Lecture 6

Estimating the size of hard to reach populations

Social Studies of Health 03/11/2020

Why bother

- To understand
- To persuade policy-makers (no numbers = no need to worry)
- To better plan any intervention

- Think about any hard-to-reach population which is of any interest to you!

Sources

- Hard-to-reach populations
- Statistical data (who's in contact with this group and might collect data?)
- General population data

As always

- 1. definition of the population (who are those guys?)
  - Who is homeless?
  - Usually includes some time-specific criteria
- 2. Territory!
- 3. Open|closed populations
- 4. Might be changing due to season/other factors

Overview of the methods

- Census and enumeration methods
- Population survey methods
- Network scale-up method
- Multiplier methods
- Nomination methods
- Capture-recapture methods

Census and enumeration methods

- Census: count everyone ☺

Example: gypsies

- Enumeration:
  - List of all places
  - Random (cluster) sample of places
  - Meet everyone
- *Need to know places*
- *Need to get access*

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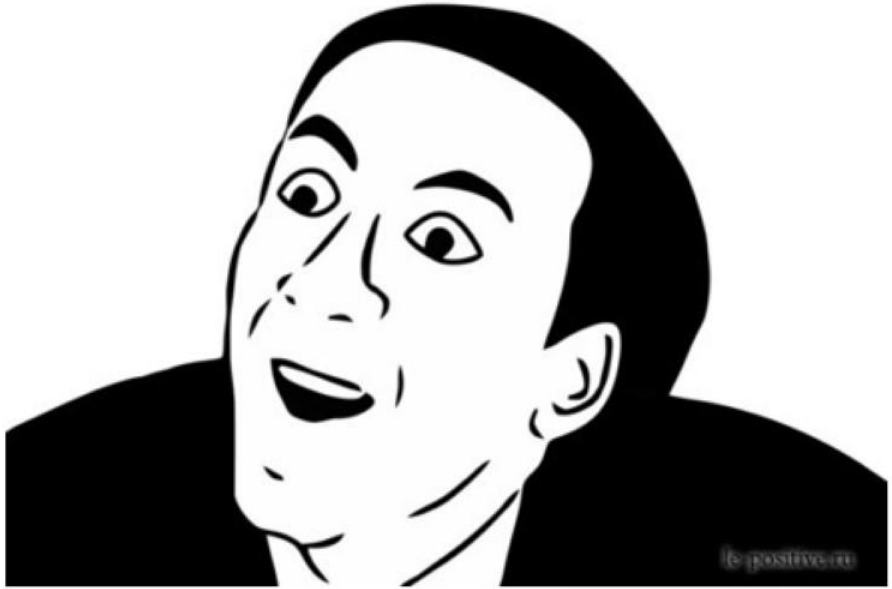
Population survey methods

- *Hello! Have you injected drugs during last 12 months?*



- If sensitive/related to probability of being reached by phone/household survey: the estimation might be even less than known Number
- But: San-Fran

But

- Cheap to add to existing survey
- Might be used as a minimal estimate

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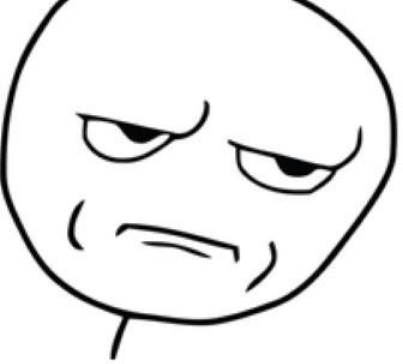


Network scale-up method: assumptions

- Everyone knows everything about everyone they know
- Everyone in the population has an equal chance of knowing someone in their network
- People recall and report accurately the number of people they know in the subpopulations→ additional correction

Network scale-up method

- Network scale-up was initially proposed after the Mexico City earthquake in 1985. An anthropologist attempted to get an estimate of the number killed in the earthquake by asking survey respondents about the people they knew who died as a result of the earthquake. In the 1990s the method was refined and used in the United States of America to estimate the number of people who were homeless, raped or HIVpositive.

