned ? (Already happened once in their life)**
(circle the answer) Only 1 choice possible

1 Yes
2 No **Skip to Q51**
99 No response

50.1 If yes, did you use drug in prison?

1 Yes
2 No **Skip to Q51**
99 No response

50.2 If yes, did you inject in prison?
1 Yes
2 No **Skip to Q50.4**
99 No response

50.3 If yes, did you share your syringes with others?
1 Yes
2 No
99 No response

50.4 Which drug did you use in prison?
1 Heroin
2 Cocain
3 Others _____
99 No response

Needs

51 **What would you like to find as services in our center?**

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

52 **Which media do you use to get information on HIV/AIDS ?**
(circle the answers) Several choices possible

1 Radio
2 Television
3 Newspaper
4 Others _____
88 Don't know
99 No response

53 **What would be for you the priority as services to be offered within Temeke district?**
(circle the answer, only 1 possible)

1 Primary health care
2 Opiates substitution treatment
3 To be helped to quit from drugs
4 Rehabilitation centres
5 Other *(please specify)*
99 Don't know

8.2 Full qualitative report

MISSION REPORT

6th -13th March 2011

QUALITATIVE ASSESSMENT OF DRUG USERS RISK PRACTICES IN TEMEKE DISTRICT DAR ES SALAAM, TANZANIA.

Dr. ABDALLA TOUFIK

Acknowledgement

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QUALITATIVE ASSESSMENT OF DRUG USERS RISK PRACTICES
IN TEMEKE DISTRICT
DAR ES SALAAM, TANZANIA

Executive summary

Tanzania has experienced double HIV/Aids epidemics: an old generalised epidemic, (more than 6% prevalence in the general population) and more recently, a new concentrated epidemic among injecting drug users. Dar Es Salam seems to be one of the most affected areas in the country by this last epidemic. In early 2010, based on its international Harm Reduction experiences, MDM has decided to offer its expertise to help the Tanzanian national and local authorities face the outbreak of HIV epidemic among injecting drug users. The NGO and national and local stakeholders have reached an agreement stipulating the implementation of a Harm Reduction outreach project in Temeke, one of the poorer districts of Dar Es Salam, where drug injection practices and related risks seem to be the most prevalent.

MDM Temeke outreach's project started its activities in late 2010. It was decided that one of the first tasks of the project should be conducting, during the first quarter of 2011, qualitative and quantitative, Rapid situation Assessment and Responses.

Objectives

The main aim of the consultant's mission (from 6th to 13th of March 2011) is to perform the first component (qualitative) of the RAR and prepare the second component (quantitative). By fulfilling the assignment requirements and responding to the above-mentioned questions, the report focuses on the eight following items:

1) Methodology of the qualitative assessment;
2) Historical of the diffusion of heroin and other illicit and pharmaceutical drugs in Dar Es Salaam;
3) Heroin diffusion in Temeke district: estimation of number of heroin users in Temeke district, heroin market, context and main reason for the first heroin use experience;
4) Route of administration of heroin in Temeke: estimation of number of heroin injectors, smokers and sniffers in Temeke district, process of transition from smoking to injection;
5) Injecting and infectious diseases risk practices: sharing syringes and other paraphernalia;
6) HIV and HCV context, knowledge and protection strategies: social sharing networks of heroin users (camp/Maskani), heroin open and hidden scenes;
7) What drug users would like MDM Temeke's project to achieve for them and
8) Recommendations.

Methodology:

Three qualitative data collection tools have been used: interviews with users and key informants. Twenty three recorded interviews have been conducted with drug users and two Tanzanians key informants (member of MDM outreach team) having a wide knowledge of the current situation and of the historical background of heroin diffusion in Dar Es Salam. Among the interviewees there are 19 injectors and 4 heroin smokers. Interviews have been conducted in the MDM Temeke centre according to an ad hoc interviews guide; Ethnographic participatory observations. Not less than ten observations "on the spot" sessions have been performed in some open and hidden "drug scenes" for injectors and for smokers or both mixed. These observations were essential to better understand the rationale behind drug users' motivations and consumption modalities and meetings with national and local stakeholders.

Summary of Findings

Diffusion of heroin in Dar Es Salam: According to the fragmented information collected from older heroin users and key informants, it seems that heroin diffusion in Dar Es Salam has followed three distinct phases: the first phase, which could be named "trend setters", began after the introduction of the economic liberalisation policy in the mid 1980s. During this phase the first circle of heroin users was mainly composed of rich individuals returning back home with heroin and/or starting to travel abroad specifically to bring back heroin for personal use only. During the second phase of its diffusion (early 1990s), heroin reached Kinondoni Road (night clubs and prostitution areas) and Magomeni Ward (middle class neighbourhood). It seems that some individuals began to travel to Pakistan to bring heroin back for personal use and/or became involved in direct heroin trafficking from Pakistan to Europe. The third phase began when European countries put an end to direct smuggling from Pakistan. To circumvent European law enforcement's measures, Tanzanian smugglers started to transport heroin through Dar Es Salam first and exported it to Europe. As a direct result of this change in trafficking routes, some quantities of heroin were infiltrated into the local market and became available at an affordable price. In around six years (1985-1991), heroin has reached all Dar Es Salam districts including Temeke. Currently heroin seems to be largely available in the district.

Estimation of heroin users and heroin injectors: The heroin user's population in Temeke district is unknown. Interviewees have been asked to estimate this population. Twenty heroin users were able to give a rough estimate of the total population. The median estimation of the number of heroin users is 1,100 (mean 2,597). The median estimation of injectors is 650, 600 for smokers and 313 for sniffers

Transition from smoking to injection: The common routes of administration in Temeke are intravenous injection and smoking. By the second half of last decade, heroin users started to shift to injection. Transition to injection is still an ongoing process among Temeke heroin smokers. It seems that an increasing number of users turn by choice or are forced to adopt this route of administration.

Factors that have lead to the diffusion of the injection route of administration are numerous. However, four chief factors seem to play a predominant role: the fact that injection ensures a quick and/or more powerful high; compared to smoking injection requires a smaller quantity of heroin and is much cheaper than smoking, increasing tolerance to opiates of older heroin users for whom smoking is not adequate to get "high", and the last factor is related to the type of heroin available in Temeke (white heroine) which can not be smoked but only injected.

Sharing injection equipment: The current sharing methods currently used in Temeke are: lending and borrowing a syringe previously used by another addict; sharing the same container; using a hidden or thrown away previously used syringe; frontloading; share one after another "half/half" with the same syringe; using one and the same syringe to divide the heroin bought jointly; sharing the preparation and washing water; sharing or using the same razor blade for cutting heroin doses package and plastic containers.

HIV and HCV knowledge: As far as intravenous injection is concerned, knowledge about the risks of transmission differs greatly depending on the virus but also, for the same virus, on paraphernalia. The perceived hierarchy of HIV risk is as follows: the top of the scale is the needle sharing admitted by the majority of users; bottom thereof are the preparation and rinse waters and container. The links between sharing injection equipment and HCV transmission is totally absent since the majority of interviewees acknowledged that they are not aware of the existence of such illness.

Recommendations

Recommendations related to the quantitative survey

1. The final version of the questionnaire should focus on the most important questions and sections. Interviews should be as short as possible. The reason is that users typically respond correctly to first sections and, if the interview is too long, they respond inaccurately to the last ones. That's why it would be better to put the most important section of the survey first and the least important last.
2. Add questions that allow the calculation of transition time-lag from heroin smoking to injecting route of administration.
3. It is recommended that the survey be conducted in MDM premises (drop-in) and not in the street as previously planned. Indeed, it would be much easier to fulfil the questionnaire, realise blood test and identify persons who try to participate more than once.

4. For the formulation of the final version of survey questionnaire, use the street names of drugs, injecting practices and sharing of injecting equipment, issued from the qualitative interviews with drug users (The list of these names is handed to project coordinator at the end of interviews).
5. Investigators will need four days of training. It is also advised to take more participants for the training than necessary, in order to choose the right persons for the position, and also to have trained more persons than actually needed to be able to replace investigators in case of sickness, etc. Training should focus on practicing the questionnaire administration. Each participant, during role play, should practice as the interviewer and as the interviewee. While "playing" the role of interviewee, it is requested to answer "yes" to all questions, including embarrassing ones such those related to having sex for drug acquisition and having sex with the same gender. Each trainee will be requested to play again a role in group of 3, one person being the interviewer, one the interviewee and 1 the observer (writing when he/she thinks something is not correct, unclear...). Then, this exercise is shared in larger group with all participants.
6. The questionnaire should be tested before the beginning of the survey at least with 10 IDUs, for language conformity and understanding.
7. The interviewers must be advised to read the questions as written –no explanations can be given, no direction that could influence the answers.
8. The person in charge of the survey should check that the data is entered correctly: take randomly 30 questionnaires. Both versions (paper and electronic) then will be compared. Once everything is typed, two others persons must review again both versions, in order to be certain that there are no mistakes.
9. It is also strongly recommended to have a daily debriefing meeting at the end of the day, in order to share the main information and any comments/questions from the investigators.
10. Avoid respondent duplication (a person trying to participate several times in the survey): to do so, an outreach worker having a good knowledge of the IDUs' community should be assigned to identifying those persons and should kindly prevent them to from doing so.
11. The questionnaire is designed to be asked during face-to-face interviews only (one investigator and one drug user). In any case, the questionnaire must be given to the interviewee so he/she fills it out.
12. At the end of the interview, the investigator should carefully review the questionnaire and ascertain that all questions are correctly answered and responses are coherent. Each questionnaire will be reviewed and validated by the principal investigator before the interviewee leaves the MdM drop-in centre.
13. During the interview, the investigator will use a pencil. He will write over with a pen only once the questionnaire is validated by the principal investigator.
14. Each interviewee has to answer the questionnaire and be tested for HIV and HCV. For this reason, a code will be given to each interviewee and will be reported on the questionnaire and on the test-result sheet.

15. Inclusion in the survey means answering the questionnaire **and** being tested for HIV and hepatitis C. If a participant informs that he has been already tested for HIV elsewhere and he is HIV positive, for the survey purpose, the test has to be done again.

Recommendations related to current drop-in and outreach activities

1. Training MdM local staff, to give them all capacities to manage and run the program by themselves (capacity building, training of trainers, study tours, etc...)
2. To make a Tanzanian version (language, iconography and injection practices) of "17'10 minutes for a safe injection" prevention film. This version could be used in Tanzania as well as in others neighbouring east African countries.
3. To help Drop-in clients build a self-organisation or at least self-help group. The first step could be issuing a newsletter written by the group members sustained by MDM outreach team.
4. To develop training and resources centre (similar to MDM harm reduction Kabul's project) for Tanzanians focusing on harm reduction and infectious diseases prevention and intervention methodology targeting drug users.
5. Initiate activities targeting heroin smokers. That includes access to the drop-in and prevention message aiming to prevent transition from smoking to injection.
6. Develop the secondary distribution as a powerful means to increase access to hard-to-reach injectors. Secondary distribution means to give already known injectors numbers of syringes and prevention materials higher than their personal needs. Those persons will be requested to distribute these materials "on the spot" and ensure the availability at any time and to any injectors. Injectors involved in such activities should be trained and firmly informed that they not allowed selling these materials to peers. An *ad hoc* chart should be developed and signed by participants.
7. The Drop-in is open to drug users one day a week for exchange of syringe and women group. When the outreach team is correctly trained and working procedures and tolls are ready, it is suggested to officially open the Drop-in every day for a limited number of hours, during a one month transition period. This transition period will allow settling possible problems that may arise before routine opening.
8. Currently syringes are distributed only in the Drop-in local. That means that syringes are available only for those who live near or not very far from the centre. It is recommended that the outreach team also distributes sterile injection paraphernalia in all currently visited camps.
9. Currently the disposal boxes given to injectors for used equipment are quite big and, more importantly, not puncture-proof. It has been observed that injectors used to open it and reused any used syringes inside the box. This could contribute to increase infectious diseases transmission instead of reducing it. It highly recommended making available small and puncture-proof boxes adapted to injectors' practices.

Recommendations related to enhancing and improving and scale up of services delivery

1. Currently MDM team is composed of non medical personnel whereas Temeke clients' medical needs are enormous. It is highly recommended to hire at least a nurse and a physician who may be able to respond to those identified medical needs.
2. The problematic drug epidemic in Temeke is exclusively a heroin epidemic. Introducing opiate substitution treatment (methadone) could greatly help to reduce injection, transition to injection and infectious diseases diffusion. Substitution prescription and dispensation could be done inside MDM premises.
3. Initiate a drug free treatment either inside MDM premises as out-patient activity or in collaboration with other medical in-patient services or both. Medically assisted drug free treatment is one of the most requested by the large majority of heroin users met during the assessment.

Recommendations related to advocacy and partnership

1. Organise a national advocacy workshop/training on substitution treatment for stakeholders and professionals of health sectors as well as law enforcement ones.
2. Initiate training for national psychiatrics and primary health care services on managing drug abuse disorders
3. Build links with SAAHRN harm reduction network and establish the Tanzanian harm reduction association as a focal point of this network.

4. Organize an important public event in Tanzania when the results of the RAR are finalized and published. That could greatly help sustain MDM project and enhance the implementation of harm reduction strategies in Tanzania.

