Journal of Alcoholism & Drug Dependence

Wanjihia et al., J Alcohol Drug Depend 2018, 6:5
DOI: 10.4172/2329-6488.1000319

Research Article Open Access

Comparison of Nutritional Status and Food Insecurity among People Who Inject Illicit Drugs, Non Drug Users and Those on Methadone Treatment in Selected Areas of Nairobi, Kenya

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Received date: September 18, 2018; **Accepted date:** October 05, 2018; **Published date:** October 10, 2018

Abstract

Background: People who Inject Drugs (PWIDs) are a key population. They suffer higher rates of food insecurity and malnutrition, although this is under-researched and there is a paucity of data on their nutritional or food security status. This study aimed to compare nutritional status and food security among people who inject drugs (PWIDs), people on methadone treatment and controls who are non-drug users.

Methods: In a cross-sectional comparative study, PWIDs were compared with Methadone users and Controls, living under the same resource-constrained settings. Information on age, gender, education, socio-economic and marital status was collected. Measurements of weight and height were taken, to determine Body Mass Index (BMI).Food insecurity was measured using the Household Food Insecurity Access Scale (HFIAS) Measurement Tool. The sample size was 165 for each of the three groups.

Results: Main occupation for the study sample was unskilled casual labor (61.6%). Men were 415 (83.8%) and women 80 (16.2%), mean age was 32.2 (+7.9) years. More PWIDs (32.7%) engaged in risky behavior like crime and sex work, compared to methadone (7.3%) and controls (0.6%).

PWIDS had a lower BMI mean (20.00 ± 2.56) compared to Controls (22.38 ± 4.22) ($p<0.001$).They also experienced a higher food insecurity score (Median 18.0; Interquartile range (IQR) 14-23) than Controls (Median 12.0; IQR 8-17) ($p<0.001$). Correlation between the food insecurity score and BMI was ($r=-0.195$, $P<0.001$).

Conclusion: PWIDs suffer malnutrition and more food insecurity. They should therefore receive nutrition education and food assistance as part of the harm reduction policy.

Keywords: People who inject drugs; Methadone intervention; Body mass index; Food security

Introduction

People who inject drugs (PWIDs) refer to those who inject psychotropic substances for non-medical purposes [1]. These substances include opioids, amphetamine-type stimulants, cocaine, hypno-sedatives and hallucinogens. Injection may be through intravenous, intramuscular, subcutaneous or other injectable routes [2]. An estimated 12.7 million (range: 8.9 million-22.4 million) people globally inject drugs, with the majority living in low and middle-income countries [1]. In Kenya rampant use of heroin has been reported with 44.9% of users being classified as injectors [3]. A study on sero-prevalence of HIV, HCV and HBV among drug users in Nairobi also reported that 44.8% of drug users were PWIDS [4]. Kenyan heroin users and development workers report that heroin is the more widely used drug for injection and is easily available in Nairobi and Tanzanian cities such as Zanzibar, Arusha and Dar es Salaam, than at the Kenyan Coast [5]. A study from Dar es Salaam, Tanzania indicates that injecting drug use is widespread in the Tanzanian capital [6]. WHO reports that large quantities of heroin begun making way to the East African Coast in the late 1990s, when smugglers switched from their traditional overland routes from Asia to the shorter sea route across the Indian Ocean. According to the United Nations Office on Drugs and Crime (UNODC), East Africa is "attractive to international drug trafficking syndicates as they are quick to exploit non-existent or ineffective border (land, sea and air) controls, limited cross border and regional cooperation as well as serious deficiencies in the criminal justice systems." [7].

Although PWIDs as a key population suffer higher rates of food insecurity and malnutrition, these are topics that are grossly under researched and there is a paucity of data on their nutritional status or food security status [8]. Studies on PWIDs have hither to concentrated on the HIV/AIDS intervention and harm reduction programmes targeting them, like Opioid substitution therapy (OST) (which in Kenya involves Methadone treatment) and Needle and syringe programmes (NSP). Nevertheless, as a vulnerable group, PWIDs are plagued by a myriad of health and socio-economic problems, key among which are nutritional deficiencies and food security problems

[9]. Food insecurity exists when people do not have adequate physical, social or economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life [10].