Steps

1. Measuring personal network size

Example of summation questions

How many people do you know in the following categories:

- Your immediate family
- Your birth family
- The family of your spouse/partner
- Co-workers
- Other people at work
- Close friends
- People known through hobbies/recreation
- People known through faith-based organizations
- People you know from your neighbourhood
- People known through others
- Childhood friends
- People who provide a service

Examples of known population questions used in recent surveys

How many people do you know who are:

- Women over 70
- Men over 70
- Women named Christine
- Men named Victor
- People who were married in 2009
- Kindergarten teachers in 2009
- Graduates of higher education institutes in 2009
- Dentists in 2009
- Medical doctors practising in 2009
- Nurses in 2009
- Police officers in 2009
- Teachers in secondary schools and technical schools in 2008

Steps

2. asking survey respondents how many people in their personal network are in the populations of interest

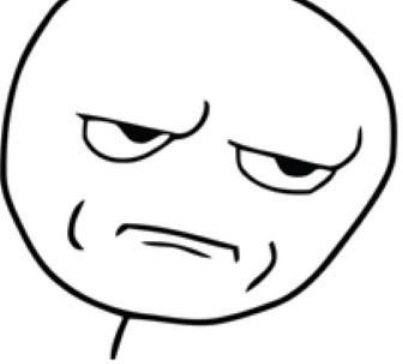
How many people who inject drugs you know?

3. Calculate the size

Steps

3. Calculate the size

For example, if, on average, survey respondents knew 1.82 people who inject drugs (m = 1.82) and we divide this average by the estimated average personal network size (c = 300) and multiply this proportion by the total population (t = 1 000 000), we estimate there are approximately 6067 people who inject drugs (1.82/300 x 1 000 000).



Network scale-up method: assumptions

- Everyone knows everything about everyone they know → ask in different survey, adjust
- Everyone in the population has an equal chance of knowing someone in their network →average or exlude if population of interest is totally isolated
- People recall and report accurately the number of people they know in the subpopulations→ additional correction

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Multiplier methods

- Two sources or data
- Independent
- Reliable
- Overlapped

Assumptions

- Usually: data from survey among H-T-R population + data from any agency they are registered
- Need to identify agencies
- This agencies need to provide data on N of people, not contacts
- People know, remember and willing to tell that they are known by agencies

Опорный показатель (О), определение	Опорный показатель (О), значение : абс. ц.	Множитель (М), определение	Значение в % /Множитель (М)	Оценка популяции ПИН (ОхМ)	Доля ПИН среди общего населения, %	Доля ПИН среди трудоспособного населения, %
Численность ПИН – жителей Воронежа, прошедших анализ на ВИЧ в период 01.01.07 – 01.01.08 в территориальном Центре СПИДа	1722 + 301	Доля ПИН, сообщивших о прохождении тестирования на в течение 12 месяцев до опроса в территориальном Центре СПИД	18,8%/ 5,3	**10721**	**1,2**	**2,0**
Число лиц, обратившихся за наркологической помощью в государственный наркологический диспансер или кабинет г. Воронежа в период 01.01.07 – 01.01.08	2826	Доля ПИН, сообщивших об обращении в государственный наркологический диспансер или кабинет г. Воронежа в течение 12 месяцев до опроса	11,7% / 8,5	**24021**	**2,9**	**4,4**
Число лиц, имеющих личный код (карточку участника) в программе Снижения вреда и обращавшихся в программу в период 01.01.07 – 01.01.08	4236	Доля ПИН, сообщивших, что они являются клиентами программы снижения вреда, имеют индивидуальный код и обращались в программу в течение последнего года	9,6%/10,4	**44054**	**5,2**	**8,2**

M = 26265; 3,1% общего населения

Me = 24021; Min = 10721; Max = 44054

- N of victims of domestic violence made an official police complain in 2018 (N=150)
- % of victims of domestic violence in 2018 reported that they made an official police complain in 2018 (10%)
- How many victims of domestic violence were in the city in 2018?

