Doping in Italy:
A Preliminary Attempt to Scope the Market

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Outline

- **Research origins and approach**
- Market context
- Market estimation
- Market comparisons
- Summary of findings and next steps

From testing to law enforcement

- Doping products include both substances and methods prohibited by IOC (1960s) and then WADA
  - WADA's 2004 Code implemented by governments through ratification of UNESCO Convention against Doping in Sport
- Uniform policy in elite sports but focus on athletes' testing increasingly seen as ineffective and costly
  - Only about 1% of athletes tests positive
  - €129 million spent in 258,000 tests worldwide in 2010
- Sports governing bodies increasingly see criminal prosecution as attractive option and "future of anti-doping" (Fahey)
  - a few countries, *in primis* Italy, have criminalized trade in doping products and actively prosecute suppliers

Doping known as public health issue, but little attention to supply

- Parameters of use well-explored
  - Doping products (i.e., banned substances and methods) are used to enhance performance, image, and aggressiveness
  - Lifetime prevalence of steroid use estimated at 3% or more in young men worldwide (Kanayama et al., 2009)
  - Medical/psychiatric effects of steroids, e.g., include cardiomyopathy, depression, and, for about one-third of users, dependence
- Parameter of supply nearly unexplored
  - Koert and van Kleij (1998), Oldersma et al. (2002), and Donati (2007)
  - Searches on Criminal Justice Abstracts, Pub Med, Web of Science in April 2012 yielded 4 relevant publications

WADA study sought to fill knowledge gap

WADA study mined Italy's experience with anti-doping criminal law

- Aimed to characterize market and assess policy
  - Analyze production and distribution of doping products
  - Understand how, if at all, anti-doping criminal provisions and enforcement can contribute to better control of doping
- Proposed seven objectives to support aims
  - To assess size of market for doping products
  - To identify types of suppliers and examine their modus operandi
  - To assess relative importance of different sources of products
  - To map distribution system of doping products
  - To estimate financial dimensions of doping market
  - To account for and assess anti-doping law enforcement and judicial activities and identify challenges
  - To draw policy implications from analysis

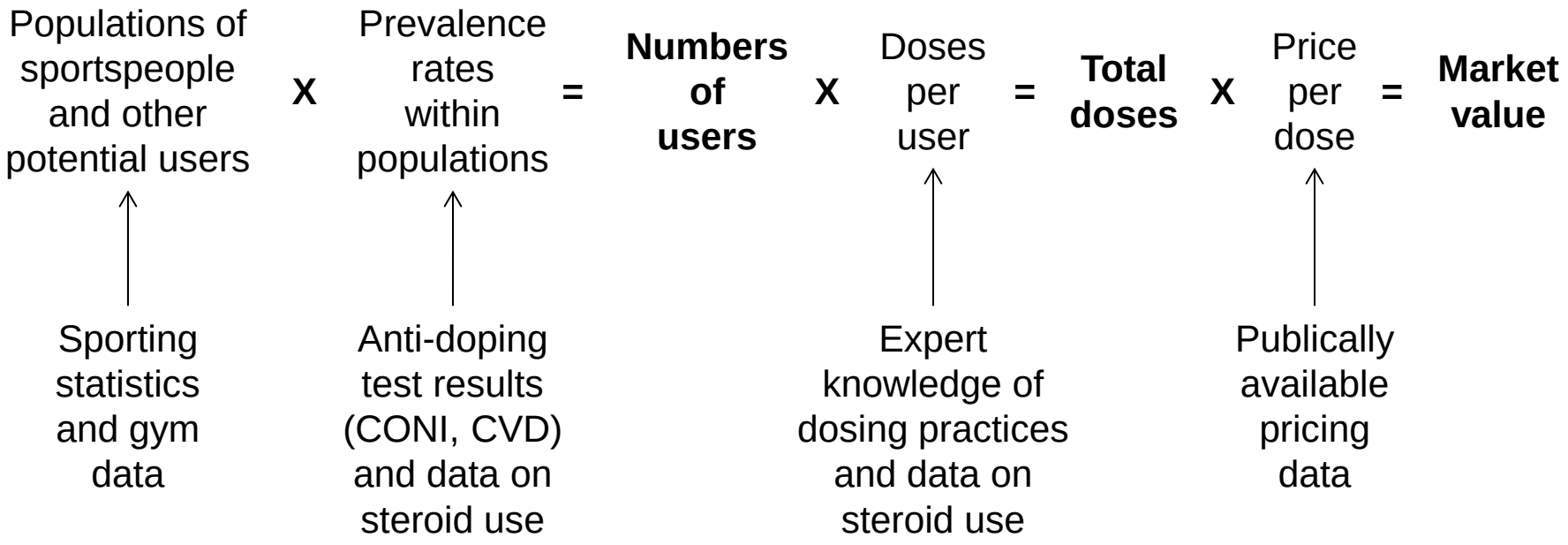
WADA study benefited from collaboration with Italian authorities