PWIDs, suffer the daily struggle of competing demands of addiction and subsistence, where eating a nutritionally adequate diet is not always a priority and they are at an increased risk of malnutrition and food insecurity regardless of whether or not they are infected with HIV [11]. They go through drug binges where they experience intense drug use lasting for days at a time, during which food intake, sleep, and basic hygiene are neglected. This significantly affects nutritional health and dietary intake [12]. Drug addiction has been shown to modify the eating habits of PWIDs, often causing poor dietary patterns like, irregular eating schedule, eating fewer meals per week, skipping meals, fasting to prolong the effects of drugs, eating late at night and eating alone [13].

PWIDs may have limited economic resources due to their diminished ability to focus on any productive activity, and these limited resources may be primarily spent on maintaining the drug habit, hindering access to groceries and food selection [14]. As a result, poor and unhealthy nutrition choices may be made by PWIDs, consequently contributing to poor nutrient intake [15].

PWIDs have been found to be more prone to vitamin deficiencies (including vitamin A, C, and E, as well as iron, zinc, thiamin and calcium), anemia, malnutrition with observable emaciation, lower body mass index (BMI), gastrointestinal distress, tooth decay, and decreased appetite than non-drug users. In PWIDs, low serum concentrations of vitamins and minerals are associated with an increased risk of morbidity [16].

A joint WHO, UNAIDS and UNODC technical guide provides countries with tools to set targets for universal access to HIV prevention, treatment and care for PWIDs. It describes a comprehensive package of nine core interventions, including:

- Needle and syringe programmes (NSP).
- Opioid substitution therapy (OST).
- Provision of antiretroviral therapy (ART).
- HIV testing and counseling (HTC).
- Prevention and treatment of sexually transmitted infections.
- Condom programmes.
- Targeted information, education and communication for people who inject drugs and their sexual partners.
- Diagnosis and treatment and vaccination for viral hepatitis.
- Prevention, diagnosis and treatment of tuberculosis [17].

In this targeted approach however, nutrition as a key intervention has not been addressed. PWIDs may have poor nutritional status and may require interventions that address this. This study will establish the nutritional status of PWIDs so that they can receive the necessary nutritional interventions if they require them. Nutritional intervention is very important for PWIDs because chronic drug use and the heightened risk for contracting infectious diseases, such as tuberculosis, HIV and HCV, as well as inadequate storage of nutrients in damaged livers together with increased nutrient excretion through diuresis and diarrhea can severely compromise their nutritional status [18].

PWIDs can however be weaned from the drug habit through Opioid substitution therapy (OST). OST supplies illicit drug users with a replacement drug, a prescribed medicine such as methadone. This is usually administered orally in a supervised clinical setting. OST programmes are effective in substantially reducing illicit opiate use, HIV risk behaviours, death from overdose, criminal activity and financial and other stresses on drug users and their families. OST helps people to stop taking opioids and also helps with cravings and withdrawals. Drug users can feel much more stable, able to cope with everyday living and focus on the future [19]. In this study, we will compare nutritional status, and food security status of PWIDs, former injectors on methadone treatment under the OST programme, for at least six months and non-drug users living in the same resource-constrained environment.

Materials and Methods

Study participants

Eligible participants were between the ages of 18 and 65 years placed in three groups as follows;

Group 1 (PWIDs): Drug Injectors for at least three years with no methadone intervention. The common injection-drug in Nairobi, especially in the resource-constrained settings, is heroin and an average injector was on at least three doses per day.

Group 2 (Methadone): Drug Injectors enrolled into an intervention/treatment programme/OST for at least 6 months (Methadone programme) without defaulting.

Group 3 (Controls): People with no history of drug injection or drug abuse, including alcohol abuse, but living under the same socio-economic conditions as groups 1 and 2.

The study used Casagrandeet al. [20], sample size calculation formula, used for comparing proportions from independent populations. Applying multiplicity testing correction (Bonferroni) the minimum sample size for each group was 146.5 rounded of to 147. Allowing for 10% non-response, the sample size was adjusted upwards to 165. Overall, the sample size was 495; for group 1 (n=165), group 2 (n=165) and group 3 (n=165).

Group 1 was selected first, using simple random sampling from the database that is kept by SAPTA (Support for Addiction Prevention and Treatment in Africa) an organization in Nairobi, Kenya that is offering harm reduction interventions for people who abuse drugs. Every 10^{th} person in the database comprising of about 2,000 cases, was selected. The selected cases were contacted by the peer educators and given an appointment to report to the SAPTA Centre. On reporting, they were informed about the study and their consent to participate was sought.