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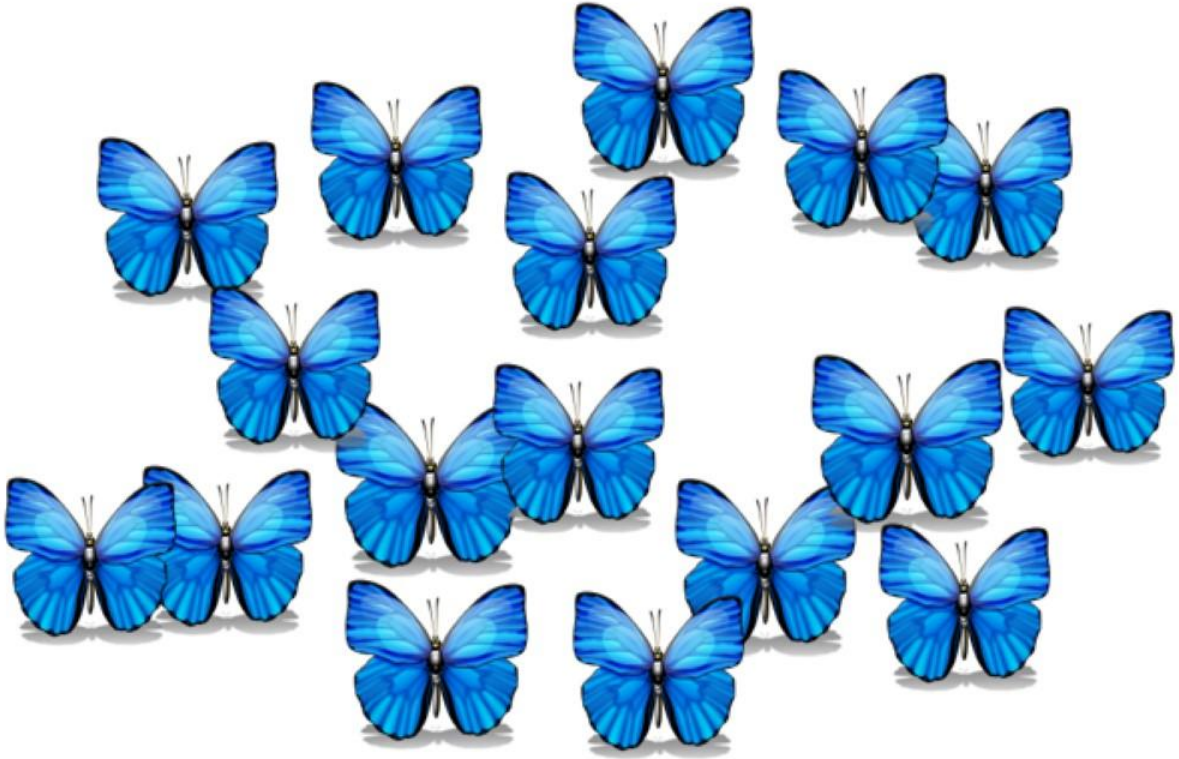
Capture-recapture methods

- Animal populations
- https://www.youtube.com/watch?v=MbRY9vdLxLM

https://www.news-press.com/story/news/2016/12/18/counting-bears-important-but-never-easy/85557198/

capture-recapture procedure



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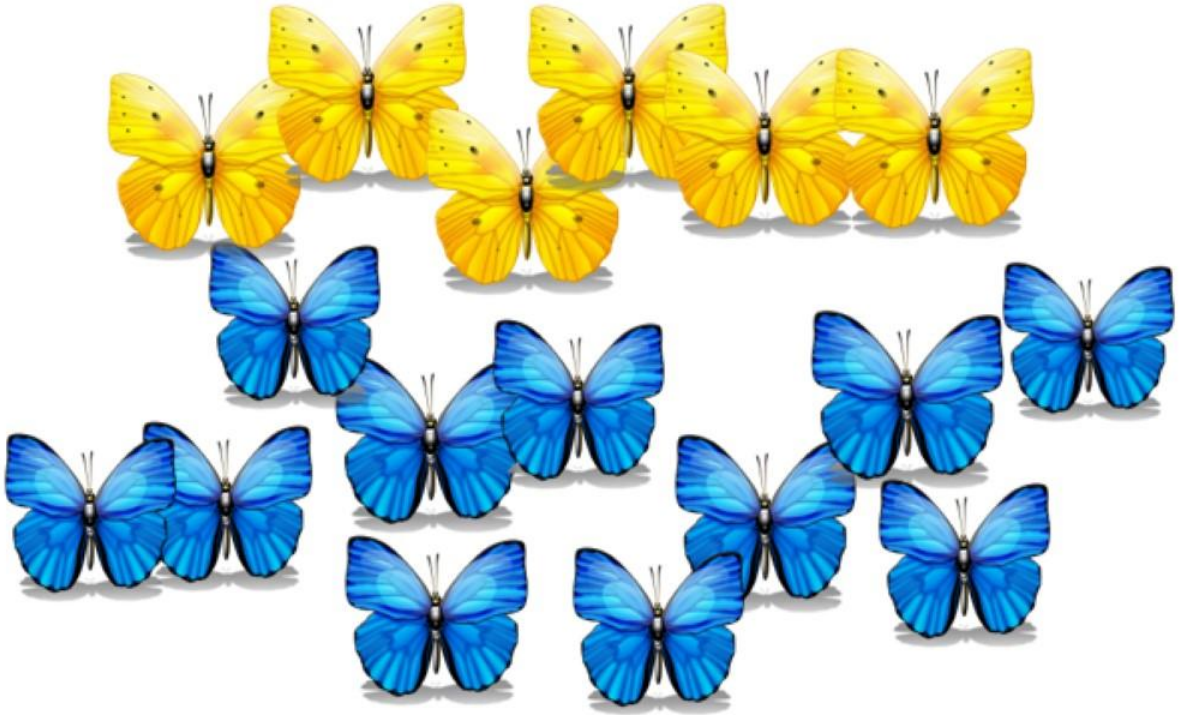

