

Appendix 1. Definition of Indicators A, B and C of any illicit drug use in the past 12 months in the Iranian Mental Health Survey (IranMHS) data

Indicator A

This indicator was based on the question from the “substance use” questionnaire for IranMHS;

Look at the following list of drugs. Have you used any of them more than 5 times in the past 12 months?

- *The cannabis family including hashish, weed, joint, bhang, marijuana, and grass.*
- *Stimulants including methamphetamine, amphetamine, non-prescribed Ritalin, and khat.*
- *Derivatives of opium including opium, opium dross, opium sap, heroin, crack of heroin, non-prescribed morphine, norgesic, temgesic, non-prescribed methadone and buprenorphine.*
- *Hallucinogens including ecstasy and LSD.*
- *Inhalants/volatile solvents including paste, gasoline, ether, and acetone.*
- *Any other drugs to feel good, relaxed, better, more active or more conscious? (Drugs such as tranquilizers, sedatives, and drugs containing codeine are not the target of this question.)*

Indicator A = Yes (in case any of the drugs in the list provided in question is selected or another illicit drug is mentioned in response to the last item); indicator A = No (otherwise)

Indicator B

This indicator was formed based on the responses to ten questions about the highest occasions any illicit drug was used by the participants in the past 12 months. This indicator was a combination of following items in the self-administrated questionnaire (Short-Form for drug use and other high risk behaviors) in the IranMHS:

- *Have you used opium (or opium dross) in the past 12 months?*
- *Have you used opium sap in the past 12 months?*
- *Have you used crack of heroin in the past 12 months?*
- *Have you used heroin in the past 12 months?*
- *Have you used methadone or buprenorphine (Temgesic) without medical supervision in the past 12 months?*
- *Have you used hashish (e.g. weed, hemp, bhang, grass, joint, and marijuana) in the past 12 months?*
- *Have you used meth (crystal or ice) in the past 12 months?*
- *Have you used ecstasy (X) tablets in the past 12 months?*
- *Have you used Ritalin without medical prescription in the past 12 months?*
- *Have you used, even once, any other substance in the past 12 months? (cocaine, gasoline, acetone, ether, paste, testosterone, nandrolone, etc.) Name the substance if you have.*

Indicator B = Yes, if any of the 2 to 5 options (referring to the following statements in the mentioned order for the past 12 months: “only once or several times”, “at least once a month”, “at least once a week”, and “almost every day”) were selected in response to each of the aforementioned questions; and Indicator B = No, if choice 1 (“never”) was selected for all questions.

Indicator C

This indicator was formed based on responses to six groups of questions about the need for receiving services because of drug use and addiction, and receiving medical services in a form other than taking part in NA addiction groups (anonymous addicts) or receiving agonist maintenance treatment because of drug use and addiction, as in-patient, short-term residential, outpatient and traditional treatments in the past 12 months.

- *Have you been in need of “visiting” a center or a therapist to receive treatment or a solution for drug use and addiction in the past 12 months? Or has anyone suggested that you need to “visit” a medical center or therapist for treatment or a solution for the aforementioned problem?*
- *If you have been hospitalized in inpatient centers in the past 12 months because of psychiatric problems or addiction, have you received Ultra Rapid Detoxification (UROD) or detoxification with anesthesia? (Inpatient centers include hospital emergency wards, hospitals, clinics (general or specialized polyclinics or comprehensive psychiatric centers), care centers (for mentally ill patients, the elderly, etc.), detoxification camps (rehabilitation houses for quitting or care centers for addicts), and other inpatient centers.)*
- *If you have been hospitalized in inpatient centers in the past 12 months because of psychiatric problems or addiction, were you exposed to other treatments for quitting or detoxification (except UROD) each time?*
- *Have you visited any Drop-in Center for receiving drug harm reduction services in the past 12 months?*
- *Have you visited an herbal pharmacy, herbalist, acupuncture center, a spiritualist, homeopath, massage therapy center, a chiropractor, a yoga or meditation center, a bloodletting/cupping center, hypnotist, energy therapy center, witch, or any other traditional therapist for addiction or drug use problems in the past 12 months?*
- *Have you visited any outpatient treatment center (except for the centers providing agonist maintenance treatment) and received treatment services for drug use and addiction*

in the past 12 months? (It refers to health houses, health stations, health centers, hospital emergency wards, hospital clinics or specialized clinics, psychiatric clinics, consulting centers, private offices, polyclinics, home services, and other outpatient treatment centers)

Indicator C= Yes, if the response to each of the aforementioned six groups of questions was positive; and Indicator C= No, if the response to all of them was negative.