- Drew on multiple data sources, largely from criminal justice system, i.e., Police Command for Health Protection (NAS)
  - Official documents of 46 anti-doping investigations
  - 80 data files on major NAS investigations from 1999 to 2009
  - Data on anti-doping activities of all 38 NAS Branch Offices
  - Seizure data from all police forces
  - Interviews with 26 NAS officers
  - Interviews with 7 prosecutors and 2 other experts
  - All relevant statistics, e.g., on sporting and anti-doping testing in Italy
  - Scientific literature, grey literature, media reports, pharmacy price lists
- Trianguated data to validate findings

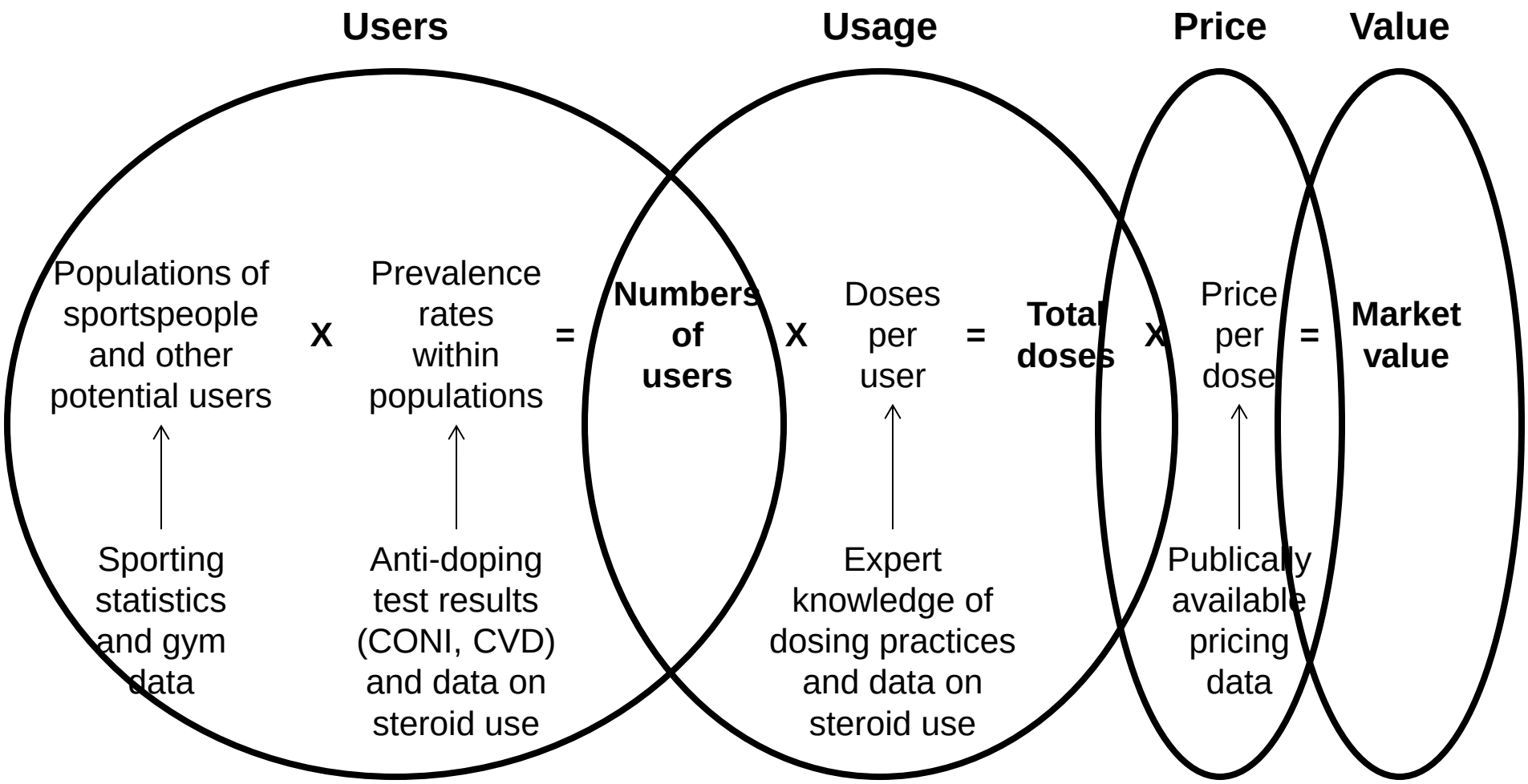
*"Comando Carabinieri per la Tutela della Salute"