INTRODUCTION

Tanzania has experienced double HIV/Aids epidemics: an old generalised epidemic, (more than 6% prevalence in the general population) and, more recently, a new concentrated epidemic among injecting drug users. Dar Es Salam seems to be one of the most affected areas in the country by this last epidemic. In early 2010, based on its international Harm Reduction experiences MDM has decided to offer its expertise to help Tanzanian national and local authorities to face the outbreak of HIV epidemic among injecting drug users. The NGO and national and local stakeholders have reached an agreement stipulating the implementation of a Harm Reduction outreach project in Temeke, one of the poorer districts of Dar Es Salam, where drug injection practices and related risks seems to be most prevalent.

MDM Temeke outreach's project has started its activities in late 2010. It has been decided that one of the first task of the project should be conducting, during the first quarter of 2011, qualitative and quantitative, Rapid Situation Assessment and Responses.

The main aim of the consultant 6th-13th March's mission is to perform the first component (qualitative) of the RAR and prepare the second (quantitative). More specifically, the mission's objectives are:

- To conduct a qualitative assessment of the drug use patterns, risk behaviours as well as links of drug use and sex work among male and female IDUs in Temeke District, Dar Es Salaam**.**
- To make a proposition of technical changes for the quantitative part and the response part of the RAR protocol as well as for the questionnaire.
- To provide recommendations for the intervention principles regarding the MDM program in Temeke district.
- To meet some key stakeholders in order to present the work done.

Five key questions should also be answered during the mission by the consultant:

1. What are the main substances used and what are the key patterns of injection drug use?
2. What are the main risk behaviours? Are behaviours such as "flashblood" or "vi-point" still prevalent?
3. What is the role of the "doctors" and "dealers" and what is their link with the users and their risk behaviours?
4. What link exists between drug use and sexual risk behaviours and/or sex work?
5. Are there recurrent patterns of violence linked to drug exchange, drug selling and drug consumption?

For fulfilling the assignment requirements and respond to the above-mentioned questions the report focus on the eight following items:

- Methodology of the qualitative assessment;

- Historical background of the diffusion of heroin and others illicit and pharmaceutical drugs in Dar Es Salam;
- Heroin diffusion in Temeke district: size estimation of heroin user's number in Temeke district; heroin market; context and main reason for the first heroin use experience;
- Route of administration of heroin in Temeke: size estimation of heroin injectors, smokers and sniffers in Temeke district; process of transition from smoking to injection;
- Injecting and infectious diseases risk practices: sharing syringes and others paraphernalia;
- HIV and HCV context, knowledge and protection strategies: social sharing networks of heroin users (camp/Meskany); heroin open and hidden scenes;
- What drug users would like MDM Temeke's project acheive for them;
- Recommendations.

PRESENTATION OF THE METHODOLOGY

Three qualitative tools have been used:

1. Interviews with users and key informants: twenty three recorded interviews have been conducted with drug users and two Tanzanians key informants (member of MDM outreach team) having a wide knowledge of the current situation and of the historical background of heroin diffusion in Dar Es Salam. Among the interviewees there are 19 injectors and 4 heroin smokers.

   Interviews have been conducted in the MDM Temeke centre according an ad hoc interviews guide *(Annex II)* composed of the thirteen following mains items:

   1. History of consumption of psychoactive substances other than the injected drug such as cannabis, alcohol, etc.
   2. First injection experience
   3. Transition to other routes of administration
   4. Drug market
   5. Association of other drugs with the main injected one
   6. Sharing of injection equipment
   7. Knowledge of HIV transmission
   8. Knowledge of HCV
   9. Perceptions and opinions on the different routes of administration
   10. Injectors' personal network size (heroin, cocaine/crack);
   11. Estimated number of heroin, cocaine/crack and injectors users in Temeke
   12. Expectations with respect to MDM project
   13. Socio-demographic features of interviewees, professional activities, income, family, etc.

All interviews have first been summarised, then categorised by using qualitative software QSR Nvivo8.

2. Ethnographic participatory observations: not less than ten observations "on the spot" sessions have been performed in some open and hidden "drug scenes" for injectors and for smokers or for both. These observations were essential to better understand the rationale behind drug user's motivations and consumption modalities.
3. Meetings with national and local stakeholders, namely Dr Joseph Mbatia, head of mental health and substance abuse department, Ministry of Health and social welfare and Dr. Mamkwe, Temeke district medical officer. These two meetings aimed to have an overview of the national and local situation and to exchange about the feasibility of some recommendations included in this report, namely the integration of OST and drug free treatment into MDM current Temeke project.

SOCIODEMOGRAPHIC CHARACTERISTICS OF INTERVIEWEES

- ### Current age of drug users interviewed

The heroin users interviewed are fourteen male adults, two male adolescents and seven female. The median age of the group is 28 years old. The median age of males is more than five years higher than the median age of females (31.5, versus 26.0). The youngest male is 14 years old, while the youngest female is 20 years old. The oldest male is 48 years old while the oldest female is only 42 years old (Table 1).

Table 12: Age of 23 heroin users interviewed

	All (Men and Women)	**Men**	**Women**
Number	**23**	**16**	**7**
Mean	**28**	**29**	**27**
Median	**28**	**31.5**	**26**
ST	**9.4**	**10.2**	**7.5**
Minimum	**14**	**14**	**20**
Maximum	**48**	**48**	**42**

All interviewees live under precarious socioeconomic conditions. The main income sources for males are: ***Dala dala*** **bus stop "Shouters** "; collection and selling of plastic bags; pickpocket; theft and street dealing of heroin. For women, sex work or sharing a life with a dealer and being sustained by a dealer are the most frequent sources of income.

HISTORICAL BACKGROUND

• Diffusion of heroin epidemic in Dar Es Salam

According to the fragmented information collected from older heroin users and key informants, it seems that heroin diffusion in Dar Es Salam has followed three distinct phases:

The first phase, which could be named "trend setters" has started after the introduction the economic liberalisation policy by the mid 1980s. During this phase, the first circle of heroin users was mainly composed of rich people returning back home with heroin and/or starting to travel abroad specifically to bring back heroin for personal use only: "*I started in magomeni with my brother who came back from Italy where he was smuggling and come back with some heroin. I tested it with marijuana with my friends. When I started heroin was nearly unknown in Dar Es Salam. My brother was one of the first users or persons who brings heroin to Tanzania [....] During this period only dealers who used it"* (male, 32 years old). The substance was expensive and difficult to find. Heroin users were concentrated in the rich residential Msasani ward (Kinondoni) and "city center".

During a second phase of its diffusion (early 1990s) heroin has reached Kinondoni Road (night clubs and prostitution areas) and Magomeni ward (middle class neighbourhood). It seems that some individuals began to travel to Pakistan to bring heroin for personal use and/or became involved in direct heroin traffic from Pakistan to Europe. As a key informant puts it: "*people went to Pakistan to buy heroin. They were involved in the business and they wanted to make money. They became rich and after that everybody wanted to be like them. I wanted to go to Pakistan like he did and make money out of the stuff. To be rich*".

The third phase began when European countries put an end to direct smuggling from Pakistan. To circumvent European law enforcement's measures, Tanzanian smugglers started to transit heroin through Dar Es Salam first and exported it to Europe. As a direct result of this change in traffic roads, some quantities of heroin have been infiltrated into the local market and became available at an affordable price.

In more or less six years (1985-1991), heroin has reached all Dar Es Salam districts and most of their wards. An approximate chronology of heroin diffusion in Dar Es Salam could be as following:

- 1985-1989 Msasani Ward (Kinondoni District)
- 1989/1990 City Center Ward (Ilala District)
- 1990 Kariako Ward Central Business district (Ilala District);
- 1990 Magomeni Ward ((Kinondoni District).
- 1990 Kinondoni Road (Kinondoni District)
- 1991 Temeke District

- ## Diffusion of others illicit and pharmaceutical drugs

Illicit drugs

The most common illicit drug widely used in Dar Es Salam is cannabis. It is either imported from Malawi or cultivated in Tanzania. Khat, imported from Kenya, is also available. Until now the drug has mainly been consumed by Somali community and maybe some Tanzanians in contact with this community. That includes truck drivers who use it to keep awake.

As far as cocaine/crack is concerned, all drug users interviewed, except two (a 25 years old female and a 24 years old male injector), have confirmed that they never heard about it in Tanzania or that it is neither available nor consumed in Temeke. The female heroin user has mentioned that cocaine is available in Dar Es Salam night club and in Zanzibar. Since it is too expensive, the only cocaine users she knows are either girls who have a "boy friend" from abroad or rich Tanzanians. The 24 years old injector has consumed the drug as a free-base (crack): "*I have used crack in Magomeni. The first time I used it was the last year but the last time I have access to it was two months ago. It is very expensive*". He seems to have a firsthand knowledge of the substance, given that he described the crack preparation process: "*it should be cooked it in a spoon. You put water and baking soda and heat the mixture after that it become dry and you smoke it with a small water plastic bottle*".

According to him, crack has arrived to Dar Es Salam only three years ago, mainly in Kariako and Magomeni. He did not expect crack to reach Temeke "*because it is very expensive and inhabitants are very poor*".

The mean price of powder cocaine gram is 40,000 sh. Converted into crack, "one gram is smoked in 4/5 "hits" (times) […]. After smoke crack you are supposed to smoke heroin".

Pharmaceutical drugs

Very few pharmaceutical medicines are available in Temeke. Drug users interviewed mention only two types: the white/yellow one and the blue one. They called both of them Valium. After checking with pharmacists from whom they buy these tablets, it appears that the first one is genuine Valium while the second is an antihistaminic, "Prometazin[1]". The street price is the same for both drugs: 10 sh the tablet.

Tablets are usually used orally and in combination with heroin: "*First you take 5 tablets and you drink something warm in your body (Tea) and after that you take heroin. When you take Valium you take heroin*".

[1] A phenothiazine derivative with histamine H1-blocking, antimuscarinic, and sedative properties. It is used as an antiallergic, in pruritus, for motion sickness and sedation.

HEROIN DIFFUSION IN TEMEKE DISTRICT

Interviewees indicate that heroin has reached Temeke by the early 1990s. Currently heroin seems to be largely available in the district. Some key informants think that the drug is more widely available in Temeke than in the others districts: "*there are more heroin smokers than marijuana alone smokers. Every one becomes heroin smoker. It became more fashionable to use heroin than marijuana*" (male, 18 years old). A Key Informant (KI) informs that: "*Most young people smoke heroin in the district*".

Some interviewees explain the large diffusion of heroin in the district by the poorness of inhabitants and by the high percentage of unemployed among them.

• Age of initiation to heroin

The oldest first heroin use experience in Temeke among interviewees was in 1990. The longest use period among current users interviewed is 20 years.

The median age of the first heroin experience among current users interviewed is 16 years old.

The oldest is 31 years old while the youngest age of the first experience is 8 years old. Some interviewees confirm that, compared to previous heroin users' generation, the age of the first experience is ever reducing. As a 20 years old female puts it: *"There a lot of young people (around 16 years old) who used to talking bad about heroin but now they start using it. Before they were attacking us and asking us to stop but now they start using themselves. That starts to happen recently"*.

Table 13: Age of first heroin use experience n=14

Mean	**17,6**
Median	**16,0**
ST	**5,1**
Minimum	**8**
Maximum	**31**

• Size estimation of heroin user's number in Temeke district

The size of heroin user's population in Temeke district is unknown. The two key Informants and interviewees have been asked to estimate this population. Twenty heroin users were able to give a rough estimation of the total population.

Only six were able to estimate the number of males and females. The median estimate of the number of heroin users is 1,100 (mean is much higher 2,597 - Standard

Deviation=3461) with an important variation of estimates. The minimum is 40 individuals and the maximum is 10,000 individuals. Based only on the information of six persons, the median estimate of number of heroin male users is 567 and females 33 only (Table 3).

Table 14: Estimation of the number of heroin users in Temeke district in 2011

	all heroin users n=22	Males n=6	Females n=6
Mean	**2,597**	**1,870**	**361**
Median	**1,100**	**567**	**33**
S.T.	**3,461**	**3,083**	**803**
Minimum	**40**	**30**	**25**
Maximum	**10,000**	**8,000**	**2,000**

• Heroin Market

According to interviewees, Temeke is only a distribution district for "big bosses" living in others districts, mainly Ilala. A stable type of dealing structure exists since the early 1990s: *"[...] the same dealers who sold the brown sugar also started selling the white. The main change was in the product itself not the dealing networks*".

They confirmed also that Temeke heroin market is dominated by nuclear dealing organisation. It is composed of more or less independent individuals or small inner families dealing networks. Each of these individuals or families sells in a fixed ward or camp.

The most well known dealing sites in Temeke are: Sharif, Sheraton, Kwa, Zakhem, Maputo, Charambee, Stereo, Kwaa Zizali, Temeke hospital and Tandika. A street dealer has estimated at up to a hundred the number of small dealers like him in this last mentioned ward (Tandika).

Types of heroin available

Three types of heroin have dominated Temeke heroine market:

- **Brown sugar** (heroine base) disappeared during the first half of the 1990s;
- **White** (heroin hydrochloride) which is currently widely used in Temeke. It is a small rock sold in a plastic single dose package (see photo). The most common designation of heroine is *ingada* (from the Arabic word, salvage). The other street names are *Nyeupe* (white), *Wanga, Dawa* (medication sawahli and in arabic), *kimondo* and *mbango*. While the heroin base is chemically prepared for smoking (heating resistant), the hydrochloride one is prepared to fit only with injection (dissolved in water).