Appendix 2. R software's codes of latent class analysis for correcting measurement error while estimating prevalence of any illicit drug use in IranMHS (Model [7]):

```
##Activating some libraries ##
options(scipen=999)
library(foreign)
library(gllm)

##Reading the main data set from SPSS in R##
lcatad = read.spss(file.choose(), use.value.labels = FALSE,
to.data.frame = TRUE)
attach(lcatad)

##Latent Class Analysis using Latent Class Log-Linear model
(Indicators A, B & C) ##

y.ad <- as.vector(table(lcatad$anydrug_B, lcatad$anydrug_
A, lcatad$anydrug_C, lcatad$gender))
y.ad

s <- c(1:16, 1:16) ## Scatter matrix: full table is 2x2x2x2x2

## Design matrix: x is the latent variable (2 levels), a-g are the
observed variables ##
i <- rep(1, 32)
x <- as.integer(gl(2, 16, 32)) - 1
g <- as.integer(gl(2, 8, 32)) - 1
c <- as.integer(gl(2, 4, 32)) - 1
a <- as.integer(gl(2, 2, 32)) - 1
b <- as.integer(gl(2, 1, 32)) - 1

X7 <- cbind(i, x, a, b, c, g, x * cbind(a, b, c, g), a * b, a * c)
colnames(X7) <- c("Int", "X", "A", "B", "C", "G", "AX", "BX",
"CX", "GX", "AB", "AC")
anydrug7 <- emgllm(y.ad, s, X7, tol = 0.000001)
anydrug7

anydrug7P_Value = pchisq(anydrug7$deviance, 20, lower.
```

```
tail = FALSE)
anydrug7P_Value

anydrug7BIC = anydrug7$deviance + log(sum(y.ad)) * 12
##This is BIC + "2*log-likelihood(saturated model)"
anydrug7BIC

ft <- anydrug7$full.table

tab.x <- xtabs(ft ~ x)
tab.x
prx <- (xtabs(ft ~ x) / sum(ft)) [2]
prx
tab.xg <- xtabs(ft ~ g+x)
tab.xg
prx.m <- tab.xg[1,2] / sum(tab.xg[1,])
prx.m
prx.f <- tab.xg[2,2] / sum(tab.xg[2,])
prx.f
tab.ax <- xtabs(ft ~ a+x)
tab.ax
sena <- tab.ax[1,2] / sum(tab.ax[,2])
sena
spea <- tab.ax[2,1] / sum(tab.ax[,1])
spea
tab.bx <- xtabs(ft ~ b+x)
tab.bx
senb <- tab.bx[1,2] / sum(tab.bx[,2])
senb
speb <- tab.bx[2,1] / sum(tab.bx[,1])
speb
tab.cx <- xtabs(ft ~ c+x)
tab.cx
senc <- tab.cx[1,2] / sum(tab.cx[,2])
senc
spec <- tab.cx[2,1] / sum(tab.cx[,1])
spec

tab.axg <- xtabs(ft ~ a+x+g)
tab.axg
sena.m <- tab.axg[1,2,1] / sum(tab.axg[,2,1])
sena.m
spea.m <- tab.axg[2,1,1] / sum(tab.axg[,1,1])
spea.m
sena.f <- tab.axg[1,2,2] / sum(tab.axg[,2,2])
sena.f
spea.f <- tab.axg[2,1,2] / sum(tab.axg[,1,2])
spea.f
tab.bxg <- xtabs(ft ~ b+x+g)
tab.bxg
```

```

senb.m <- tab.bxg[1,2,1]/sum(tab.bxg[,2,1])
senb.m
speb.m <- tab.bxg[2,1,1]/sum(tab.bxg[,1,1])
speb.m
senb.f <- tab.bxg[1,2,2]/sum(tab.bxg[,2,2])
senb.f
speb.f <- tab.bxg[2,1,2]/sum(tab.bxg[,1,2])
speb.f
tab.cxg <- xtabs(ft ~ c+x+g)
tab.cxg
senc.m <- tab.cxg[1,2,1]/sum(tab.cxg[,2,1])
senc.m
spec.m <- tab.cxg[2,1,1]/sum(tab.cxg[,1,1])
spec.m
senc.f <- tab.cxg[1,2,2]/sum(tab.cxg[,2,2])
senc.f
spec.f <- tab.cxg[2,1,2]/sum(tab.cxg[,1,2])
spec.f

detach(lcadat)

```

Appendix 3. The reason of replacing BIC with “BIC + [2*ln(likelihood of saturated model)]” in Table 2

In Table 3, we replaced BIC with “BIC + [2*ln(likelihood of saturated model)]”. The reason was that the output of the “emgllm” function in the “gllm” package of R did not provide the likelihood of models and instead provided the “Deviance = -2*[ln(likelihood of current model) – ln(likelihood of saturated model)]” of each model [A01]. Hence, in equation (1), which is developed for calculation of BIC [A02,A03], deviance is used instead of the models’ “-2*ln(likelihood)”:

$$\text{BIC} = [-2*\ln(\text{likelihood})] + [\ln(n)*(\text{number of model parameters})] \quad (1)$$

Consequently, “BIC + [2*ln(likelihood of saturated model)]” was obtained. Since in all models the fixed value of “[2*ln(likelihood of saturated model)]” is added to BIC values, at the time of comparing models in terms of their “BIC + [2*ln(likelihood of saturated model)]”, it is as if the BIC of the models is compared.

A01. Nelder JA, Wedderburn RW. Generalized linear models. *J R Stat Soc Ser A* 1972;135:370-384.

A02. Schwarz G. Estimating the dimension of a model. *Ann Stat* 1978;6:461-464.

A03. Wit E, van den Heuvel E, Romeijn JW. ‘All models are wrong...’: an introduction to model uncertainty. *Stat Neerl* 2012;66:217-236.