After selection of group 1, group 2 and 3 were selected. They were matched for age and gender with group 1. Group 2 were also selected from the Methadone database also at SAPTA; only the cases that matched group one were selected using a program fed into the database.

For group 3, Community Health Volunteers worked with the local administration to access listings of the inhabitants of the area who met the inclusion criteria. From this list, purposive sampling was done to select those who matched the selected participants in group 1.

All participants had the following questionnaires administered to them;

- Lifestyle questionnaire that included detailed information on socio-demographics, including age, gender, education, socio-economic and marital status.
- Measurements of weight and height to determine Body Mass Index (BMI).
- Food insecurity was measured using the Household Food Insecurity Access Scale (HFIAS) Measurement Tool [21].

Ethical considerations

PWIDs as a key population were considered as requiring additional considerations, this is due to the likelihood of them being cognitively impaired resulting from the drug habit. This may compromise their capacity to understand the information presented and their ability to make a sound decision about participation in the study. The study protected the privacy of all subjects and confidentiality of the data collected. Competence of the participant, which is the ability to understand the information presented, to appreciate the consequences of acting or not acting on the information and to make an informed choice, was assessed at the SAPTA center by trained psychologists who deal with the PWIDs on a regular basis. If a participant was deemed lacking in proper competence, they were not included in the study.

Only trained psychologists who have worked with them, obtained informed consent from the PWIDs. Trained Counselors who work at SAPTA were recruited as data collectors during this study.

Ethical approval for the study was obtained from the Kenya Medical Research Institute (KEMRI) Scientific and Ethical Review Unit (SERU). It was approved as protocol number 3194. Informed consent was obtained from participants in all groups.

Statistical Methods

Data analysis was conducted using IBM SPSS version 21.0 statistical software. Exploratory data techniques were employed at the initial stage of analysis to uncover the structure of data and identify outliers or unusual entered values. Descriptive statistics such as proportions were used to summarize categorical variables while measures of central tendency such as mean, standard deviations, median, and range were used to summarize continuous variables. To test for differences between study groups for continuous variables, one-way Analysis of Variance (ANOVA) was carried out for normally distributed variables and Kruskal-Wallis one-way ANOVA for skewed variables. Pearson's Chi-square test was used for categorical variables. Spearman's correlation coefficient was calculated to estimate the strength of association between nutritional indicators. The threshold for statistical significance was set at $p<0.05$.

Results

Demographic characteristics of the participants

Out of 495 participants, 415 (83.8%) were men and 80 (16.2%) were women with no significant difference in sex distribution between the three groups (p=0.17).The mean age of all participants was 32.29 (+7.90) years and that of Methadone group (36.04) differed significantly from both PWID group (30.95) and Control group (29.87) with Methadone group being older by about 5 to 6 years on average. Significantly fewer PWIDs were in stable marital unions (17.6%) compared to methadone and controls, at 33.3% and 31.5% respectively. Those who reported to be separated/divorced/widowed from their spouses with either current (PWIDS) or past drug habit (Methadone) were 32.7% and 34.5% respectively, significantly higher than the controls (20.0%). Cohabitation (living with a partner but not legally married) was also significantly higher among PWIDs and Methadone (8.5% and 9.1% respectively) as compared to Controls (2.4%). PWIDs reported the lowest level of post-secondary or tertiary education (2.4%) as compared to Methadone and Controls, at 12.1% and 12.7% respectively.

The main occupation or source of livelihood most cited by all the study groups was casual laborer. A high percentage of PWIDs engaged in risky work or unlawful engagement like crime and sex work, 32.7% compared to 7.3% among those in the methadone intervention/ treatment and 0.6% among the control group, as indicated in Table 1.

Variable	All 495	PWIDs 165 (33.3%)	Methadone 165 (33.3%)	Controls 165 (33.3%)	P value
Age (years)*	32.29 (± 7.90)	30.95 (± 7.35)	36.04 (± 7.54)	29.87 (± 7.44)	<0.001
Gender Male Female	415 (83.8%) 80 (16.2%)	142 (86.1%) 23 (13.9%)	131 (79.4%) 34 (20.6%)	142 (86.1%) 23 (13.9%)	0.165
Marital status Single Married Sep/Div/Wid Cohabiting	182 (36,8%) 136 (27.5%) 144 (29.1%) 33 (6.7%)	68 (41.2%) 29 (17.6%) 54 (32.7%) 14 (8.5%)	38 (23.0%) 55 (33.3%) 57 (34.5%) 15 (9.1%)	76 (46.1%) 52 (31.5%) 33 (20.0%) 4 (2.4%)	<0.001
Education Upto Primary Secondary Post-Secondary	250 (50.5%) 200 (40.4%) 45 (9.1%)	94 (57.0%) 67 (40.6%) 4 (2.4%)	70 (42.4%) 75 (45.5%) 20 (12.1%)	86 (52.1%) 58 (35.2%) 21 (12.7%)	0.001