- **Brown Pombe**: despite having the same price as the white (1,000 sh), this type is rarely or very little used in the district. Some heroin users think that *Brown Pombe* is a mixture of heroin and unknown psychoactive powerful tablets. One of them suggests that one dose of this substance could be equivalent to nine doses of white heroin: *"you make you like psychotic, make you mad"*. The availability of *Brown Bombay* seems to be limited to Temeke district.

Price

Current standard price for one white heroin dose is 1,000 sh in Temeke (1,500 in the city centre of Dar Es Salam).

The single dose package is called "kete", the three dose package "Point" (3,000 sh) and the 12 doses package "booster". A booster is currently sold 10,000 sh.

One gram = 3 boosters (36 ketes) costs 30,000 sh. The ten grams package is named "finger". The price of a finger is 300,000 sh.

A street dealer declared that, per gram sold, he would make a benefit of 6000 sh in addition to the 6 ketes per gram, he received as a "gift" from his supplier 8 ketes. In other words, he earned 6,000 sh + 8 kete (another 8,000 sh) net. His net profit per gram amounts to around 14,000 sh.

• Context and main reason for the first heroin use experience

The context and main reason of the first experience are different according to sex. For a woman, the first heroin experience happens often when she becomes a dealer's sexual partner:

Female, 25 years old:" *I started in 2002, when I was at 16 years old. At that time I did not need to buy it. I had a friend (dealer) who used to go to Pakistan and after to Brazil to bring heroin*";

Female, 26 years old: *"I shared a room with a sex worker ten years ago. I start hanging with her. Her brother, who is pusher* [sic]*, fell in love with me. And I was poor and desperate I accept to be his girl friend and start to prepare heroine packages for him. We ended by selling and smoking heroin and this for three years".*

Female, 20 years old: *"I started 3 years ago, at 17 years old, my boy friend who is a pusher* [sic]*. He used to give me heroin to sell it. I start to use it secretly without telling him that I do so".*

For men, there seems to be four main reasons for the first experiment: peers incitement/pressure, a member of the family is a drug user, the sexual partner is a user and, finally, the attempt to get a better "high".

Peers incitement/pressure

Male, 35 years old declared: "*I heard about heroin in 1991. Some Arabs and Indians and Pakistanis come to buy marijuana from my family. They asked them how you can get so high just with Marijuana. They told us that this not only marijuana but also heroin and show us the heroin. In this period 1 kete (dose) was 1,500 sh*".

Male, 48 years old: "*In 1993 we were setting in a camp and smoking Marijuana. Some young people who just come from Pakistan and said 'let just try this' that it was the first time I tried heroin. After that people have started talking that there is a new stuff 'brown sugar' and people who smoking marijuana wanted to test it and after that it went from camp to camp [...]. By 1994 there were only 20-25 heroin users in all Temeke*".

Female, 27 years old: "*I was initiated by women a friend of mine. I started as smoker 3 years ago and injection one year after using drugs*".

Male, 15 years old: "*I start two years ago when I have 13 years with marijuana and after that with cocktail. My friends persuaded me to use heroin. All my camp's friends (around 20 young persons) use also heroin*".

Male, 28 years old: "*I started with cannabis at 18 years old. I started heroin 2 years later. I was a friend, from Arabic origin that persuaded me. That was in Temeke. He told me that I should stop using marijuana and grow-up for something stronger*".

Male, 35 years old: *"I started in 1997. I start smoking heroin with my friends. I and my friends we used to hanging out all the day nothing to do*".

Male, 24 years old: "*I used to go with my friends to night clubs and smoke marijuana together. One day one of my friends come back with a package of heroin and just said 'try this stuff' and since then I keep using*". The first time was by smoking".

A member of the family is a user

Male, 32 years old: "*I started in Magomani with my brother who come back from Italy where he was smuggling and come back with some heroin. I tested it with marijuana with my friends. When I started heroin was nearly unknown in Dar Es Salam. My brother was one of the first users or persons who brings heroin to Tanzania that was in 1990*".

Male, 39 years old: "*All my family are pushers*[sic] *including myself*"

Male, 45 years old: "*I Started in Kariako Dar Es Salam. The first time was with my brother*"

The sexual partner is a user

Male, 42 years old: "*I was in love with a women and I had a problem when making love with her. I could not control myself, it comes very quickly (Premature ejaculation) and some told me if you do not want to come quickly you should use heroine what I did and it works". I still doing so every time I have sex*"

Attempting to get a better "high"

Male, 35 years old: "*I started using Cannabis in 1992. After some time I did not feel getting high any more that is why I started using heroin. I have started by one kete and now I need five ketes a day*".

ROUTE OF ADMINISTRATION OF HEROIN IN TEMEKE

Heroin can be used in diverse ways. There is the sniffing method (or "snorting"): heroin powder is inhaled through the nose. The smoking method consists of mixing heroin with tobacco and marijuana in a cigarette. This is known as "*cocktail*", the most widely used for smoking heroin in Temeke.

Heroin is also smoked without being mixed with tobacco, with a method called "chasing the dragon". Heroin powder is placed on a piece of aluminium paper. When heated, the powder turns first into a liquid then into a gas that is inhaled through the mouth. This method doesn't seem to be currently used in Temeke. Finally, heroin powder can also be intravenously injected after mixing it with water.

During nearly a decade since the first introduction of heroin in Tanzania in the first half of the 1980's, the commonly used heroin routes of administration were either smoking or, to a much lesser extent, snorting. According to interviewees, the injecting route of administration of heroin has appeared for the first time during the second half of the 1990s. That coincides with the arrival of "white" heroin to Tanzanian market. Indeed, the heroine base, known as "brown sugar", has suddenly disappeared from the market when the white one appeared. According to interviewees, the first one was usually imported from Pakistan while the second is imported from Brazil and Iran. That means that the change in heroin smuggling route has meant also substitution of the heroin base (brown sugar) by the heroin hydrochloride (white).

• Size estimation of heroin injectors, smokers and sniffers in Temeke district

Among interviewees, fourteen were able to estimate the number of heroin injectors, nine were able to estimate the number of heroin smokers and only two were able to estimate the number of heroin sniffers. The median number for estimates are 650 for injectors, 600 for smokers and 313 for sniffers.

Table 15: Estimation of number of heroin injectors, smokers and sniffers in Temeke district in 2011

	Injectors n=14	Smokers n=9	Sniffers n=2
Mean	**1,599**	**1,044**	**313**
Median	**650**	**600**	**313**
S.T.	**2,190**	**1,043**	**265**
Minimum	**40**	**20**	**125**
Maximum	**7,500**	**3,000**	**500**

The outreach team has counted 420 IDUs (all well known to them). They estimate that there may 500 more IDUs still hidden.

Among those known there are 30 women. The estimated number of hidden women users is around 100, most of them resorting probably to sex in order to get drugs or money. As a Key Informant puts it: "*Women can be rarely seen at the street level because of stigma attached to drug use. Usually they came to camps to buy and use in their homes or sent some one (boy friend) to buy for them. Most of women are sex workers. Very few are not*"

- **Process of transition from smoking to injection**

The common routes of administration in Temeke are intravenous injection and smoking in cocktail: the heroin dose (small rock, see photo) is placed in a "Ceramic Tile" already heated (Ceramic Tile). Then the rock is crushed and mixed with marijuana in a cigarette, often with tobacco (photos below).

Since it is smoked in the same way and in combination with tobacco and Marijuana, this specific smoking method may contribute to facilitate heroin diffusion among young people in Temeke. Unlike the "chasing the dragon" method, used for heroin base where the foil is directly heated, this method only facilitates the powdering of the heroin.

By the second half of last decade, heroin users started to shift to injection. Since then, two generations have considered injection as the best way for getting high.

Among Temeke heroin users, the distribution of injectors and smokers differs according to "camps". Some camps are more injectors while others are more smokers.

As the four following quotations may indicate, transition to injection is still an ongoing process among Temeke heroin smokers. It seems that an increasing number of users turn by choice or are forced to adopt this route of administration.

Male, 48 years old: "*the number of injectors in Temeke is going up. The reason for that is the quality of heroin is decreasing every day and shooting getting more 'high'. […]There are more and more young people who shift to injection*"

Male, 35 years old: "*Right now there are more injectors than smokers in Temeke. His generation and the generation who come after think that the best way for getting high*".

Male, 35 years old: "*The tendency now in Temeke is smokers become shooters. This tendency starts in 2001/2002. In this period the quality of heroin is becoming bad and price went up in the same time but it becomes more visible since last year 2010.*

Never seen people starting by injection also they start by smoke and after that they shift for injection. The youngest one I know is 17/18. I have the impression that all the new smokers and shooters are more and younger than 10 years before".

Male, 35 years old: *"I have the impression that injecting is going up*".

Transition time lag from smoking to injection

Among current injectors interviewed, sixteen (ten men and six women) were able to indicate the time lag transition from smoking to injection. The mean age is 32.4 years old (median 31.5), the youngest is 20 years old while the older is 48 years old.

Before shifting to injection, all of them have been initiated to heroin through the smoking route of administration. The transition to injection has occurred after a minimum of six months smoking period and a maximum of fourteen years. The mean is 4.4 years (median 3.7 years).

Transition seems not to be age-dependant. While the younger injector (20 years) has shifted to injection after a three years smoking period, the oldest one (48 years) became injector after a 6 years smoking period. The smallest transition period (six months) concerned a 24 years old individual while the longest (14 years) concerned a 39 years old one.

Table 16: Time lag transition from smoking to injection, n = 16

	Current Age	Time lag year
Mean	**32,4**	**4,4**
Median	**31,5**	**3,7**
Minimum	**20**	**0.6**
Maximum	**48**	**14,0**

According to a 26 years old female injector, heroin users tend to be younger. She also notices that users start more frequently with the injecting route of administration instead of smoking, as her generation was accustomed to do: *"There are more and more tendency to start by injection. It depends also of the area if the area is shooters area people start by shooting. I know 3 persons starting by injection. Most people start using heroin younger than before around (10-12 years old), street children"*.

Main leading factors for transition to injection

Factors that have lead to the diffusion of the injection route of administration are numerous. However, we can deduce from interviews the following four chief factors: quick and/or more powerful high, cheaper comparative cost, increasing tolerance to opiates, and type of heroin available in Temeke.

- **Quick and/or more powerful high**

Female, 27 years old: *"I started as smoker 3 years ago and injection one year later. […] My boy friend asked me just to try. The first time I felt immediately much better. I never return back to smoke*";

Male, 32 years old: *"It was with my friends 'They told me it would be much better if you shoot it'. When you inject you get high faster"*.

Women, 26 years old: *"Smoking and injecting is very similar. But the difference is you smoke it takes 40 mn to fill high if you shoot it takes 2-3 mn to fill the same high. If I have the choice between smoking and injecting I prefer smoking but the reason for shooting is I smoke I will not fill high as by injection"*.

Women, 42 years old: "*Because by this way heroin is getting faster in the body*".

- **Less expensive, more economic**

Female, 30 years old: "*Injection is much cheaper than smoking*".

Male, 30 years old (smoked ten years before shifting to injection): "*I started to develop tolerance. The amount I am used to get not help me any more getting high. I decided to get high quicker with less money". If I smoke I need 15 kete but when I inject I needs 6 kete for the same high"*.

Male, 35 years old: *"One big reason is I start to develop tolerance to heroin and now of stead of getting one hit I need two hits or three hits. So I am spending all this money to get this high. If you use by shooting you just need one kete that mean 1000 sh instead of 5 or 6 000sh. So you can get the same high what you get for 5 000 sh.*

Injecting is 4 times less expressive the smoking. The income is low and you should get the maximum of the little many you have".

Male, 42 years old: *"It was expensive and the quality was poor. At the end I was forced to decrease the dose for smoking and I find that if I shoot I spend the same sum of money and shoot as much time as I want and even getting higher". One of my friends told me about this 'you wasting money by smoking'. […] The rate between smoking and injecting is: If you smoke you needs 8 ketes and if you inject you needs 3 ketes only and you get much better high because it goes straight to the brain".*

- **High threshold of tolerance to opiates**

Female, 20 years old: *"I started at seventeen, 3 years ago, with smoking heroin. I inject only since this year. I shifted to injection because 'I am not getting high any more from smoking" The tolerance is getting high' ".*

Male, 35 years old: "*I was watching people who doing it and enjoying it I wanted see what they feel when injecting. I developed a tolerance I could not get high any more that is why I decided to shoot straight to blood. In doing so you get more high and spend less money. I come to this idea because I was in company of shooters and shooters told me that is much less expensive than smoking and getting higher quicker. To get the same high I need 6 ketes for smoking and only 3 by injection*".

Women, 26 years old: *"I shared a room with another SW injector and in the same time my tolerance is getting high that my friend told me 'you waste your time and money shoot and you enjoy more'. If I have money I smoke 20 ketes but by injection I need only 10 ketes".*

- **Type of heroin available in Temeke**

Male, 28 years old: *"Not getting high any more I have been told that if I should enjoy White I should inject it".*

Male, 24 years old: *"Shortly after starting smoking I started shooting also. In these days it was the brown sugar and shortly the brown disappear that is why I start shooting. That was 2004/2005. This was the only raison why I start shooting. […] If the brown sugar comes back again I continue to inject for this reasons: I dislike smoking even cigarette".*

Reasons for not shifting to injection

Four heroin smokers have been interviewed. One of them, a young man (18 years old), declared he didn't exclude shifting to injection if his tolerance threshold increased to the point that he could not get high using the smoking route of administration: "*Right*

now I am satisfy by smoking. But I could not predict the future. May be I will come a shooter one day. That could happen if his tolerance getting high and I could not get high any more then it could happen. I do not think that I am not a chronic[2] *yet".* His main reason for not shifting yet to injection is related to social network:*" I am not surrounding by shooters but if it happens I am surrounding by shooters I can be attempted* [...] *all, my friend in the market are smokers. I do not know what could happen in the future*".

