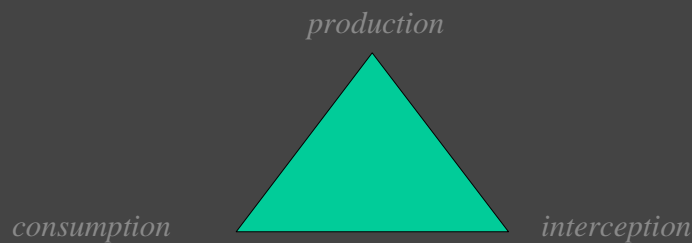


WIPO/OECD EXPERT  
MEETING ON MEASUREMENT AND STATISTICAL ISSUES

## UNODC experience in estimating the global drug market

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## Basic equations of the global drug market



Supply +/- changes in stocks - seizures/losses = Demand

Demand = No. of users \* Quantities consumed per user

## Example of estimates of production of opiates

### Afghanistan Opium Survey 2003: coverage and data collection methods

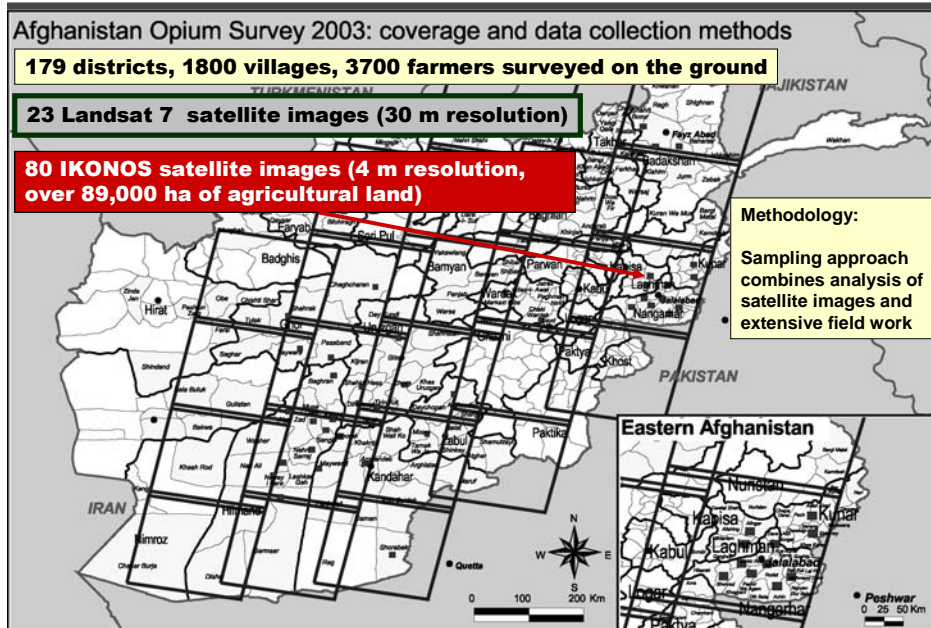
**179 districts, 1800 villages, 3700 farmers surveyed on the ground**

**23 Landsat 7 satellite images (30 m resolution)**

**80 IKONOS satellite images (4 m resolution, over 89,000 ha of agricultural land)**

Methodology:

Sampling approach combines analysis of satellite images and extensive field work



## Opium yield in Afghanistan



Capsule measurement (5098 capsules measured in 2004) from 446 plots from 149 fields across Afghanistan. Calculation of oven-dry opium based on a non-rectangular hyperbola linking capsule volume per m<sup>2</sup> and opium yield:

Non-rectangular hyperbola formula for predicting opium yield

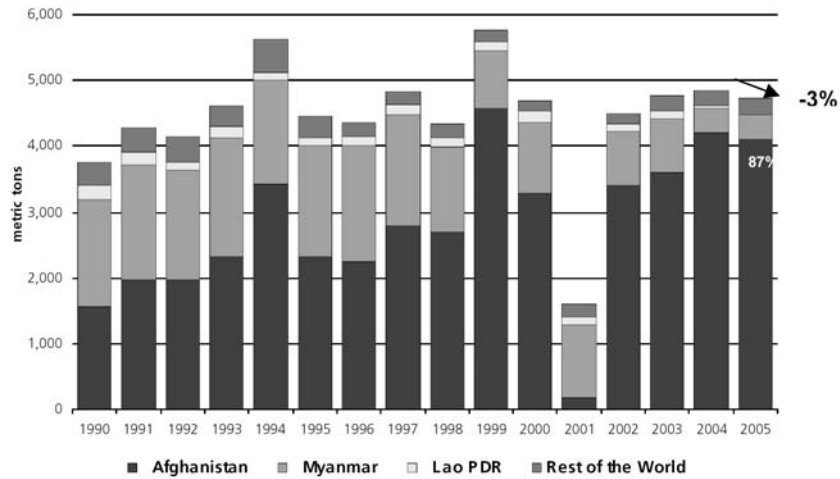
$$Y = [(VC + 1495) - ((VC + 1495)^2 - 395.259 VC)^{0.5}] / 1.795$$