WADA study adopted “novel” market approach

- Depict legal and policy environments, suppliers, and distribution chains
- Develop market estimate, consisting of



Market estimate can be framed in terms of users, usage, price, and value



This presentation focuses on market estimation

- Market estimate
  - Types and numbers of users
  - Volume of consumption
  - Value of market
- Comparisons to markets for traditional illegal drugs, primarily heroin and cocaine

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Doping occurs in semi-illegal market

- Legal status of supply-side activities varies by country and within countries, including Italy, depending on
  - Products exchanged and their final use
  - *Bona fide* of some suppliers (e.g., pharmacists)
  - Applicable offences
- Illegality must be ascertained empirically for each doping product and supplying activity

Legal status of doping products suffers burden and ambiguity of contextual specificity

Suppliers are not marginalized

- Mostly men
- Mostly Italian
- Few have doping-related or other criminal records
  - Hardly any have traditional criminal careers
- Most have legitimate professions or occupations
- Very limited mafia involvement, exceptions include
  - “Receiving” drugs stolen by truck robbers
  - Administering doping substances to race horses

Suppliers are often white-collar criminals

Category	Type
Gym	Gym managers or owners and body-building instructors Dietary supplement shop managers or owners
Healthcare	Pharmacists Physicians Hospital, health clinic and nursing home employees (Para-) pharmaceutical company employees or salesmen
Organized sports	Sports team staff members Sporting federation staff members
Horseracing	Veterinary physicians Breeders Drivers
Use	Athletes Law enforcement officers engaging in body-building
Other	Individuals without distinctive professions or occupations