Residence Githurai Pangani	204 (41.2%) 291 (58.8%)	83 (50.3%) 82 (49.7%)	40 (24.2%) 125 (75.8%)	81 (49.1%) 84 (50.9%)	<0.001
Occupation Unlawful Work# Unemployed Casual labour Petty trade Employed	67 (13.5%) 24 (4.8%) 305 (61.6%) 53 (10.7%) 46 (9.3%)	54 (32.7%) 6 (3.6%) 97 (58.8%) 8 (4.8%) 0 (0%)	12 (7.3%) 10 (6.1%) 97 (58.8%) 21 (12.7%) 25 (15.2%)	1 (0.6%) 8 (4.8%) 111 (67.3%) 24 (14.5%) 21 (13.7%)	<0.001

Table 1: Characteristics of study participants; *m (± sd) = Mean (± standard deviation), # Unlawful engagement included crime and sex work (prostitution).

Body mass index

The mean body mass index (BMI) of the study participants across all the groups was 21.07 (+3.59) kg/m^2. A higher percentage (30.3%) of PWIDs were underweight, with a BMI of below 18.5 kg/m^2 compared to methadone (25.5%) or control group (15.8%), while only 4.8% PWIDs were overweight and obese with a BMI of ≥ 25 kg/m^2, compared to methadone and control groups with 10.3% and 26.7% respectively. PWIDS had lower mean BMI values (20.00 ± 2.56 Kg/m^2) compared to Methadone (20.84 ± 3.42 Kg/m^2) and both groups significantly differed from Controls (22.38 ± 4.22 Kg/m^2) with a p<0.001, as shown in Table 2.

BMI (Kg/M^2) category	All	PWIDs	Methadone	Control	P-value
Underweight (<18.5)	118 (23.8%)	50 (30.3%)	42 (25.5%)	26 (15.8%)	<0.001
Normal (18.5-24.9)	308 (62.2%)	107 (64.8%)	106 (64.2%)	95 (57.6%)	
Overweight/Obese (≥ 25)	69 (13.9%)	8 (4.8%)	17 (10.3%)	44 (26.7%)	

Table 2: BMI categories of study participants.

Food security status

The Household Food Insecurity Access Scale (HFIAS) was used to assess the food security of the households of the study participants in the last 30 days. The maximum score for a household was 27 if the household response to all nine frequency-of-occurrence questions was "often", coded with response code of 3; the minimum score was 0 if the household responded "none" to all occurrence questions. For instance, "In the past four weeks, how often did you worry that your household would not have enough food?"

3 "Often"

2 "Sometimes"

1 "Rarely"

0 "None"

The higher the score the more food insecurity the household experienced. The lower the score, the less insecurity or more food security, a household experienced.

PWIDs experienced significantly higher food insecurity (Median 18.0; IQR 14-23) than methadone (Median 12.0; IQR 16-21) and Control groups (Median 12.0; IQR 8-17) with a p<0.001. There was however no significant difference between Methadone and Control group (Table 3).

Correlations of nutritional variables

The study witnessed a very significant negative correlation between the food security score and BMI (r=-0.195, P=0.001) which meant that the higher the food security score an individual reported, the lower their reported BMI score. This is indicative of the fact that individuals with higher food security scores, or those who were more food insecure, were more likely to have lower BMI scores or to be more nutritionally compromised (Table 4).

Study group	Body mass index (BMI) Me (SD)h	Food Security Score (FSS) M (IQR)$
PWIDs	20.00 (2.56)	18.0 (14.0 – 23.0)
Methadone	20.84 (3.42)	12.0 (6.0 – 21.0)
Control	22.38 (4.22)	12.0 (8.0 – 17.0)
P-value	<0.001	<0.001

Table 3: Comparison of nutritional indicators between study groups; $ M (IQR)=Median (Interquartile range) hMe (SD)=Mean (Standard Deviation).