where,

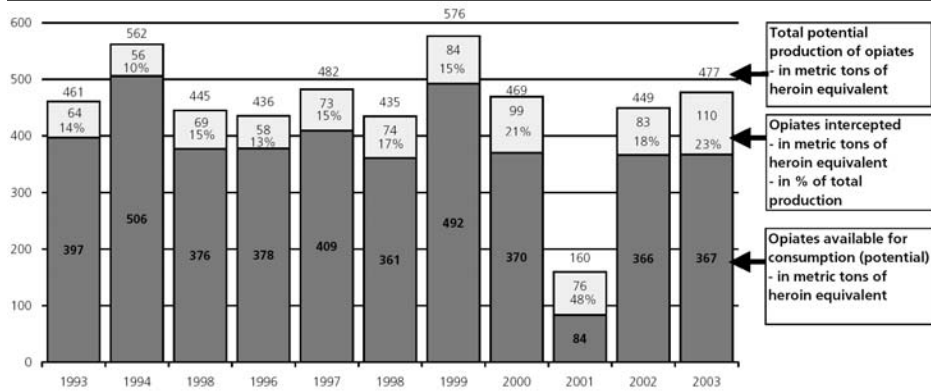
Y = Dry opium gum yield (kilograms / hectare)  
VC = Mature capsule volume (cm<sup>3</sup>/m<sup>2</sup>)

## Global opium production 1990-2005\* (metric tons)

\* Based on provisional figures for 2005 for Myanmar and the rest of the world



## Global illicit supply and opiates available for consumption



## Interception rates of main plant-based drugs (10 years average)

- Heroin & morphine 19%
- Cocaine 26%

## Production estimates of synthetic drugs

- Seizures of end product extrapolated by assumed interception rate  
We do not assume that interception rate is the same as opiates and cocaine, but smaller (7-10%) – Why?
  - Mostly local/regional production
  - Less possibility of police to intervene (no borders crossed, etc)
- Seizures of precursors: interception rates applied (7-10%) – to estimate total production
- Production estimated on consumption (number of users estimated from surveys \* average consumption) + seizures

## Methods to estimate drug use

- Direct methods
  - Household surveys
  - School surveys
- Indirect methods
  - Multiplier methods
  - Capture-recapture methods
  - Multivariate methods

## Multiplier methods

- Treatment: If a survey among heroin addicts reveals, for instance, that one quarter of them was in treatment in the last year, the multiplication of the registered treatment population with a multiplier of four provides an estimate of the likely total number of problem heroin users in a country.
- Police data: Similarly, if a survey among heroin addicts reveals that one out of five addicts was arrested in the previous year, a multiplication of the persons arrested for heroin possession by the multiplier (five) provides another estimate for the number of heroin users.
- Establishing various multipliers and applying them to the registered drug using population, provides a range of likely estimates of the heroin abuse population in a country.
- Either the mid-point of the range, the median or the mean of these estimates can be subsequently used to arrive at a national estimate.

## Capture-recapture models

- Capture-recapture models are another method based on probability considerations, which can be undertaken without additional field research. If in one register (e.g. arrest register) 5000 persons are found (for possession of heroin) and in a second register (e.g. treatment register) 2000 persons are found (for treatment of heroin abuse), and there are 400 persons who appear in both registries, it can be assumed that 20% (400/2000) of the drug addicts have been arrested, so that the total heroin addict population could be around 25,000 (5000/20%), five times larger than the total number of arrested heroin users.
- Such methods were originally developed to estimate the size of animal population. If, for instance, 200 fish are caught ('capture'), marked, and released back into the lake, and then the next day 100 fish are caught, of which 10 were already marked ('re-captured'), probability considerations suggest that the number of fish captured the first day were a 10% sample of the total population. Thus the total population of the lake can be estimated at around 2000 fish.

## Capture-recapture models (ctd.)

- More sophisticated capture-recapture models exist, and are used by some advanced countries, in order to make calculations based on more than two registries. However in order to arrive at reasonable orders of magnitude of the heroin problem in a particular country it is probably sufficient to calculate the various combinations shown above and subsequently report the mid-point, the median or the mean of the resulting estimates.
- The advantage of this method is that no additional field research is necessary. There are, however, problems as the two 'sampling processes' for the registries in practice are not independent from each other so that some of the underlying assumptions of the model may be violated (e.g. the ratio could be higher as some of the people arrested are likely to be transferred to a treatment facility; thus the ratio does not correspond any longer to the true proportion of people arrested among the addicts population, and may lead to an under-estimation of the total heroin addict population).