Many abuse positions of authority and athletes' trust

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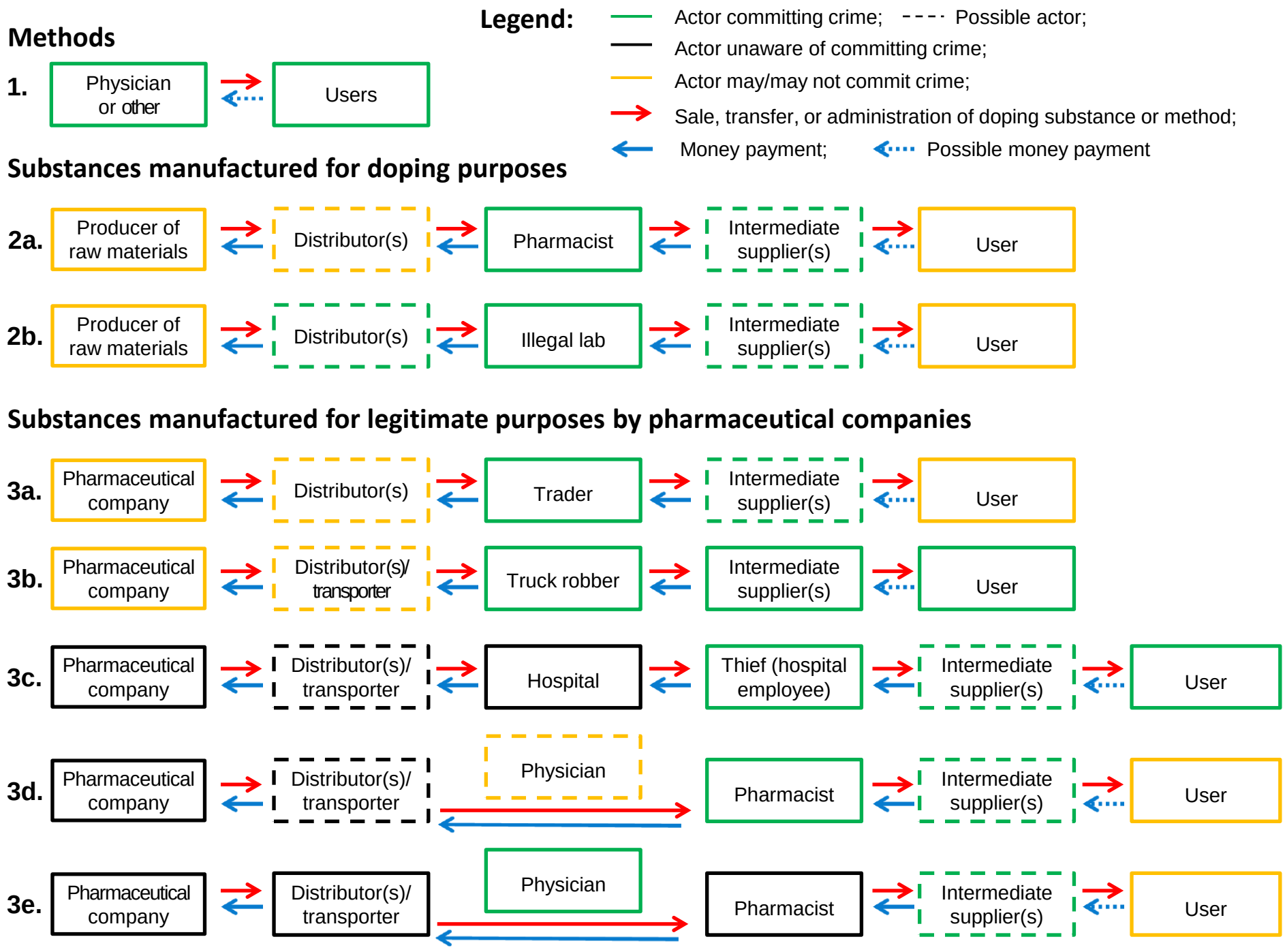
No evidence of violence or bribery

Many abuse positions of authority and athletes' trust

Distribution chains are also semi-illegal

- Doping methods
  - No separate distribution system
- Substances manufactured for doping purposes
  - In pharmacies or illegal labs, in Italy or abroad
  - “Producers-retailers” or distribution chain
- Substances manufactured for legitimate purposes, in Italy or abroad, then diverted by
  - Manufacturers or distributors, their affiliates or employees
  - Traders, who sometimes sell drugs on-line
  - Robbers stealing from trucks or storage
  - Hospital or health clinic employees stealing from storage
  - Pharmacists or their employees

Users bypass domestic distribution chains with internet


Legend:
Actor committing crime;
Possible actor;
Actor unaware of committing crime;
Actor may/may not commit crime;
Sale, transfer, or administration of doping substance or method;
Money payment;
Possible money payment
Methods
1.
Physician or other
Users
Substances manufactured for doping purposes
2a.
Producer of raw materials
Distributor(s)
Pharmacist
Intermediate supplier(s)
User
2b.
Producer of raw materials
Distributor(s)
Illegal lab
Intermediate supplier(s)
User
Substances manufactured for legitimate purposes by pharmaceutical companies
3a.
Pharmaceutical company
Distributor(s)
Trader
Intermediate supplier(s)
User
3b.
Pharmaceutical company
Distributor(s)/ transporter
Truck robber
Intermediate supplier(s)
User
3c.
Pharmaceutical company
Distributor(s)/ transporter
Hospital
Thief (hospital employee)
Intermediate supplier(s)
User
3d.
Pharmaceutical company
Distributor(s)/ transporter
Physician
Pharmacist
Intermediate supplier(s)
User
3e.
Pharmaceutical company
Distributor(s)/ transporter
Physician
Pharmacist
Intermediate supplier(s)
User