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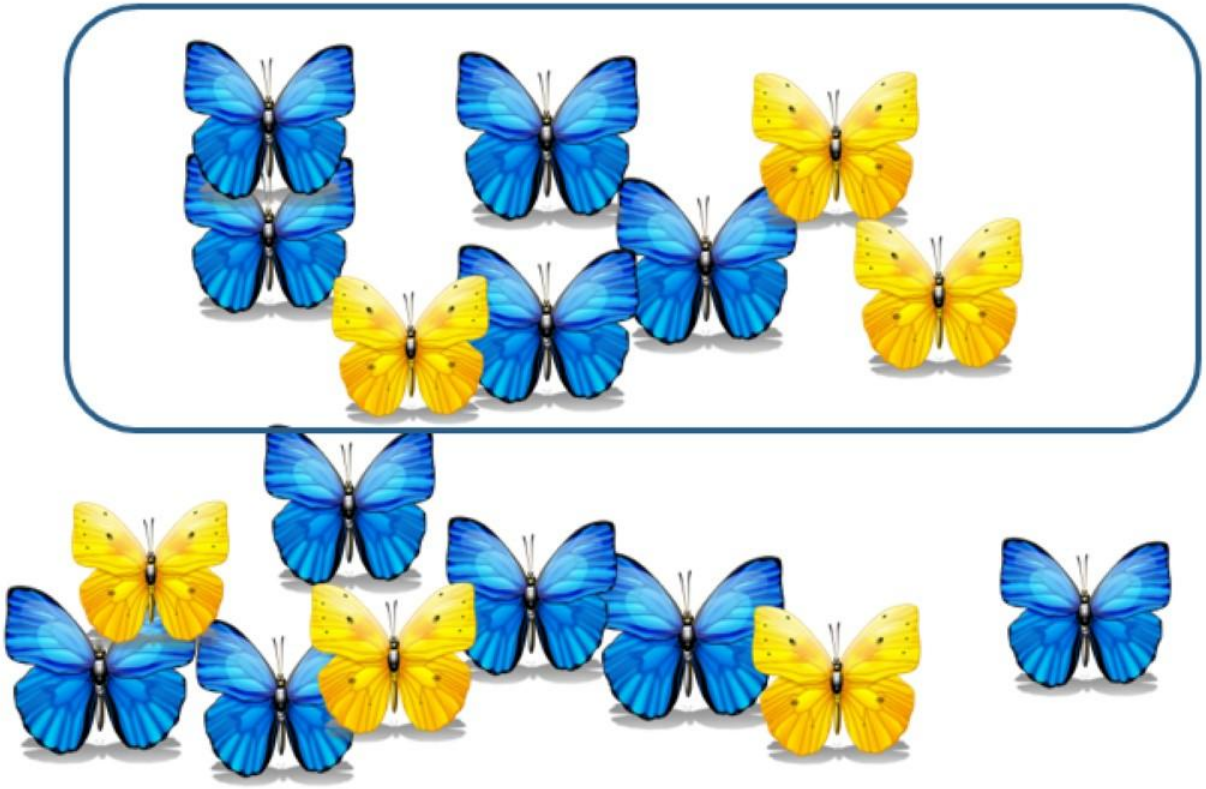