## Multivariate indicators

- For this approach, a number of local/regional studies are conducted, using various multiplier and/or capture-recapture methods.
- Such local studies are usually far cheaper than comprehensive national studies. They serve as anchor points for the subsequent estimation procedures.
- The subsequent assumption is that drug abuse at the local level correlates with other data that are readily available.
- For instance, heroin arrest data, heroin treatment data, IDU related HIV data, etc. are likely to be higher in communities where heroin abuse is high and lower in communities where heroin abuse is low. In addition, heroin abuse may correlate with some readily available social indicators (higher levels in deprived areas than in affluent areas; higher levels in urban than in rural areas etc).
- Taking all of this additional information into account, results from the local studies are then extrapolated to the national level.

## Combine supply/demand

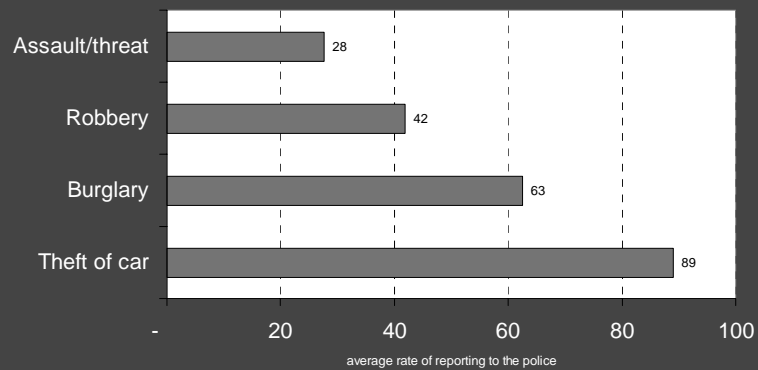
- Starting from production - seizures, purity adjusted = what is available for distribution
- Distribution pattern (geographical)
  - Available data on seizures (police/customs/Interpol/government agencies/WCO)
  - Include a measure of efficiency of police (assumption that the police in Europe are better than Africa = see ICVS)
- From the demand side:
  - Per-capita consumption estimates \* users (where available from local studies)
  - Plausibility checks (if result would give us unreasonable differences we would disregard it)

## Estimates for conventional crime

## Estimates

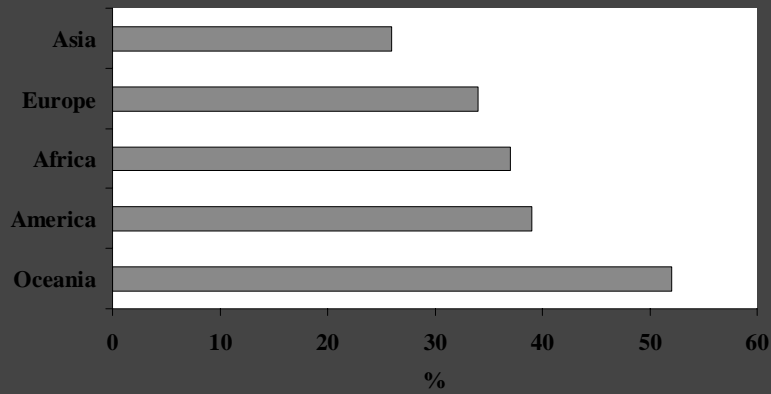
- To assess the full impact of crime it is necessary to estimate the actual number of crimes that occur, rather than those that are recorded by the police.
- It is possible to use victimisation figures to estimate the actual levels of crime
- Multiplier methods may be applied, based on the % of crimes estimated by victim surveys but not reported to the police

## Percentage of crimes reported to the police, 2000



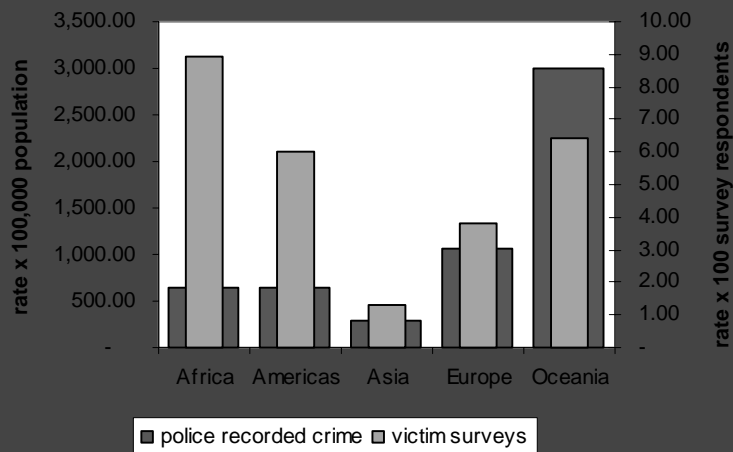
Source: ICVS 2000

## Percentage of victims reporting any crime to the police



Source: ICVS 2000

## Property crime, by regions



Sources: CTS, 2002 or latest available data and ICVS, 2000