National sports bodies serve prominent role as accomplices and protectors

- Officials and staff members of sports bodies openly acted as accomplices in doping of elite athletes until 1990s
  - Three CONI Presidents and Prof. Conconi charged with criminal organization for administering dangerous drugs to super elite athletes
  - IOC-accredited anti-doping lab in Rome closed in 1998 because it did not test football players for steroids
  - Reports of doping practices covered up by sport body officials
- Since 2000 lack of commitment in anti-doping and seeming tolerance of elite athletes' doping practices
  - Continuity in top management, CONI's delay in publishing results of anti-doping tests, sports federations' deficient collaboration with NAS, conflicts of interest for some CVD's board members

Unparalleled case of government-tolerated – and funded – system of illegality

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Users

Potential users consist of sportspeople and "not-sportspeople"

Category	Notes	Number
Sportspeople	Age 15+	13,780,000
• Competitive	Referred to as "athletes"	4,690,000*
- Elite athletes	Competing nationally or internationally, as professionals or amateurs; Further distinguished as "super elite" athletes	10,200**
- Recreational athletes	Competing sub-nationally	Just < 4,690,000
• Non-competitive	Not referred to as "athletes"	
- Body-builders	Largely affiliated with gyms	1,270,000***
- Other sportspeople	Engage non-competitively in regular or occasional physical exercise	7,820,000
Not-sportspeople	In rare instances, others age 15+	≤ 40,000,000

Sources: Istat (2007) for data on total and competitive sportspeople, except super elite athletes; Ministries of Sports and Social Solidarity for data pertaining to body-builders

Notes: *unrounded figure is 4,685,257; **Super elite only, including some juveniles; ***Potential body builders, drawing on surveys of gym attendance and availability of body-building equipment

Anti-doping test results provide some insight to prevalence of use among athletes

- Government agencies publish data on number and results of anti-doping tests of athletes
  - CONI* and sports federations test elite athletes
  - CVD** tests recreational athletes
- Data have substantial shortcomings
  - Few out-of-competition tests
    - Elite athletes can anticipate tests
    - Recreational athletes might be less able to anticipate tests
  - Testing (urine) only addresses certain drugs
  - Evidence suggests non-trivial incidence of cheating

*Italian National Olympic Committee

**Commissione per la vigilanza e il controllo sul doping e per la tutela della salute nelle attività sportive

Positive results serve as “lower bound” for calculating prevalence rates

Anti-doping test results for elite athletes, 2002-2007

	2002	2003	2004	2005	2007	Avg
Total tests	7,823	9,431	9,950	8,791	11,154	9,430
Positive results	48	62	65	52	69	59
% positive results	0.61	0.66	0.65	0.59	0.62	**0.63**

Source: CONI, 2012.
Notes: CONI has published no data about positive results since 2007; in late 2012 it published data on adverse results.

Anti-doping test results for recreational athletes, 2003-2011

	2003	2004	2005	2006	2007	2008	2009	2010	2011	Avg 2003-11	Avg 2008-11
Total tests	740	1,556	1,875	1,511	1,607	955	1,328	1,115	1,676	1,303	1,374
# of substances	n.a.	n.a.	n.a.	40	52	n.a.	52	**97**	**80**	n.a.	76.3*
Positive results	20	42	37	37	46	39	42	53	52	40.9	46.5
% positive	2.7	2.7	2.0	2.4	2.9	4.1	3.2	4.8	3.1	**3.4**	**3.8**

Source: Ministero della Salute and ISS; several years.
Notes: *Average for 2007 and 2009-2011.