The reasons given by the three other smokers interviewed for not shifting to injection are by and large linked to injection related risks: abscesses, syringes sharing, etc.

Male, 18 years old: "*Some of my friends who start smoking at the same age as me did have already become injectors. […] I have seen the shooter at night where the pharmacies are closed without syringes. I saw them sharing the same syringe. I do not like that. I know about HIV*".

Male, 15 years old: "*I have seen that it is not good. You get abscess, Die etc. so it is not good. And none of my group has tried injection. When I smoke I am in peace not thinking of my dead parents and others problems. I smoke 20 cigarettes a day from morning until I go to sleep. I will never shift to shooting. I have seen people dying from injection and have abscess I do not want to be like that*".

Male, 14 years old: "*I experienced shooting only twice 3 years ago. I was always in the company of shooters and after they shoots themselves. I saw that they are very in peace and I was curious and I wanted to see how it looks like. […] When you smoke it take some times before you get high but when you shoot you fill high very fast and you fill asleep and you hear people but it like a dream. […] I felt bad, have an abscess and after that I stopped and return back to smoking. […] I will never become injector because 'I see what it does to people' […]*".

A 42 year old heroin street dealer also confirms that heroin users are afraid of intravenous injection because of risks of overdose: "*Injectors could by die from overdose but not smokers. That is why a lot of people are afraid of being injectors*".

[2] His own definition of a chronic: somebody who smoke so much he cannot get high any more.

INJECTING AND INFECTIOUS DISEASES RISK PRACTICES

The way to prepare heroin for injection differs according to whether its chemical composition is alkaline or hydrochloride. In order to turn the chemically composed heroin base (which disappeared from the market over the past years), which fits for smoking only, into a substance that can be injected, injectors add an acid substance and heat the obtained solution. The process involves seven necessary elements: a syringe, a needle, a container (spoon), a filter (cotton or cigarette filter), some acid (lemon), water and a source of heat. As for heroin hydrochloride, it is prepared 'cold' for injection without heating or adding any acid substance: "*just take it and mixed it with cold water and put it in the syringe. No use of lemon or heat the mixture. The use of lemon and heating has disappeared 5/6 years ago with disappearance of the brown sugar*".

In Temeke, most users either mix the heroin rock with water in a plastic container (a corner triangle cut in the plastic bag of a new sterile syringe) or directly in the syringe itself (see photos).

The most common type of syringe that injectors prefer and use is the one with the long mobile needle. As an interviewer puts it: "*we prefer the long needle instead of insulin one because our veins are quite down (deep) to reach them*".

• Sharing syringes and others paraphernalia

The injecting heroin users interviewed have mentioned five ways of sharing injection equipments. Three others have been identified during ethnographic observations of injectors practices "on the spot".

All interviewees confirmed they never heard about "flashblood" as defined by McCurdy. S. A. *et al* "*Flash blood is a syringe-full of blood drown back immediately after initial injection that is passed to a companion to inject. Those practicing flashblood believe that the syringe-full of approximately 4cm of such blood contains*

enough heroin to avoid the pans of withdrawal […]"[3]. In Temeke the term "flashblood" is used for naming a practice by which the injector flashblood with his own blood only, without sharing it with anyone else.

The current eight sharing methods currently used in Temeke are:

1 - Lending and borrowing a syringe previously used by another addict

Male, 48 years old: "*one after another (after cleaning it with water)*"

Male, 31 years old: "*Use the syringe after another injector after cleaning it with water*".

Female, 20 years old: "*I am used to give her used syringe to others if they asked for*"

2 - Share the same container (Kunnguzia)

Sharing in the plastic bag (spoon) with two syringes

Male, 31 years old: "*Sharing spoon*"

Male, 39 years old: share "*in the plastic container used to prepare the heroin with the water*"

Female, 42 years old: "*with two different syringes, each with his own syringe*" (Kunnguzia) = To share the spoon with two different syringes

KI: "*After I take a syringe. The other person does not have heroin then I drew the mixing to the syringe and I leave some in the container (spoon) for the other person who drew it and shoot it*".

3 - Use a hidden or thrown away previously used syringe

Male, 20 years old: "*When you do not have syringe you looks for any hidden syringe and used it*".

Male, 39 years old: "*Injectors used to hide their used needles for future use. But if you do not have a syringe you always find one hided somewhere by someone else*".

4 - Frontloading (koukatiana)

Male, 28 years old: "*I mix it with the water in the plastic bag just to powdering it (like a spoon) and after that I put the liquid in one syringe and after that put a quantity in the other receiving syringe*".

Female, 25 years old: *"If you have one staff and two syringes you mixed it in a object (spoon) after that you get the needle out and inject a part of the mixture in the other syringe (frontloading*". This is most common sharing method in Temeke.

[3] McCurdy, S. A., M. W. Ross, et al. (2010). "Flashblood: blood sharing among female injecting drug users in Tanzania." Addiction **105**(6): 1062-70.

5 - Share one after another "half/half" with the same syringe (Kubakishia)

KI: "*The first one shoot half of it and after that the second take it and shoot himself with the same syringe with the remaining half or so*".

Male, 35 years old: "*It could happen but not often*".

Male, 39 years old: "*The first one injects and leaves half of the quantity or so for the other injector who do the same immediately*".

Female, 42 years old: *"[...] It happen that 4 persons share the same syringe. Each for example have 5 Ml. This is quite often practice. This a way to kill "Horsto" (withdrawal syndromes)."*

• HIV AND HCV CONTEXT, KNOWLEDGE AND PROTECTION STRATEGIES

Social sharing networks of heroin users: Camp/Meskany, heroin open and hidden scenes

It is difficult for a heroin addict to ensure the three or four doses needed everyday without others' help. Therefore, in most cases, he joins a big or small network of addicts. Together they buy drugs and together they use it. Such a practice facilitates for every member the satisfaction of his needs even if he does not have money every day.

It is clear that the sharing network plays an important role in the spread of viral diseases. The wider and the more numerous these groups are, the greater the risk of transmission of these diseases among members. In Temeke, the most common pattern or "organisation" is the "camp" or "meskany".

Each camp has a given name. That could be the name of the place or of the street where they meet, for example, camp "*Shaze*". It can also be a much more significant name like "*Osama Ben Laden*".

The outreach mapping survey shows that the majority use drugs in common and/or in the same places. Among 51 injectors, 48 (94%) said that they use heroin either in the street or in the group. Only 3 users (6%) declared that they used drugs alone or in private places. (Table 6)

Table 17: Distribution of injectors practices, alone/in private or in the street/in group, n=51

	Number	Percentage
Alone/ Private	**3**	**6%**
Street/ In group	**27**	**94%**
Total	**51**	**100**

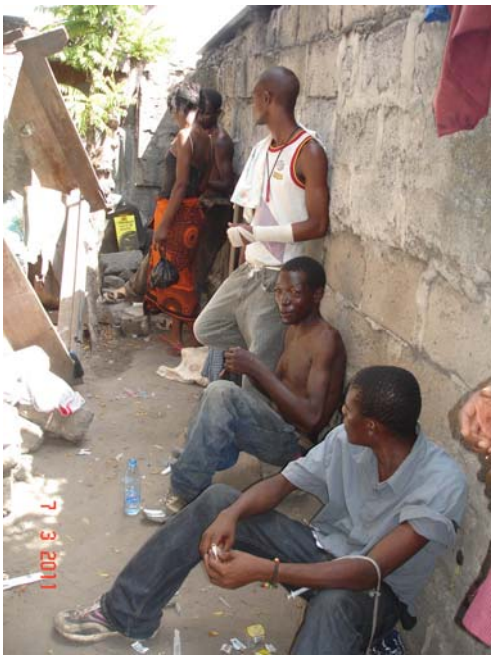
Source MDM Temeke mapping survey, 2010

There are 30 wards in Temeke District. The outreach team has identified 60 camps, small or big, and drug scenes, open or hidden (see annex). There many camps not identified yet by the MDM team. The biggest camp gather around 50 injectors (around 5 camps) and the smallest are composed only of less than 10 persons (around 45 camps).

The information map established by the outreach team indicates 47 camps with less than 10 men and 10 other with more than ten men. This team has also identified 4 camps with less than 5 women and 6 camps with more than 5 women. The outreach team estimates that there are 200-250 more others camps used by heroin smokers.

Camps are mainly places for buying and using drugs among a given user's network (ex. photo below).

As a key informant notices: "*There is some place where you can buy and use like 'Sheraton' and 'Sharif' while in some others you can mainly only buy but the border is not so strict. Most users smoke and inject together. It is very rare that a person use alone*".



A camp can also be a socialisation place for those marginalised drug users. A 15 years old male member of "Ben Laden" camp describes the daily live of his camp: "*We play gambling, discuss, when the 'Dala dala' come we shout for them. We have nothing also to do all the day than smoking cocktail. Only boys in our camps. No girls. The average age of camp member is between 10 to 25 years old. The whole membership is around 60 persons. We have a pusher* [sic] *in the camp [...]*".

A 18 years old smoker informs that in their camp: "*we just smoking, do not do anything else. You look for money somewhere else. In the camp you just come to smoke*".

A camp is a risky place in terms of HIV and HCV transmission. In a camp there is a high probability of being in a situation of sharing injecting equipment with a big number of others injectors. The IDUs injecting and risk practices are much similar among users and among camps.

- **The role of the "Doctor"**

The Doctor is an important player in the injecting drug user's camps. A doctor is an experienced injector who injects others, mainly those who have deep veins, those who have exhausted their venous capital or new injectors. "*Some people come to shoot but they do not find the vein. From my experience and intuition I know where are the vein where can shoot in. There 30/40 how come to me every day for helping them. I do not ask for money, just share heroine with them*". (Doctor, 35 years old)

Usually a doctor is paid either in drug or in money. The average price for one shoot is 200 to 500 Sh:

Female, 20 years old: "*Sometimes I ask a doctor (A man) service for that I pay 200/300 or 400 sh. I have a fixed doctor who usually injects me*".

Female, 25 years old: "*I buy my staff and ask someone else to inject me a 'doctor'. The price for this service is 500 sh. If he is a friend I share the drug with him*".

Doctor, 48 years old: "*As a doctor I am paid 500 sh. I usually have 5-10 clients a day. Some of them regular while others are not*"

Doctors seems to play an important role in viral transmission since, most often, they share drug with their clients after preparing it for injection either in the syringe or in the container.

On the other hand, some of them could claim playing a prevention role: "*As a doctor 'I teach injectors how to shoot safe'. They should not use needle twice*" (Doctor, 48 years old).

HIV and HCV knowledge

Having sex without condom, sharing the razor blades and sharing syringes are the most common HIV risk factors mentioned by the interviewees.

As far as intravenous injection is concerned, knowledge about the risks of transmission differs greatly depending on the virus but also, for the same virus, on paraphernalia.

The perceived hierarchy of HIV risk is as following: the top of the scale is the needle sharing admitted by the majority of users; bottom thereof are the preparation and rinse waters and container. A small proportion has admitted that frontloading could be a potential risk for HIV transmission.

Thus, users seem to consider the intravenous injection as the potential source of HIV transmission.

Male, 35 years old: "*By shooting you exchange the blood with the other person and you get the HIV. If you use a syringe after cleaning it after someone else you get also HIV*".

However, even if the couple syringe/HIV is clearly identified, the identification of other injection paraphernalia is only partial: many users do not recognize these materials as a source of virus transmission risk.

The links between sharing injection equipment and HCV transmission is totally absent since the majority of interviewees acknowledged that they are not aware of the existence of such illness: "*never heard about it*". The only one interviewee having very limited knowledge of this virus said that he had learned from MDM outreach project.

Protection strategies

Regardless of the diverse factors that make them opt for intravenous drug use, lots of addicts attempt to apply what they believe would protect them from infection, resting therein on the little they know about AIDS.

The means of protection that addicts use thanks to their personal experience can be incorporated into the framework of a common harm reduction strategy that themselves can disseminate among their peers. We sum up these means in the following eleven points:

- **Stop the most risky sharing syringes**

Male, 39 years old: "*During the 90s people used to share the liquid in the syringe (half/half) but since the early 2000s people become aware of risks since they do not share in this way anymore. They have been told by the hospital".*

Male, 35 years old: "*Before I used to share 7/8 years ago but since I stop sharing*".

- **Never Share syringes**

  Male, 24 years old: "*For me I just use mine never share*".

- **Making the best effort to get new syringes**

  Male, 35 years old: "*Personally I do not share. If there is only one syringe I just go out and look for a new needle. As a doctor I share the powder with is clients*".

  Female, 20 years old: "*I always managed to have a new syringe. I do not use others injector's ones*".

- **Inject alone**

  Male, 14 years old: "*Never share because the times when he tries he did it alone*"

- **Avoid sharing syringes with HIV positives**

  Male, 28 years old: "*I avoid sharing with HIV people who either declare it themselves, or looks like HIV positive or other people tell me that they are HIV positive. That is how I avoid HIV*".