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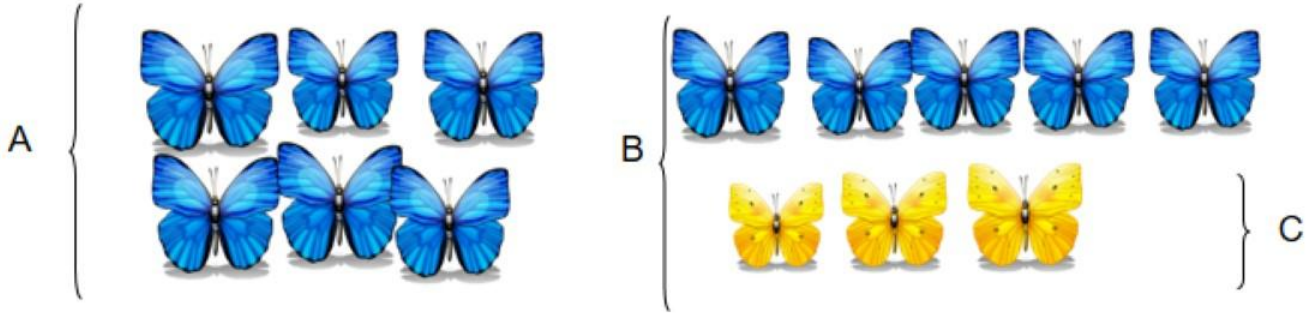
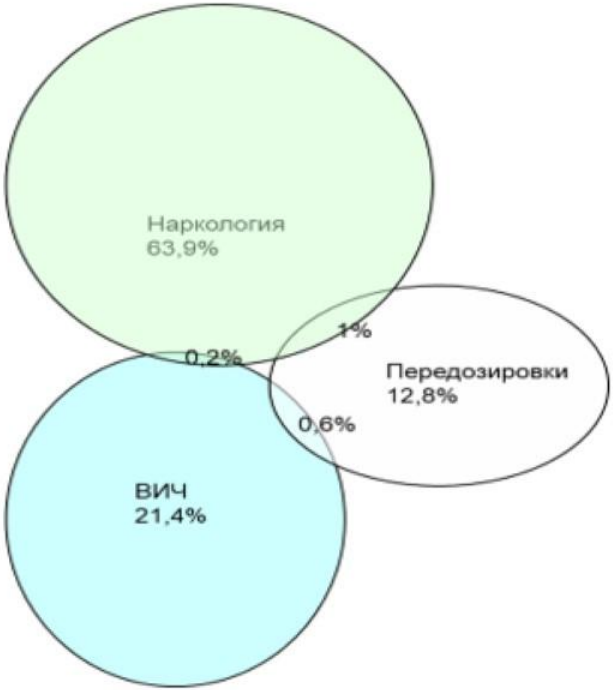


N = (A*B)/C

N = (6*8)/3= 16

- Better – repeat it several times! (more sophisticated calculations then)
- The “natural captures” might be used

Основные результаты, Набережные Челны повторный захват



ПАРАМЕТРЫ ОЦЕНКИ

- «Наблюдаемая» популяция – 2 034
- Оценка «ненаблюдаемой» популяции – 19 021
- Суммарная оценка – 21 055
- G^2 = 1,34, p=0,51, AIC -2,66; BIC -10,70
- Распространенность среди населения
- – общее – 4,2%

Unique object multiplier

- People would want to get it
- People would remember it, no one else distribute that
- People would tell us if they have received it from us (and would tell truth)!

- QUESTIONS?!

- There's 100 000 men in the city
- In survey 5% of men used sex workers services during last 12 months
- In average they had 5 sexual contacts with sex workers in 12 months
- In survey among sex workers they told they in average have about 5 clients per day * 20 days per month
- How many sex workers are in the city?

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- How many sex workers are in the city?

- 0,05*100 000 = 5000 clients
- 5000*5=25 000 paid sexual contacts
- 5*10*12= 600 paid sexual contacts per sex worker
- 25 000 / 600 = 42 sex workers

- What this method looks like?

- What are possible limitations/biases

Next seminar

- Please prepare the presentation of your project
  - Justification
  - Blog: content plan + dissemination platform + audience
  - Prevention intervention: aim and methods
  - Prevention material: aim, idea and the way of presentation
- All: relevant population size estimations and epidemiological characteristics (prevalence/incidence) or how to get them
- All: relevant theoretical frameworks
- All: questions for audience (what kind of advice you'd like to have)