CVD also reports results by substance type

Substance types detected	2010	2011
Anabolic agents	36	16
Peptide hormones (growth factors) and related substances,* of which	10	3
- EPO	4	4
- Chorionic gonadotropin	6	2
Beta-2 agonists	6	4
Hormones and metabolic modulators	0	0
Diuretics and other masking agents	12	20
Stimulants, of which	10	13
- Cocaine	3	4
Narcotics	2	0
Cannabinoids	7	14
Glucocorticosteroids	14	10
Beta-blockers	0	0
Total substances detected	**97**	**80**

Can use data to derive

- numbers of users of doping substances in aggregate
- numbers of users of particular substances

Source: our calculations on the basis of Ministero della salute (2011) and Ministero della Salute (2011) and Ministero della Salute and Istituto Superiore di Sanità (2012)
*GH and other growth factors are not included as they were not detected in the urine tests ordered by CVD.

Bottom line for athletes depends on treatment of cannabis and cocaine users

Year	Number of athletes	% positive results on total tests w/ all substances (unrounded)	Users of all doping substances	% positive results on total tests w/o cannabis and cocaine (unrounded)	Users of doping substances other than cannabis and cocaine
2010	4,685,257	4.8 (4.75)	222,707	4.3 (4.26)	199,592
2011	4,685,257	3.1 (3.10)	145,243	2.2 (2.20)	103,076
Simple average	**4,685,257**	**-**	**183,975**	**-**	**151,334**
			185,000		**150,000**

Overall estimate of users accounts for bodybuilders but not others

- Survey and investigative data yield rough estimate of number of body builders engaging in doping
- Data not sufficient to yield compelling estimates of numbers of other potential users

	Users of all doping substances	% of total	Users w/o cannabis or cocaine	% of total
Athletes	185,000	73%	150,000	69%
Body-builders	68,700	27%	68,700	31%
Total	**253,700**	100%	**218,700**	100%

Usage

Archetypal profiles address differences in consumption patterns across sportspeople

- Profiles normalized to
  - create representative athlete
  - create representative bodybuilder
- Profiles framed in terms of standard doses for each substance (see back up)
- Profiles conform to CVD detection shares for athletes and NAS seizure shares for bodybuilders

Profiles have been "vetted" but methodology under review

Steroids and body-builders account for lion's share of doses

Substance types	Athletes	Body-builders	Total doses per type	% of total
Anabolic agents	45,304,348	173,522,903	218,827,251	**58.93%**
Peptide hormones, growth factors and related substances*, of which	19,956,522	3,767,419	23,723,941	6.39%
- EPO	7,675,907	0	7,675,907	2,07%
- GH**	n.a.	3,564,001	3,767,419	0,96%
- Chorionic Gonadotropin	12,280,615	203,418	12,484,033	3,36%
Beta-2 agonists	13,130,435	11,081	13,141,515	3.54%
Hormones and metabolic modulators	0	132,968	132,968	0.04%
Diuretics and other masking agents	32,391,304	55,403	32,446,708	8.74%
Stimulants	24,739,130	27,036,774	51,775,905	13.94%
Narcotics	7,000,000	0	7,000,000	1.89%
Glucocorticosteroids	21,130,435	531,871	21,662,306	5.83%
Beta-blockers	2,608,696	0	2,608,696	0.70%
Total doses	166,260,870	205,058,419	**371,319,290**	
Percent of total	44.78%	**55.22%**	100.0%	

Price

Pricing data drawn from official sources and internet

- Most doping substances are sold in pharmacies and have “official” price, which is same throughout the country
- For those that are not officially traded, i.e., no therapeutic purpose, internet websites provide some information

Official prices may be too low or too high, but certainly not “right”

Substance type	Active ingredients per dose	Average price per dose
Anabolic agents (including testosterone)	10 mg	1.12
Peptide hormones, growth factors and related substances,* of which:	Variable	4.76
- **EPO and other similar hormones**	200 IU or 1 mcg	3.09
- **GH and other similar hormones**	1 IU or 0.333 mg	13.90
- **Related substances**, of which**	Variable	2.50
***Chorionic gonadotrophin**	1,000 IU	3.27
***Gonadorelin**	1.2 mg	48.05
***ACTH and other corticotrophins**	0.25 mg	3.70
***Insulin**	10 IU	0.03
Beta-2 agonists	2 mcg	0.20
Hormones and metabolic modulators	10 mg	1.26
Diuretics and other masking agents	25 mg	0.40
Stimulants	25 mg	0.60
Narcotics	50 mg	1.28
Glucocorticosteroids	25 mg	0.49
Beta-blockers	5 mg	0.26

Source: Our calculations on the basis of the Database on NAS investigations.