- **Inject first**

  Female, 25 years old: "*If I have the staff and it is my needle you mix the staff in water and after I take for example 0.3 or 0.5 and after that the fried clean the syringe and inject himself.*"

- **Clean syringe with Bleach**

  Female, 25 years old: "*If she does have her one syringe she clean the other person used syringe with bleach* (distributed another outreach team in 'membini')".

- **Sharing the heroin in its powder format only**

  Male, 35 years old: "*I divide the powder only*"

  Male, 28 years old: "*I never share the liquid. I share the powder. I take my part saying (50%) and take mine that mean the other 50%*".

- **Share with new syringes only**

  Female, 20 years old: "*When I Frontloading the two needles should be news*"

- **Trust and good knowledge of sexual and injecting partners**

  Female, 20 years old: "*I do not use condom with my boy friend but with others yes*".

- **Always use condom with clients**

  Female, 25 years old: "*I always use condom with clients. Condom is very cheap 200 sh. I refuse to have sexual relation without condom*"

WHAT DRUG USERS WOULD LIKE MDM TEMEKE'S PROJECT ACHIEVE FOR THEM

All interviewees have been asked about which types of services the new MDM Temeke project could offer them. Not all of them have expressed or formulated clear specific demands. Most of them express satisfaction of current services and activities available in the centre and those of the Mobil Units.

Interviewees suggested additional services focussed on needs of medical/psychosocial services helping them to stop using heroin. That includes opiate substitution treatment, social reintegration (housing, legal income sources activities and skills building), aftercare and self empowerment of users (initiation of self organization and help groups) and finally some suggestions aiming at improving sterile syringes availability and peer acceptation of harm redaction norms which include some kind of "coordination" with street dealers.

• Help in order to stop using drug and access to Opiate Substitution treatment

Male, 31 years old: *"I want MDM help him to stop taking heroine*";

Adolescent, 15 years old: "*Stop using heroin. He gets a lot of money but he never has any that is why he wants to stop. When I get money it is hard to resist. I am dependant of heroine*";

Adolescent, 14 years old: "*Help to stop drugs*".

Female, 42 years old: "*Quite using. To be helped to stop using heroin*".

Male, 35 years old: "Help me to stop heroin".

Male, 24 years old: "*Right now that what I want from MDM nothing else, helped to stop using*".

Male, 35 years old: "*This new medicine* (Methadone) *that helps reduce use of heroin and ultimately stop using it*"

Female, 26 years old: "*Methadone*"

Female, 20 years old: "*Methadone*".

• Social reintegration

Male, 15 years old: "*What I want is to return back to school*"

Female, 26 years old: "*Give opportunity to make money like small business or trade* […] *give them the possibility to have a job or if they need capital to start a new personal project*"

Female, 26 years old: "*(for women) Education given opportunity to learn skills*"

Adolescent, 14 years old: "*I leave without family. I want not to be in the street*".

Female, 42 years old: "*Have income, enterprise for generating income*"

Male, 35 years old: "*A place for people to get out of the street. A place to relax/rest and out of this environment*".

Female, 20 years old: "*Have something to do to have a source of income, making money*".

Male, 32 years old: "*I would like to have a place where I can stay and just relax and be away from the street*".

- **Aftercare and self help groups for Ex-users**

Female, 26 years old: "*Support group for formers users (this group should take care of people who stop using and give them the possibility to have a job or if they needs capital to start a new personal project*"

Female, 26 years old: "*Especial services for women who use drugs. A centre who could meet, make a project a kind of self help group*".

Male, 35 years old: What you do is very good and wants to be an ambassador for MDM.

- **Enhance outreach activities**

Male, 35 years old: "*More available needles not only for the camps near to MDM but also for camps where users could not come to MDM place. The way to do that is to leave the syringe to an outreach worker who live there and will be in charge to give them to injectors when needed. […] MDM could collaborate with the pushers* [sic] *who in contact with all injectors leave syringe with them. When they buy a kete they give a new syringe. If he try to sell syringes given par MDM he should be informed that kete for him but the syringes have been given for free and he should give them to users for free. In this context Injectors pressure could work and forced reluctant dealers to give syringes for free. […] Also make Leaflets to drug users*".

Male, 32 years old: "*To have abscess treated*".

RECOMMENDATIONS

- ## I - Recommendations related to the quantitative survey

16. The final version of the questionnaire should focus on the most important questions and sections. Interview should be as short as possible. The reason is that usually users respond correctly to firsts sections and, if the interview is too long, they badly respond to the last ones. That's why it would be better to put the most important section of the survey first and the less important last.

17. Add questions allowing calculating transition time-lag from heroin smoking to injecting route of administration.

18. It is recommended that the survey be conducted in MDM premises (drop-in) not in the street as previously planned. Indeed, it would be much easier to fulfil the questionnaire, realise blood test and identify persons who try to participate more than once.

19. Use for the formulation of the final version of survey questionnaire the street names of drugs, injecting practices and sharing of injecting equipment, issued from the qualitative interviews with drug users (The list of these names is handed to project coordinator at the end of interviews).

20. Investigators will need four days training. It is also advised to take more participants for the training than necessary, in order to choose the right persons for the position, and also to have trained more persons than actually needed to be able to replace investigators in case of sickness, etc. Training should focus on practicing the questionnaires administration. Each participant, during role play, should practice as the interviewer and as the interviewee. While "playing" the role of interviewee, it is requested to answer "yes" to all questions, including embarrassing ones such those related to having sex for drug acquisition and having sex with the same gender. Each trainee will be requested to play again a role in group of 3, one person being the interviewer, one the interviewee and 1 the observer (writing when he/she thinks something is not correct, unclear...). Then, this exercise is shared in larger group with all participants.
21. The questionnaire should be tested before the beginning of the survey at least with 10 IDUs, for language conformity and understanding.
22. The interviewers must be advised to read the questions as written –no explanations can be given, no direction that could influence the answers.
23. The survey responsible should check that the data are entered correctly: take randomly 30 questionnaires. Both versions (paper and electronic) then will be compared. Once everything is typed, two others persons must review again both versions, in order to be certain that there are no mistakes.

24. It is also strongly recommended to have a daily debriefing meeting at the end of the day, in order to share the main information and any comments/questions from the investigators.
25. Avoid respondent duplication (a person trying to participate several times in the survey): to do so, an outreach worker having a good knowledge of the IDUs' community should be assigned to identifying those persons and should kindly prevent them to do so.

26. The questionnaire is designed to be asked during face-to-face interview only (one investigator and one drug user). In any case, the questionnaire must be given to the interviewee so he/she fills it.
27. At the end of the interview, the investigator should carefully review the questionnaire and be ascertain that all questions are correctly answered and responses are coherent. Each questionnaire will be reviewed and validated by the principal investigator before the interviewee leaves MdM drop-in centre.
28. During the interview, the investigator will use a pencil. He will write over with a pen only once the questionnaire is validated by the principal investigator.
29. Each interviewee has to answer the questionnaire and be tested for HIV and HCV. For this reason, a code will be given to each interviewee and will be reported on the questionnaire and on the test-result sheet.
30. Inclusion in the survey means answering the questionnaire **and** being tested for HIV and hepatitis C. If a participant informs that he has been already tested for HIV elsewhere and he is HIV positive, for the survey purpose, the test has to be done again.

• II - Recommendations related to current drop-in and outreach activities

10. Training MdM local staff, to give them all capacities to manage and run the program by themselves (capacity building, training of trainers, study tours, etc...)

11. To make a Tanzanian version (language, iconography and injection practices) of "17'10 minutes for a safe injection" prevention film. This version could be used in Tanzania as well as in others neighbouring east African countries.

12. To help Drop-in clients to build a self organisation or at least self-help group. The first step could be issuing a newsletter written by the group members sustained by MDM outreach team.

13. To develop training and resources centre (similar to MDM harm reduction Kabul's project) for Tanzanians focusing on harm reduction and infectious diseases prevention and intervention methodology targeting drug users.

14. Initiate activities targeting heroin smokers. That includes access to the drop-in and prevention message aiming to prevent transition from smoking to injection.

15. Develop the secondary distribution as a powerful mean to increase access to hard-to-reach injectors. Secondary distribution means to give to already known injectors numbers of syringes and prevention materials higher than their personal needs. Those persons will be requested to distribute these materials "on the spot" and ensure the availability at any time and to any injectors. Injectors involved in such activities should be trained and firmly informed that they not allowed selling these materials to peers. An *ad hoc* chart should be developed and signed by participants.

16. The Drop-in is partially open to drug users one day for exchange of syringe and women group. When the outreach team is correctly trained and working procedures and tolls are ready, it is suggested to officially open the Drop-in every day for a limited number of hours, during one month transition period. This transition period will allow settling possible problems that may arise before routine opening.

17. Currently syringes are distributed only in the Drop-in local. That means that syringes are available only for those who live near or not very far from the centre. It is recommended that the outreach team distributes also injection sterile paraphernalia in all currently visited camps.

18. Currently the disposal boxes given to injectors for used equipment are quite big and, more importantly, not puncture-proof. It has been observed that injectors used to open it and reused any used syringes inside the box. This could contribute to increase infectious diseases transmission instead of reducing it. It highly recommended making available small and puncture-proof boxes adapted to injectors' practices.

- **III - Recommendations related to enhancing and improving and scale up of services delivery**

4. Currently MDM team is composed of non medical personnel whereas Temeke clients' medical needs are enormous. It is highly recommended to hire at least a nurse and a physician who may be able to respond to those identified medical needs.

5. Problematic drug epidemic in Temeke is exclusively a heroin epidemic. Introducing opiate substitution treatment (methadone) could greatly help to reduce injection, transition to injection and infectious diseases diffusion. Substitution prescription and dispensation could be done inside MDM premises.

6. Initiate a drug free treatment either inside MDM premises as out-patient activity or in collaboration with other medical in-patient services or both. Medically assisted drug free treatment is one of the most requested by the large majority of heroin users met during the assessment.

- ## IV - Recommendations related to advocacy and partnership

5. Organise a national advocacy workshop/training on substitution treatment for stakeholders and professionals of health sectors as well as law enforcement ones.

6. Initiate training for national psychiatrics and primary health care services on managing drug abuse disorders

7. Build links with SAAHRN harm reduction network and establish the Tanzanian harm reduction association as a focal point of this network.

8. Organize an important public event in Tanzania when the results of the RAR are finalized and published. That could greatly help sustain MDM project and enhance the implementation of harm reduction strategies in Tanzania.

ANNEXES:

- **ANNEX I - INJECTING DRUG USERS CAMPS IDENTIFIED BY MDM MAPPING SURVEY**

1.	SHERATON
2.	TRANSFORMA (TANDIKA)
3.	MWEMBEYANGA
4.	DAVIS CORNER
5.	TAYOHOPE
6.	SHARIF SHAMBA
7.	KWA MAYAWA
8.	PASHAWAAL
9.	MACHIMBO YA KOKOTO-MITI MIREFU
10.	MIKWAMBE - SHIMO LA MCHANGA
11.	WAVUVI
12.	FERRY
13.	TANDAVAMBA
14.	SIDADI
15.	MBAGARA STAND
16.	KIZUIANI
17.	ZAKHEM
18.	NJINJO
19.	MWEMBE BENDERA
20.	KIBURUGWA INN
21.	MZINGA MBAGARA
22.	MBAGARA MISSION BUS STAND
23.	KIRUNGURE
24.	KIRUNGURE STAND
25.	CHARAMBE STAND
26.	TRANSFORMA CHARAMBE
27.	MGENI NANI
28.	KIJICHI
29.	SERENGETI KWA KABUMA
30.	DUBAI/BONDENI
31.	UDIUDI- SHIMO LA UDONGO
32.	POLISI UFUNDI BUS STAND
33.	MBANDE BUS STAND
34.	CHAMAZI CENTRE
35.	TEMEKE STEREO
36.	TEMEKE MWISHO
37.	NJARO CAMP
38.	TEMEKE HOSPITAL BUS STAND
39.	MASANGATI
40.	TAZARA BUS STAND
41.	WAGONGA KOKOTO -TAZARA
42.	DARFUR
43.	LUGALO- SOKOTA BUS STAND
44.	TP
45.	AJAX
46.	HOMEBOY
47.	MAGUTA
48.	KEKO GEREZANI- WAMILEMBE CAMP
49.	WAMILEMBE& NATIONAL KOTA
50.	NEWSTIME (BUZA)
51.	MASELA
52.	STAMALA
53.	ABIOLA
54.	YOMBO DOVYA SHULE
55.	RUMO
56.	KWA ALI MBOA STAND
57.	CCM YOMBO
58.	YOMBO RELI
59.	KILAKALA KWA DOGO JANJA
60.	MZINGA BUS STAND

- **ANNEXE II - INTERVIEW GUIDELINES**

Qualitative assessment

Drug use and risk behaviours in "Temeke" Dar Es Salaam

Interview Guide

Dr Abdalla Toufik

PRELIMINARY PRESENTATION

We are currently conducting research on injection practices and injection drug use in Temeke. In this context, we will ask you some questions about your current or past drug use.

More specifically, we will ask questions about how you use them (sniff, injection, swallowing, smoke, etc.), and about the reasons for keeping or abandoning each of these routes of administrations.

The interview that we will achieve is anonymous, that is to say that you have the opportunity to choose an identity. In addition, the content of the interview will remain confidential: its content will be known only by you and me.

I will ask you some questions that you may find difficult or embarrassing. In this case, it goes without saying that you are not obliged to answer.