HIV status among PWIDs and methadone

No HIV testing was conducted due to the fact that HIV testing as part of the harm-reduction program was routinely carried out within SAPTA. Therefore, HIV status in this study was by self-reporting. The PWIDs and Methadone Group who reported knowing their HIV status were 99.4% (164) of Methadone compared to 91.5% (151) of PWIDs. The participants who reported knowing their HIV status were asked whether they would like to share it and if they consented, it was recorded, if they did not consent, it was not recorded. The PWIDs who reported being HIV seropositive were 9.9% (15), compared to 19.9% (32) of Methadone. Of these self-reported HIV seropositive, 67% (10) PWIDs and 94% (30) Methadone, reported that they were on Anti-retroviral Therapy (ART).

	Body mass index (BMI) r (p)ƛ	Food Security Score (FSS) r (p)ƛ
Body Mass Index (BMI)	1	-0.195 (<0.001)
Food Security Score (FSS)		1

Table 4: Correlations of nutritional indicators. ƛr (p) = Spearman's rank correlation and p-value.

Appetite changes

The Methadone group was also asked about their perceived change in appetite after induction into the Methadone intervention. They were asked "How has Methadone affected your food intake/appetite. They had to choose among these choices; 1. Increased appetite 2. Reduced appetite 3. Other and 4. Don't know.

Those in the Methadone group who reported increased appetite after being recruited into methadone treatment were 62.5% (105).

Discussion

A study among three groups of drug injectors identified heroin users as being 3.4 times at risk of being underweight compared with other users [22]. This is in line with the findings of our study which indicate that the heroin injectors referred to PWIDs in this study, were twice as likely to be underweight when compared to the normal population. Also in congruence with our results, a study on drug use and factors associated to lower Body Mass Index among HIV infected individuals reported that overall, drug users had a lower BMI than non-drug users, and HIV infection was not a confounding factor. The BMI of cocaine users was reported to be 1.4 kg/m^2 less than that of non-drug users (P=0.02) [23].

In a study on the frequent food insecurity among injection drug users, it was reported that in the 6 months preceding the study, 54.5% of participants reported that on a daily/weekly basis they did not have enough to eat because of a lack of money, while 22.1% reported this type of food insecurity on a monthly basis. In addition, 60.4% and 24.3% reported that they did not eat the quality or quantity of food they wanted on a daily/weekly or a monthly basis, respectively. These food security and food intake experiences were strongly correlated with sharing of injection-related equipment as well as viral load and unprotected sex among HIV seropositive PWIDs [8,24]. This has been replicated in our study in which we report high food insecurity highly correlated with BMI.

This study directly associates the effect of the methadone treatment with nutritional status and food insecurity among past drug injectors on current methadone treatment. In the group, 62.5% reported increased appetite after being recruited into methadone treatment.

In a study about weight gain among the patients in a methadone maintenance treatment program, the results indicated that weight increase in the methadone patients should not be considered a direct side-effect, because it was not possible to differentiate between a drug effect and changed behavioral eating stereotypes that could be identical to those in the general population. Nevertheless, the study only measured BMI in relation to the general population and did not factor in food intake changes or changes in appetite after recruitment into Methadone treatment [25].

Conclusion

PWIDs are at a high risk of developing malnutrition, because of their reported food insecurity and low BMI. They are hence in need of targeted food assistance and nutritional support which should be incorporated into harm reduction/minimization interventions. Nutrition interventions are essential as part of drug addiction treatment.

Acknowledgements

We would like to thank and acknowledge the contributions of participants and staff at SAPTA Centre in Nairobi; notably Esther Gitau (Centre Co-ordinator), Clinical Officers; Faith Kyalo and Richard Thiong'o and Counseling Psychologist Philemon Koskei.

Authors' Contributions

VW conceived and designed the study, led its implementation, coordination, and drafted and finalized the manuscript. EM assisted with analyses and designing tables and figures and also conceived the study design and sample size calculation, as well as assisting with the analyses, and drafting the manuscript. MM, CM and FK contributed in offering technical expertise, selection of study participants, interpretation of results and editing the manuscript. All authors read and approved the final manuscript.

Funding Source

This work was supported by KEMRI Internal Research Grants. Research Grant Number KEMRI/IRG/011/4.

Competing Interests

The authors declare that they have no competing interests.

References

1. United Nations Office on Drugs and Crime (UNODC). World drug report (2014) New York (NY): United Nations Office on Drugs and Crime.
2. UNAIDS. HIV and young people who inject drugs: A technical brief UNAIDS 2014/ JC2666 WHO/HIV/.17.
3. Beckerleg S, Telfer M, Hundt GL (2005) The rise of injecting drug use in East Africa: A case study from Kenya. Harm Reduction Journal 2: 12.