- Prices in doping market may differ greatly from official prices
  - More in risky environments
  - More if other “service fees” included in net price
  - Less via internet
- Official prices of doping doses are mostly cheaper than known prices of illegal drugs
  - Exceptions are GH and gonadorelin
  - By comparison, 0.25 gram doses of heroin and cocaine cost €10.49 and €17.29 and a hashish joint €3.73

Value

Market yields modest, but not insubstantial revenues

- By multiplying official prices per dose with dosing estimates, we calculate annual retail revenues of €537 million
  - Steroids account for about €245 million or 46% of the total revenues, less than their share of doses (58.9%) due to relatively low prices
  - Peptide hormones account for disproportionately large share of revenue, i.e., 27% revenue v. 6% doses, due to relatively high prices
- Estimate is, on most counts, very conservative
  - Reflects limits of testing and excludes GH and gonadorelin
  - Omits “other sportspeople” and “not-sportspeople”
  - Draws on official price data and does not account for other “service fees”
- No information on manufacturers’ revenues or profits, as only one lab has been seized in Italy
- Most other suppliers do not earn much
  - Few physicians serving elite athletes constitute exception

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How does doping market compare to those for traditional illegal drugs?

- Numbers of users
  - Roughly similar to heroin (218,425 opiate users needing treatment)
  - Substantially smaller than cocaine (353,000 users based on 0.9% prevalence rate)
- Value of market
  - Substantially smaller than heroin and cocaine (€3,685 million), on basis of “official” prices
  - Inattention to ‘risk premiums’ and other service charges may understate true value, though increasing use of internet might offset

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Concluding remarks

- Next steps in analysis
  - Refine pricing estimates
  - Refine methodology vis-à-vis profiles
- Market appears to be substantial, if not “high value” in comparison to those for traditional illegal drugs, though estimate may understate true value
- Market looks more like those for other diverted pharmaceuticals and “legal highs”, than like those for traditional illegal drugs, e.g., primarily white-collar, non-violent
  - Could this be the future of illegal drug markets, except for heroin and cocaine?

Back up

Doping doses for main types of doping substances seized by NAS

Substance type	1 dose
Anabolic agents	10 mg
Peptide hormones, growth factors and related substances, of which	
- **EPO and other similar peptide hormones**	200 IU or 1 mcg
- **GH and other similar peptide hormones**	1 IU or 0.333 mg
- **Chorionic gonadotrophin**	1,000 IU
- **Gonadorelin**	1.2 mg
- **Adrenocorticotrophic hormone (ACTH) and other corticotrophins**	0.25 mg
- **Insulin**	10 IU
Beta-2 agonists	2 mcg
Hormones and metabolic modulators	10 mg
Diuretics and other masking agents	25 mg
Stimulants	25 mg
Narcotics	50 mg
Glucocorticosteroids	25 mg
Beta-blockers	5 mg

Source: Donati and NAS, re doping doses for main types of doping substances seized by NAS

NAS seized 88 million doses from 1999-2009

Substance type	Pills, ampoules and other packages seized	Active ingredients seized (mg)	# of doping doses	% of total doses
Anabolic agents	3,531,232	745,476,230	74,547,623	83.16%
Peptide hormones, growth factors and related substances, of which:	45,812	Not comparable	1,604,608	1.79%
-EPO and similar hormones	12,430	Not comparable	626,335	0.70%
-GH and other growth factors	20,482	Not comparable	928,335	1.04%
-Related substances*	12,900	Not comparable	49,938	0.06%
Beta-2 agonists	640	9,780	4,890	0.01%
Hormones and metabolic modulators	35,561	355,610	35,561	0.04%
Diuretics and other masking agents	13,339	340,125	13,605	0.02%
Stimulants	3,373,570	291,379,175	11,655,167	13.00%
Narcotics	1	6,750	135	0.00%
Glucocorticosteroids	130,802	4,549,125	181,965	0.20%
Beta-blockers	11	55	11	0.00%
TOTAL	7,176,780	1,042,116,850	88,043,565	100.00%

Source: our elaboration on NAS data.