1. **History of consumption of psychoactive substances other than the product injected (cannabis, alcohol etc..): (Without much detail)**

- Age of first use
- Types of products used (cocaine, cannabis, drugs), trade name, etc.
- Place of initiation: Temeke or elsewhere
- Methods of procurement
- Route of administration (snorting, injecting, smoking, swallowing, etc.). Reasons for the choice of initial route

2. **First injection experience (very detailed)**

- Product description (name, physical description, colour, etc.)
- Age and, approximately, the year;
- *Context:* geographical location (city), physical location (flat, street, etc.); alone or in groups, associated products, methods of procurement
- *Describe* [as precisely as possible]: the preparation, the modalities; did anybody know how to do it? Who taught the person how to do it? Feelings: fear, apprehension? Environment and dialogue with others during this experience
- Appraisal (negative, positive) if the experiment was considered negative; reasons or factors that motivated the pursuit of new experiences.

3. **Transition to others route of administration (very detailed):**

- Type of change: from injection (IV) to sniff or to smoking; IV to sniff or to smoking; smoking to IV, or to sniff. Rational behind this transition
- When this transition took place (year)
- Context mainly: the product price, quality, availability, matching resources and needs
- Influence of the availability or non-availability of syringes on the choice of route of administration
- Sources of supply and system of deal
- Possible influence of infectious diseases (AIDS and hepatitis)
- For those who haven't made any significant transition in their careers, reasons (very detailed).

4. **Drug Market**

- Type of product usually purchased (i.e. *heroin*,white or brown). Localisation
- What are the lowest and highest prices of a typical dose or of a gram of heroin?
- Extent of availability and accessibility (can it be purchased day and night? in one or more sites in the city? may it not need an intermediary?)
- Daily cost of the drug
- Daily revenue sources to get the drug
- Describe the smuggling system of this product and socio-demographic characteristics of street dealers in Temeke and Dar Es Salaam.

5. **Association of others drugs with the main injected one:**

- What products are usually taken before, during or after taking the injected drug?
- Why? Timing desired and felt effects?
- Route of administration of each associated drugs?

6. **Sharing of injection equipment:**

- How often, on average, he/she injects a day/week?
- How do users get syringes?
- Has a shared injecting equipment include: syringe, needle, filter, container, water preparation and rinse water or the product itself?
- If so, with whom he/she used to share and why?
- Describe in detail, step by step, the last sharing scene. (time and location, attendance, types of sharing, reasons for sharing)

7. **Knowledge of HIV transmission:**

8. **Knowledge of HCV:**

How HIV is transmitted in general, blood transmission, in particular. To which extent - sharing practices described by or referred to by the interviewer are contaminating or not.

9. **Perceptions and opinions on the different routes of administration:**

- Opinion - positive or negative - on the different routes of administration (IV, sniff, smoking, etc.). Focus primarily on those already experienced
- Historical overview of recent injection practices in Temeke and Dar Es Salaam
- Assessment of injection practices' changes in Temeke: socio-demographic characteristics of injectors
- Main reasons for the diffusion of injecting practices in Temeke.

10. **I would give up injection if:**

With current or recent injectors, ask: What are the conditions (i.e.) physical, psychological, cost, resources, etc.) that could encourage you to abandon the intravenous route.

11. **Personal Network Size**

Heroin

Cocaine / Crack

Injectors

12. **Estimated number in Temeke**

Heroin

Cocaine / Crack

Injectors

13. Expectations with respect to MDM project

14. Socio-demographic features:

- Gender
- Professional activities
- Income
- Family.

8.3 Univariable and multivariable associations with HIV seropositivity in PWIDs

	HIV Positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
Total	93	34.8						
Sex								
Male	69	29.9	*			*		
Female	24	66.7	4.7	**<0.01**	2.2-9.9	6.9	**<0.01**	3.0-16.0
Age			1.1	**<0.01**	1.0-1.1	1.1	**0.03**	1.0-1.1
Highest level of education								
Secondary	11	25.6	*					
Primary school or less	82	41.0	1.7	0.17	0.8-3.5			
Marital status								
Married, living with spouse[2]	1	8.3	*					
Living with other sexual partner	34	36.2	6.2	0.09	0.8-50.4			
Not living with a spouse/sexual partner[3]	58	36.0	6.2	0.09	0.8-49.2			
Main source of income								
Skilled labour[4]	8	24.2	*					
Petty trade/small business[5]	25	35.7	1.7	0.25	0.7-4.4			
Stealing	3	23.1	0.9	0.93	0.2-4.3			
Housewife	9	75.0	9.4	**<0.01**	2.0-43.3			
Bus stop/driver	23	27.1	1.2	0.76	0.5-2.9			
Unskilled labour[6]	12	42.9	2.3	0.13	0.8-7.0			
Commercial sex worker	3	60.0	4.7	0.12	0.7-33.2			
Other[7]	2	18.2	1.6	0.64	0.2-10.2			
Currently unemployed	7	50.0	3.1	0.09	0.8-11.6			
Route of heroin administration *in previous month*								
Inject and smoke	4	14.8	*			*		
Inject only	89	37.1	3.4	**0.03**	1.1-10.1	2.9	0.10	0.8-10.0
Crack use *in previous month*								
No	92	34.8	*					
Yes	1	33.3	0.9	0.96	0.1-10.4			
Valium use *in previous month*								
No	85	34.3	*					
Yes	8	42.1	1.4	0.49	0.5-3.6			
Marijuana use *in previous month*								
No	50	39.7	*					
Yes	43	30.7	0.7	0.13	0.4-1.1			
Consume alcohol weekly or more *in previous month*								
No	87	38.2	*			*		
Yes	6	15.4	0.3	**0.01**	0.1-0.7	0.2	**0.01**	0.1-0.6
Years since injecting daily			1.1	**<0.01**	1.0-1.2	1.1	**0.01**	1.0-1.2
Number of *kete* of heroin used per day *on average*			1.0	0.80	1.0-1.0			
Where inject								
In camp	32	36.0	1.3	0.71	0.3-5.4			
At home	49	33.8	1.2	0.81	0.3-4.8			
Wherever	9	39.1	1.5	0.62	0.3-7.4			
Other	3	30.0	*					
Who injects with								
At least 1 other person	22	30.1	*					
Alone	35	34.0	1.2	0.59	0.6-2.3			
With a group of people in the camp	34	39.1	1.5	0.24	0.8-2.9			
Other	2	50.0	2.3	0.42	0.3-17.5			
Number of times use same needle/syringe to inject *in past month*								

	HIV Positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
Once (never reuse)	21	34.4	*					
Twice	16	30.8	0.85	0.68	0.4-1.9			
3 times	32	37.6	1.2	0.69	0.6-2.3			
4 or more times	24	34.8	1.0	0.97	0.5-2.1			
Ever injected with a needle/syringe previously used by someone else *in past month*								
No	78	35.1	*					
Yes	14	31.8	0.9	0.67	0.4-1.7			
Whose needle have reused *in previous month*								
Someone in a shooting gallery	2	28.6	*					
Friend	9	29.0	1.0	0.98	0.2-6.3			
Sexual partner (first sexual encounter)	1	50.0	2.5	0.58	0.1-62.6			
Drug Dealer	0	0.0						
Haven't shared in past month	78	35.1	1.4	0.72	0.3-7.1			
Used syringe that was kept hidden *in previous month*								
No	71	34.5	*					
Yes	22	36.7	1.1	0.75	0.6-2.0			
Ever practice withdrawing blood in syringe after injected and giving it to someone else *in past month*								
No	89	36.2	*					
Yes	4	19.0	0.4	0.12	0.1-1.3			
Helped by someone to inject *at last injection*								
No	70	34.8	*					
Yes	23	34.8	1.00	1.0	0.6-1.8			
Used a sterile needle and syringe *at last injection*								
Yes	81	33.5	*			*		
No	11	55.0	2.4	0.06	1.0-6.1	2.4	0.13	0.8-7.1
Practiced frontloading *at last injection*								
No	82	32.9	*					
Yes	11	61.1	3.2	**0.02**	1.2-8.6			
Shared razor blade *at last injection*								
No	78	36.1	*					
Yes	15	30.0	0.8	0.42	0.4-1.5			
Used a shared bottle, spoon, container, or water *at last injection*								
No	72	32.4	*					
Yes	21	46.7	1.8	0.07	1.0-3.5			
Took solution from a shared container *at last injection*								
No	71	31.0	*			*		
Yes	22	57.9	3.1	**<0.01**	1.5-6.2	3.7	**<0.01**	1.5-9.0
Injected with a used syringe not cleaned *at last injection*								
No	87	34.4	*					
Yes	6	42.9	1.4	0.52	0.5-4.3			
Injected with a used syringe that was first cleaned (water) *at last injection*								
No	48	30.8	*					
Yes	45	40.5	1.5	0.10	0.9-2.6			
Overdosed *in previous 12 months*								
Yes	29	30.5	*					
No	64	37.2	1.3	0.27	0.8-2.3			
Ever tried to stop using drugs								
No	60	34.7	*					
Yes	33	35.1	1.0	0.95	0.6-1.7			

	HIV Positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
Number sex partners *in previous 12 months* (continuous)			1.0	0.17	1.0-1.0			
Had sex *in past month*								
No	55	34.8	*					
Yes	38	35.2	1.0	0.95	0.6-1.7			
Used condom *at last sex*								
No	67	32.8	*					
Yes	23	39.0	1.3	0.38	0.7-2.4			
Regular sex partner/s *in previous 12 months*[8]								
Yes - inconsistent condom use[9]	40	32.3	*					
Yes - consistent condom use	9	45.0	1.7	0.27	0.7-4.5			
No	44	36.4	1.2	0.50	0.7-2.0			
If regular partner injects								
No	35	31.3	*					
Yes	14	43.8	1.7	0.19	0.8-3.8			
No regular partner	44	36.4	1.3	0.41	0.7-2.2			
Transactional sex partner/s in previous 12 months[10]								
Yes - consistent condom use[9]	13	37.1	*					
Yes - inconsistent condom use	8	21.1	0.6	0.13	0.2-1.3			
No	71	37.8	1.0	0.94	0.5-2.2			
Bought sex in exchange for money or drugs *in previous 12 months*								
No	79	39.5	*					
Yes	12	19.7	0.4	**0.01**	0.2-0.7			
Sold sex in exchange for money or drugs *in previous 12 months*								
No	80	35.6	*					
Yes	12	30.8	0.8	0.56	0.4-1.7			
Casual sex partner/s *in previous 12 months*[11]								
Yes - consistent condom use[9]	6	21.4	*					
Yes - inconsistent condom use	15	25.0	1.2	0.72	0.4-3.6			
No	71	42.3	2.7	**0.04**	1.0-7.0			
Inconsistent condom use with any partner *in previous 12 months*								
Always consistent condom use[9]	44	44.0	*					
Inconsistent condom use with any partner	49	29.9	0.6	**0.03**	0.3-1.0			
Ever been raped								
No	90	34.4	*					
Yes	1	33.3	1.0	0.97	0.1-10.7			
Ever had male-male sex *in previous 12 months*								
No	67	30.6	*					
Yes	2	18.2	0.5	0.39	0.1-2.4			
N/A: Female	24	66.7	4.5	**<0.01**	2.1-9.6			
Drug-related arrest *in previous 12 months*								
No	45	41.7	*					
Yes	47	29.7	0.6	**0.05**	0.4-1.0			
Use drugs in prison								
No	30	40.0	*					
Yes	5	19.2	0.4	0.06	0.1-1.1			
Never imprisoned	57	34.8	0.8	0.44	0.5-1.4			

	HIV Positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
Heard of AIDS								
No	1	14.3	*					
Yes	92	35.4	3.3	0.27	0.4-27.7			
HIV knowledge score								
4 or 5	64	35.8	1.1	0.65	0.7-1.9			
1, 2 or 3	29	33.0	*					
Heard of Hepatitis C								
Yes	30	33.0	*					
No	63	35.8	1.1	0.65	0.7-1.9			
Ever tested for HIV								
No	43	30.5	*					
Yes	50	39.7	1.5	0.12	0.9-2.5			
Ever tested for HCV								
Yes	2	40.0	1.2	0.81	0.2-7.6			
No	91	34.9	*					
Know where to get tested for HIV								
No	24	26.7	*					
Yes	69	39.2	1.8	**0.04**	1.0-3.1			
Condoms received *in previous 12 months*								
No	41	29.9	*					
Yes	51	39.5	1.5	0.10	0.9-2.5			
Sterile needles/syringes received *in previous 12 months*								
No	43	29.9	*					
Yes	50	40.7	1.6	0.07	1.0-2.7			

* Reference group
[1] Hosmer-lemeshow: 0.80; r2: 0.19
[2] Includes those that are married, but living with other sexual partner
[3] Includes those that are married, but not living with a spouse or sexual partner
[4] Skilled labour roles included carpenters, construction workers, electricity and mechanical technicians, craftsmen, farmers, and fishery workers.
[5] Petty trade or small business positions mostly involved selling food or other goods in the market.
[6] Unskilled labour roles included basic manual labour, collecting and selling scrap metal, and porters.
[7] The other category includes artists, musicians, drug dealer (n=1) and otherwise uncategorised.
[8] A *regular sex partner* refers to a spouse or live-in sex partner
[9] *Consistent condom use* is defined as using a condom every time; *inconsistent condom use* is defined as not using a condom every time had sex with partner/s
[10] A *transactional sex partner* refers to a partner from who sex was bought or sold in exchange for money or drugs
[11] A *casual sex partner* refers to a sex partner that is not a spouse, live-in partner or transactional sex partner