4. Odek-Ogunde M, Okoth FA, Lore W, Owiti FR (2004) Sero-prevalence of HIV, HBC and HCV in injecting drug users in Nairobi, Kenya: World Health Organization drug injecting study phase II findings in proceedings of 15th International AIDS Conference Bangkok, Thailand.
5. Odek-Ogunde M, Lore W, Owiti FR (2003) Risky behaviours among injecting drug users in Kenya. In Proceedings of 14th International Conference on the Reduction of Drug Related HarmChiang Mai, Thailand.
6. Muhondwa E, Mpembeni R, Mayunga F (2002) An assessment of the treatment needs of drug users in Dar es Salaam. Report byChrist Compassion in Action prepared for Save the Children UK, Tanzania Programme.
7. WHO Bulletin 2013; 91 Number 2, 81-156.
8. Strike C, Rudzinski K, Patterson J, Millson M (2012) Frequent food security among injection drug users: Correlates and concerns. BMC Public Health 12: 1058.
9. Kaufman R, Isralowitz R, Reznik A (2005) Food insecurity among drug addicts in Israel: Implications for social work practice. J Soc Work Practice Addict 5: 21-32.
10. FAO (2006) Food Security Policy Brief. Issue 2.
11. Romero-Daza N, Himmelgreen DA, Pérez-Escamilla R (1999) Food habits of drug-using Puerto Rican women in inner-city Hartford. Medical Anthropology 18: 281-298.
12. Cornish JW, O'Brien CP (1996) Crack cocaine abuse: An epidemic with many public health consequences. Annu Rev Public Health 17: 259-273.
13. Baptiste F, Hamelin A, Cote F (2009) Drugs and diet among women street sex workers and injection drug users in Quebec City. Can J Urban Res 18: 78-95.
14. Tang A, Bhatnagar T, Ramachandran R (2011) Malnutrition in a population of HIV-positive and HIV-negative drug users living in Chennai, South India. Drug Alcohol Depend 118: 73-77.
15. Alves D, Costa A, Custodio D (2011) Housing and employment situation, body mass index and dietary habits of heroin addicts in methadone maintenance treatment. Heroin Addict Relate Clin Prob 13: 11-14.
16. Hendricks K, Erzen H, Wanke C (2010) Nutritional issues in the HIV-infected injection drug user: Findings from the nutrition for healthy living cohort. J Am CollNutr 29: 136-143.
17. WHO U, UNAIDS. WHO, UNODC, UNAIDS (2009) Technical Guide for countries to set targets for universal access to HIV prevention, treatment and care for injecting drug users. World Health Organization.
18. Normen L, Chan K, Braitstein P, Anema A, Bondy G, et al. (2005) Food insecurity and hunger are prevalent among HIV-positive individuals in British Columbia, Canada. J Nutr 135: 820-825.
19. Casagrande JT, Pike MC, Smith PG (1978) An improved approximate formula for calculating sample sizes for comparing two binomial distributions. Biometrics 34(3): 483-486.
20. Kermode M, Crofts N, Kumar MS, Dorabjee J (2011) Opioid substitution therapy in resource-poor settings. Bulletin of the World Health Organization 89: 243.
21. Coates J, Swindale A, Bilinsky P (2006) Household food insecurity access scale (HFIAS) for measurement of household food access: Indicator guide. Vol. 2. Washington, D.C: Food and Nutrition Technical Assistance Project, Academy for Educational Development.
22. Mcllwraith F, Betts KS, Jenkinson R, Hickey S, Burns L, et al. (2014) Is low BMI associated with specific drug use among injecting drug users? Subst Use Misuse 49: 374-382.
23. Quach LA, Wanke CA, Schmid CH, Gorbach SL, Mwamburi DM, et al. (2008) Drug use and other risk factors related to lower body mass index among HIV-infected individuals. Drug Alcohol Depend 95: 30-36.
24. Shannon K, Kerr T, Milloy MJ, Anema A, Zhang R, et al. (2011) Severe food insecurity is associated with elevated unprotected sex among HIV-seropositive injection drug users independent of HAART use. AIDS 25(16): 2037-2042.
25. Tarasuk V (2017) Implications of a basic income guarantee for household food insecurity. Research Paper No. 24, Northern Policy Institute.