8.4 *Univariable and multivariable associations with newly diagnosed HIV in PWIDs*

	Newly diagnosed HIV positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
Total	68	28						
Sex								
Male	51	24	*			*		
Female	17	59	4.5	**<0.01**	2.0-10.0	6.7	**<0.01**	2.6-17.5
Age (continuous)			1.0	0.07	1.0-1.1	1.1	0.09	1.0-1.1
Highest level of education								
Primary school or less	59	29	1.5	0.34	0.7-3.3			
Secondary	9	22	*					
Marital status								
Married, living with spouse[2]	1	8	*					
Live with other sexual partner	28	32	5.1	0.13	0.6-41.7			
Don't live with spouse or other sexual partner[3]	39	27	4.2	0.18	0.5-33.3			
Living place								
Own private place	21	28	1.5	0.39	0.6-4.0			
At parents' home	34	31	1.8	0.23	0.7-4.4			
At relatives place	7	20	*					
At friends' place	4	40	2.7	0.20	0.6-12.1			
In the street, homeless/no fixed place	2	20	1.0	1.00	0.2-5.8			
Main source of income								
Skilled labour[4]	6	12	*					
Petty trade/small business[5]	19	30	1.8	0.29	0.6-5.0			
Stealing	3	23	1.3	0.78	0.3-6.0			
Housewife	5	63	6.9	**0.02**	1.3-37.5			
Bus stop/driver	19	23	1.3	0.64	0.5-3.6			
Unskilled labour[6]	8	33	2.1	0.24	0.6-7.1			
Currently unemployed	5	42	3.0	0.14	0.7-12.7			
Commercial sex worker	1	33	2.1	0.57	0.2-27.0			
Other[7]	2	33	1.0	0.97	0.1-11.1			
Route of heroin administration *in previous month*								
Inject and smoke/inhale	2	8	*			*		
Inject only	66	30	5.0	**0.03**	1.2-21.9	3.4	0.13	0.7-16.6
Crack use *in previous month*								
No	67	28	*					
Yes	1	33	1.3	0.84	0.1-14.4			
Valium use *in previous month*								
No	7	39	*					
Yes	7	39	1.7	0.29	0.6-4.6			
Marijuana use *in previous month*								
No	35	32	*					
Yes	33	25	0.7	0.29	0.4-1.3			
Consume alcohol weekly or more *in previous month*								
No	63	31	*			*		

	Newly diagnosed HIV positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
Yes	5	13	0.3	**0.03**	0.1-0.9	0.3	**0.05**	0.1-1.0
Years since injecting daily			1.1	**0.01**	1.0-1.2	1.1	**0.03**	1.0-1.2
Number of *kete* (dice) of heroin used per day *on average*			1.0	0.96	1.0-1.0			
Where inject								
In camp	25	30	1.3	0.44	0.7-2.4			
At home	33	26	*					
Wherever	7	33	1.5	0.46	0.5-3.9			
Other	3	30	1.2	0.76	0.3-5.1			
Who injects with								
Alone	20	23	*					
At least 1 other person	19	27	1.3	0.52	0.6-2.6			
With a group of people in the camp	28	35	1.8	0.09	0.9-3.5			
Other	1	33	1.7	0.67	0.1-19.7			
Number of times use same needle/syringe to inject *in previous month*								
Once (never reuse)	14	26	*					
Twice	11	23	0.9	0.77	0.4-2.2			
3 times	25	32	1.3	0.45	0.6-2.9			
4 or more times	18	29	1.1	0.75	0.5-2.6			
Ever injected with a needle/syringe previously used by someone else *in previous month*								
No	54	27	*					
Yes	13	30	1.2	0.70	0.6-2.4			
Whose needle have reused *in past month*								
haven't shared in past month	54	27	*					
Sexual partner (first sexual encounter)	1	50	2.7	0.49	0.2-43.4			
Friend	8	27	1.0	0.95	0.4-2.3			
Drug Dealer	0	0						
Someone in a shooting gallery	2	29	1.1	0.94	0.2-5.7			
Used syringe that was kept hidden *in previous month*								
No	50	27	*					
Yes	18	32	1.3	0.46	0.7-2.4			
Ever practice withdrawing blood in syringe after injected and giving it to someone else *in previous month*								
No	66	30	*					
Yes	2	11	0.3	0.10	0.1-1.2			
Helped by someone to inject *at last injection*								
No	49	27	*					
Yes	19	31	1.2	0.61	0.6-2.2			
Used a sterile needle and syringe *at last injection*								
Yes	59	27	*			*		
No	9	50	2.7	**0.04**	1.0-7.2	3.1	0.06	0.9-10.3
Practiced frontloading *at last injection*								
No	60	26	*					
Yes	8	53	3.2	**0.03**	1.1-9.1			
Shared razor blade *at last injection*								
No	58	30	*					
Yes	10	22	0.7	0.32	0.3-1.5			
Used a shared bottle, spoon, container, or water at last injection								

	Newly diagnosed HIV positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
No	54	26	*					
Yes	14	37	1.6	0.19	0.8-3.4			
Took solution from a shared container at last injection								
No	53	25	*			*		
Yes	15	48	2.8	**0.01**	1.3-6.0	4.6	**<0.01**	1.6-12.6
Injected with a used syringe not cleaned at last injection								
No	62	27	*					
Yes	6	43	2.0	0.21	0.7-6.0			
Injected with a used syringe that was first cleaned (water) at last injection								
No	33	23	*					
Yes	35	35	1.7	0.06	1.0-3.1			
Overdosed *in previous 12 months*								
Yes	22	25	*					
No	46	30	1.3	0.42	0.7-2.3			
Ever tried to stop using drugs								
Yes	23	27	*					
No	45	28	1.1	0.86	0.6-1.9			
Number sex partners in *previous 12 months*			1.0	0.50	1.0-1.0			
Had sex *in past month*								
No	37	26	*					
Yes	31	31	1.2	0.57	0.4-1.6			
Used condom *at last sex*								
No	50	27	*					
Yes	16	31	0.8	0.57	0.4-1.6			
Regular sex partner/s in *previous 12 months*[8]								
Yes - consistent condom use[9]	8	42	*					
No	30	28	0.5	0.22	0.2-1.5			
Yes - inconsistent condom use	30	26	0.5	0.16	0.2-1.3			
If regular partner injects								
No	28	27	*					
No regular partner	30	28	1.1	0.82	0.6-2.0			
Yes	10	36	1.5	0.35	0.6-3.7			
Transactional sex partner/s in previous 12 months[10]								
Yes - consistent condom use[9]	8	27	*					
No	55	32	1.3	0.56	0.5-3.1			
Yes - inconsistent condom use	4	12	0.4	0.14	0.1-1.4			
Bought sex in exchange for money or drugs *in previous 12 months*								
No	60	33	*			*		
Yes	7	13	0.3	**<0.01**	0.1-0.7	0.2	**<0.01**	0.1-0.6
Sold sex in exchange for money or drugs *in previous 12 months*								
No	59	29	*					
Yes	8	23	0.7	0.46	0.3-1.7			
Casual sex partner/s *in previous 12 months*[11]								
Yes - consistent condom use[9]	5	19	*					
No	52	35	2.4	0.10	0.8-6.6			
Yes - inconsistent condom use	11	20	1.1	0.90	0.3-3.5			
Inconsistent condom use with any partner *in previous 12 months*								
Always consistent condom use[9]	31	36	*					

	Newly diagnosed HIV positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
Inconsistent condom use with any partner	37	24	0.6	0.09	0.3-1.1			
Ever been raped								
No	67	28	*					
Yes	1	33	1.3	0.84	0.1-14.4			
Ever had male-male sex *in previous 12 months*								
No	49	24	*					
Yes	2	18	0.7	0.64	0.1-3.3			
N/A: Female	17	59	4.4	**<0.01**	2.0-9.8			
Drug-related arrest in *previous 12 months*								
No	33	34	*					
Yes	35	24	0.6	0.08	0.3-1.1			
Used drugs in prison								
No	20	31	*					
Yes	4	16	0.4	0.16	0.1-1.4			
Never imprisoned	44	29	0.9	0.81	0.5-1.7			
Heard of AIDS								
No	1	14	*					
Yes	67	29	2.4	0.42	0.3-20.3			
Heard of Hepatitis C								
Yes	21	26	*					
No	47	29	1.2	0.54	0.7-2.2			
HIV knowledge score								
1, 2 or 3	22	27	*					
4 or 5	46	29	1.1	0.82	0.6-1.9			
Ever tested for HIV								
No	43	30	*			*		
Yes	25	25	0.7	0.33	0.4-1.3	0.4	**0.02**	0.2-0.9
Ever tested for HCV								
Yes	1	25	*					
No	67	28	1.2	0.89	0.1-11.6			
Know where to get tested								
No	23	26	*					
Yes	45	30	1.2	0.53	0.7-2.2			
Condoms received *in previous 12 months*								
No	31	24	*					
Yes	37	32	1.5	0.18	0.8-2.6			
Sterile needles/syringes received *in previous 12 months*								
No	27	21	*			*		
Yes	41	36	2.1	**0.01**	1.2-3.7	2.3	**0.02**	1.1-4.5

* Reference group
[1] Hosmer-lemeshow: 0.43; r^2: 0.24
[2] Includes those that are married, but living with other sexual partner
[3] Includes those that are married, but not living with a spouse or sexual partner
[4] Skilled labour roles included carpenters, construction workers, electricity and mechanical technicians, craftsmen, farmers, and fishery workers.
[5] Petty trade or small business positions mostly involved selling food or other goods in the market.
[6] Unskilled labour roles included basic manual labour, collecting and selling scrap metal, and porters.
[7] The other category includes artists, musicians, drug dealer (n=1) and otherwise uncategorised.
[8] A *regular sex partner* refers to a spouse or live-in sex partner
[9] *Consistent condom use* is defined as using a condom every time; *inconsistent condom use* is defined as not using a condom every time had sex with partner/s

	Newly diagnosed HIV positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI

[10] A *transactional sex partner* refers to a partner from who sex was bought or sold in exchange for money or drugs
[11] A *casual sex partner* refers to a sex partner that is not a spouse, live-in partner or transactional sex partner

8.5 Univariable associations with HIV seropositivity in other drug users

	HIV Positive		OR	p-value	95% CI
	n	%			
Total	19	12			
Sex					
Male	4	3.2	*		
Female	15	40.5	20.8	**<0.01**	6.3-68.5
Age			1.0	0.41	1.0-1.1
Highest level of education					
Secondary	3	14.3	1.3	0.69	0.3-5.0
Primary school or less	16	11.3			
Marital status					
Live with other sexual partner	6	12.5	*		
Married, living with spouse[1]	0	0.0			
Don't live with spouse or other sexual partner[2]	13	13.4	1.1	0.88	0.4-3.1
Living place					
Own private place	3	6.3	*		
At parents' home	7	8.9	1.5	0.60	0.4-5.9
At relatives place	2	9.1	1.5	0.67	0.2-9.7
At friends' place	6	50.0	15.0	**<0.01**	2.9-76.3
In the street, homeless/no fixed place	1	50.0	15.0	0.08	0.7-303.7
Main source of income					
Trade/small business[3]	4	7.5	*		
Housewife	5	31.3	5.6	**0.02**	1.3-24.2
Commercial sex worker	5	62.5	20.4	**0.00**	3.5-118.3
Unskilled labour[4]	2	9.1	1.2	0.82	0.2-7.2
Currently unemployed	1	11.1	1.5	0.72	0.2-15.5
Stealing	0	0.0			
Skilled labour[5]	0	0.0			
Bus stop/driver	0	0.0			
Other[6]	2	100.0			
Crack use *in previous month*					
No	19	11.7			
Yes	0	0.0			
Valium use *in previous month*					
No	19	15.0			
Yes	0	0.0			
Marijuana use *in previous month*					
No	12	14.3	*		
Yes	7	8.9	0.6	0.29	0.2-1.6
Consume alcohol weekly or more *in previous month*					
No	16	11.6	*		
Yes	3	12.5	1.1	0.90	0.3-4.1
Number of *kete* of heroin used per day *on average*			1.0	0.10	1.0-1.1
Overdosed *in previous 12 months*					
No	15	13.3	*		
Yes	3	6.3	2.3	0.21	0.6-8.3
Ever share razor blades					

	HIV Positive		OR	p-value	95% CI
	n	%			
No	7	9.9	*		
Yes	12	14.0	1.5	0.44	0.6-4.0
Ever tried to stop using drugs					
No	6	6.0	*		
Yes	13	20.6	4.1	**0.01**	1.5-11.4
Number sex partners *in previous 12 months*			1.0	0.17	1.0-1.0
Had sex *in previous month*					
No	5	6.6	*		
Yes	14	16.1	2.7	0.07	0.9-8.0
Used condom *at last sex*					
No	10	8.1	*		
Yes	9	24.3	3.7	**0.01**	1.4-9.9
Ever been raped					
No	16	10.1	*		
Yes	3	75.0	26.8	**0.01**	2.6-273.2
Ever had male-male sex *in past 12 months*					
No	4	3.4	*		
Yes	0	0.0			
N/A: Female	15	40.5	19.6	**<0.01**	5.9-64.7
Regular sex partner/s *in previous 12 months*[7]					
Yes - inconsistent condom use[8]	14	15.9	1.2	0.80	0.2-6.1
Yes - consistent condom use	2	13.3	*		
No	3	5.2	0.4	0.28	0.1-2.3
If regular partner injects					
No regular partner	3	5.2	0.3	0.11	0.1-1.3
Yes	4	26.7	2.3	0.21	0.6-8.4
No	12	13.6	*		
Transactional sex partner/s in previous 12 months[9]					
Yes - consistent condom use[8]	8	24.2	*		
Yes - inconsistent condom use	6	17.1	0.6	0.47	0.2-2.1
No	4	4.3	0.1	**<0.01**	0.0-0.5
Sold sex in exchange for money or drugs *in previous 12 months*					
No	5	4.1	*		
Yes	14	35.9	13.2	**<0.01**	4.4-40.0
Bought sex in exchange for money or drugs *in previous 12 months*					
No	17	14.7	*		
Yes	2	4.4	0.3	0.09	0.1-1.2
Casual sex partner/s *in previous 12 months*[10]					
Yes - consistent condom use[8]	1	5.9	*		
Yes - inconsistent condom use	5	11.4	2.1	0.53	0.2-19.0
No	13	13.3	2.4	0.40	0.3-20.0
Inconsistent condom use with any partner *in previous 12 months*					
Always consistent condom use[8]	4	8.5	*		
Inconsistent condom use with any partner	15	13.2	1.7	0.37	0.5-5.4
Arrested in association with drugs *in previous 12 months*					
No	10	14.1	*		
Yes	9	9.8	0.7	0.40	0.3-1.7
Used drugs in prison					
No	4	12.9	*		
Yes	2	15.4	1.2	0.83	0.2-7.7
Never imprisoned	13	11.3	0.9	0.81	0.3-2.9
Heard of AIDS					

	HIV Positive		OR	p-value	95% CI
	n	%			
No	0	0.0			
Yes	19	12.0			
Heard of Hepatitis C					
Yes	2	3.4	*		
No	17	16.2	5.4	**0.03**	1.2-24.3
HIV knowledge score					
1, 2 or 3	4	8.2	*		
4 or 5	15	13.2	1.7	0.37	0.5-5.4
HIV knowledge score (continuous 0-5)			1.2	0.57	0.7-2.0
Ever tested HIV					
No	7	8.3	*		
Yes	12	15.2	2.0	0.18	0.7-5.3
Ever tested HCV					
Yes	0	0.0			
No	19	11.9			
Know where to get tested					
No	7	12.3	*		
Yes	12	11.3	0.9	0.86	0.3-2.5
Condoms received *in previous 12 months*					
No	15	14.7	*		
Yes	4	6.6	0.4	0.13	0.1-1.3
Sterile needles/syringes received *in previous 12 months*					
No	15	11.4	*		
Yes	3	10.3	0.9	0.88	0.2-3.3

* Reference group
[1] Includes those that are married, but living with other sexual partner
[2] Includes those that are married, but not living with a spouse or sexual partner
[3] Petty trade or small business positions mostly involved selling food or other goods in the market.
[4] Unskilled labour roles included basic manual labour, collecting and selling scrap metal, and porters.
[5] Skilled labour roles included carpenters, construction workers, electricity and mechanical technicians, craftsmen, farmers, and fishery workers.
[6] The other category includes artists, musicians, drug dealer (n=1) and otherwise uncategorised.
[7] A *regular sex partner* refers to a spouse or live-in sex partner
[8] *Consistent condom use* is defined as using a condom every time; *inconsistent condom use* is defined as not using a condom every time had sex with partner/s
[9] A *transactional sex partner* refers to a partner from who sex was bought or sold in exchange for money or drugs
[10] A *casual sex partner* refers to a sex partner that is not a spouse, live-in partner or transactional sex partner

8.6 Univariable and multivariable associations with HCV seropositivity in PWIDs

	HCV Positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
Total	74	28						
Sex								
Male	64	28	*			*		
Female	10	28	1.0	**0.99**	0.5-2.2	1.0	0.92	0.4-2.6
Age (continuous)			1.0	0.24	1.0-1.1	1.0	0.67	0.9-1.0
Highest level of education								
Primary school or less	62	28	*					
Secondary	12	28	1.0	0.98	0.5-2.1			
Marital status								
Married, living with spouse[2]	2	17	*					
Lives with other sexual partner	27	29	2.0	0.39	0.4-9.8			
Doesn't live with a sexual partner[3]	45	28	1.9	0.40	0.4-9.2			
Living place								
At relatives place	11	17	*					
At parents' home	36	30	1.2	0.60	0.5-2.9			
Own private place	27	31	1.2	0.68	0.5-2.6			
At friends' place	0	0						
In the street, homeless/no fixed place	0	0						
Main source of income								
Skilled labour[4]	4	12	*					
Petty trade/small business[5]	20	29	2.9	0.07	0.9-9.3			
Stealing	1	8	0.6	0.67	0.1-6.0			
Housewife	4	33	3.6	0.11	0.7-17.8			
Bus stop/driver	21	25	2.4	0.14	0.7-7.6			
Unskilled labour[6]	16	57	9.7	**<0.01**	2.7-35.0			
Currently unemployed	4	29	2.9	0.18	0.6-13.8			
Commercial sex worker	1	20	1.8	0.63	0.2-20.5			
Other[7]	2	33	3.6	0.21	0.5-26.6			
Route of heroin administration *in previous month*								
Inject plus sniff/smoke	3	11	*			*		
Inject only	71	30	3.4	**0.05**	1.0-11.5	3.3	0.08	0.9-12.6
Crack use *in previous month*								
No	74	28						
Yes	0	0						
Valium use *in previous month*								
Yes	4	21	*					
No	70	28	1.5	0.50	0.5-4.6			
Marijuana use *in previous month*								
No	35	28	*					
Yes	39	28	1.0	0.99	0.6-1.7			
Consume alcohol weekly or more *in previous month*								
No	65	29						
Yes	9	23	0.8	0.49	0.3-1.7			
Years since injecting daily			1.1	**0.01**	1.0-1.1	1.1	**0.01**	1.0-1.2
Number of *kete*(dice) of heroin used per day *on average*			0.9	**0.04**	0.9-1.0	0.9	**0.04**	0.9-1.0

	HCV Positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
Where inject								
Other	2	20	*					
Wherever	7	30	1.8	0.54	0.3-10.4			
At home	44	30	1.7	0.49	0.4-8.5			
In camp	21	24	1.2	0.80	0.2-6.3			
Who inject with								
At least 1 other person	16	22	*					
Alone	35	34	1.8	0.08	0.9-3.6			
With a group of people in the camp	22	25	1.2	0.62	0.6-2.5			
Other	1	25	1.2	0.89	0.1-12.2			
Number of times use same needle/syringe to inject *in previous month*								
Once (never reuse)	14	23	*					
Twice	12	23	1.0	0.99	0.4-2.4			
3 times	23	27	1.2	0.57	0.6-2.7			
4 or more times	25	36	1.9	0.10	0.9-4.1			
Ever injected with a needle/syringe previously used by someone else *in previous month*								
No	65	29	*					
Yes	9	20	0.6	0.24	0.3-1.4			
Whose needle have reused *in previous month*								
Someone in a shooting gallery	1	14	*					
Drug Dealer	0	0						
Friend	7	23	1.8	0.63	0.2-17.1			
Sexual partner (first sexual encounter)	1	50	6.0	0.31	0.2-196.3			
Haven't shared in past month	65	29	2.5	0.40	0.3-21.0			
Used syringe that was kept hidden *in previous month*								
No	56	27	*					
Yes	18	30	1.1	0.67	0.6-2.2			
Ever practice withdrawing blood in syringe after injected and giving it to someone else *in previous month*								
No	70	28	*					
Yes	4	19	0.6	0.36	0.2-1.8			
Helped by someone to inject *at last injection*								
Yes	16	24	*					
No	58	29	1.3	0.47	0.7-2.4			
Used a sterile needle and syringe *at last injection*								
Yes	68	28	*			*		
No	5	25	0.9	0.77	0.3-2.4	0.6	0.41	0.2-2.1
Practiced frontloading *at last injection*								
No	68	27	*					
Yes	6	33	1.3	0.58	0.5-3.7			
Shared razor blade *at last injection*								
Yes	13	26	*					
No	61	28	1.3	0.34	0.7-2.3			
Used a shared bottle, spoon, container, or water *at last injection*								
No	62	28	*					
Yes	12	27	0.9	0.86	0.5-1.9			
Took solution from a shared container *at last injection*								
No	60	26	*					
Yes	14	37	1.6	0.18	0.8-3.4			
Injected with a used syringe not cleaned *at last injection*								
Yes	3	21	0.7	0.59	0.2-2.6			

	HCV Positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
No	71	28	*					
Injected with a used syringe that was first cleaned (water) *at last injection*								
No	37	24	*			*		
Yes	37	33	1.6	0.09	0.9-2.8	2.0	**0.03**	1.1-3.8
Overdosed *in previous 12 months*								
Yes	23	24	*					
No	51	30	1.2	0.47	0.7-2.1			
Ever tried to stop using drugs								
No	43	25	*					
Yes	31	33	1.5	0.16	0.9-2.6			
Number sex partners *in previous 12 months*			1.0	0.79	1.0-1.0			
Had sex *in previous month*								
Yes	31	29	*					
No	43	27	0.9	0.79	0.5-1.6			
Used condom *at last sex*								
No	57	28	*					
Yes	15	25	0.9	0.70	0.5-1.7			
Regular sex partner/s in *previous 12 months*[8]								
Yes - consistent condom use[9]	3	15	*			*		
Yes - inconsistent condom use	38	31	2.5	0.16	0.7-9.1	5.2	**0.03**	1.2-21.9
No	32	26	2.0	0.28	0.6-7.4	2.6	0.18	0.6-11.1
If regular partner injects								
No	33	29	*					
Yes	9	28	0.9	0.88	0.4-2.2			
No regular partner	32	26	0.9	0.61	0.5-1.5			
Transactional sex partner/s in previous 12 months[10]								
Yes - consistent condom use[9]	10	29	*					
Yes - inconsistent condom use	9	24	0.8	0.64	0.3-2.2			
No	55	29	1.0	0.94	0.5-2.3			
Bought sex in exchange for money or drugs *in previous 12 months*								
Yes	16	26	*					
No	55	28	1.1	0.85	0.6-2.0			
Sold sex in exchange for money or drugs *in previous 12 months*								
Yes	9	23	*					
No	65	29	1.4	0.46	0.6-3.0			
Casual sex partner/s *in previous 12 months*[11]								
Yes - consistent condom use[9]	7	25	*					
Yes - inconsistent condom use	12	20	0.8	0.60	0.3-2.2			
No	53	32	1.4	0.49	0.6-3.5			
Inconsistent condom use with any partner *in previous 12 months*								
Always consistent condom use[9]	46	28	*					
Inconsistent condom use with any partner	28	28	1.0	0.88	0.6-1.7			
Ever been raped								
No	73	28						
Yes	0	0						
Ever had male-male sex *in previous 12 months*								
N/A: Female	10	28	*					
Yes	3	27	1.1	0.93	0.3-4.3			
No	61	28	1.0	0.96	0.5-2.0			
Drug-related arrest *in previous 12 months*								

	HCV Positive		Univariable			Multivariable[1]		
	n	%	OR	p-value	95% CI	AOR	p-value	95% CI
No	42	39	*			*		
Yes	32	20	0.40	**<0.01**	0.2-0.7	0.4	**<0.01**	0.2-0.8
Used drugs in prison								
Yes	7	27	*					
No	23	31	1.2	0.72	0.4-3.3			
Never imprisoned	43	26	0.96	0.94	0.4-2.5			
Heard of AIDS								
No	2	29	*					
Yes	72	28	1.0	0.96	0.2-5.0			
Heard of Hepatitis C								
Yes	23	25	*					
No	51	29	1.2	0.52	0.7-2.1			
HIV knowledge score								
1, 2 or 3	21	24	*					
4 or 5	53	30	1.3	0.33	0.7-2.4			
Ever tested HIV								
No	31	22	*					
Yes	43	34	1.6	0.07	1.0-2.6			
Ever tested HCV								
No	71	27	*					
Yes	3	60	4.0	0.13	0.7-24.5			
Know where to get tested								
No	16	18	*			*		
Yes	58	33	2.3	**0.01**	1.2-4.2	2.3	**0.03**	1.1-4.7
Condoms received *in previous 12 months*								
No	30	22	*					
Yes	44	34	1.8	**0.03**	1.1-3.2			
Sterile needles/syringes received *in previous 12 months*								
No	29	20	*			*		
Yes	45	37	2.3	**<0.01**	1.3-4.0	2.7	**<0.01**	1.4-5.2

* Reference group

[1] Hosmer-lemeshow: 0.60; r^2: 0.16

[2] Includes those that are married, but living with other sexual partner

[3] Includes those that are married, but not living with a spouse or sexual partner

[4] Skilled labour roles included carpenters, construction workers, electricity and mechanical technicians, craftsmen, farmers, and fishery workers.

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[9] *Consistent condom use* is defined as using a condom every time; *inconsistent condom use* is defined as not using a condom every time had sex with partner/s

[10] A *transactional sex partner* refers to a partner from who sex was bought or sold in exchange for money or drugs

[11] A *casual sex partner* refers to a sex partner that is not a spouse, live-in partner or transactional sex partner

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