

**Towards the optimal total cardiovascular risk estimation
ESC Congress 2005
Stockholm, September 3-7**

**THE EXPERIENCE FROM
IL PROGETTO CUORE**

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Il Progetto **CUORE**

Aims

1. To implement a national cardiovascular event register
2. To describe risk factor distributions
3. To assess cardiovascular risk in the Italian population

Supported by the Italian Ministry of Health and coordinated by the Italian Institute of Health - 1998

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Base-Line risk factors

Questionnaire

Gender

Age

Smoking habit

History of diabetes

History of coronary heart diseases (Rose-Q, ECG-Minnesota)

Family history of CVD

Anti-hypertensive medications

Exam

Systolic and diastolic blood pressure (2 consecutive measurements)

Total serum cholesterol, HDL-cholesterol, triglycerides, fasting blood glucose (63%)

Body mass index

FOLLOW-UP

Events

Myocardial infarction, coronary death, sudden death, intracerebral and subarachnoid hemorrhage, thrombosis, stroke, revascularization.

For each participant who experienced one of the previous diseases or death from baseline examination to december 2002 were collected:

hospital medical records

death certificate

medical records from GPs

Events were validated following the MONICA criteria

Cohort distributions, men and women 35-69 years

Brianza	N	Events
Men	2,519	172
Women	2,623	54

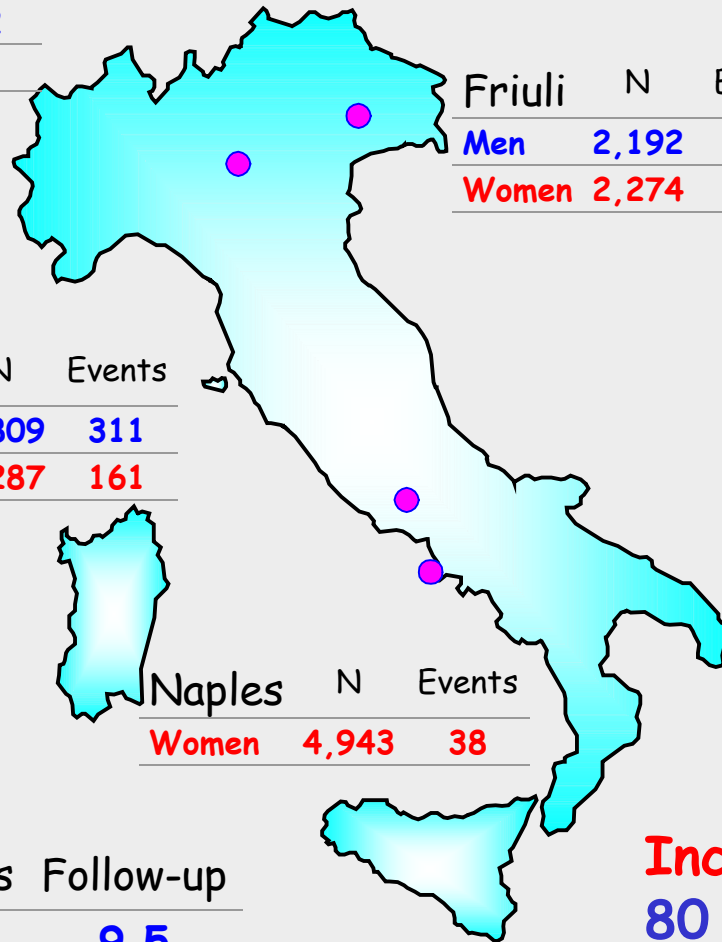
Friuli	N	Events
Men	2,192	160
Women	2,274	75

Latina	N	Events
Men	2,809	311
Women	3,287	161

Naples	N	Events
Women	4,943	38

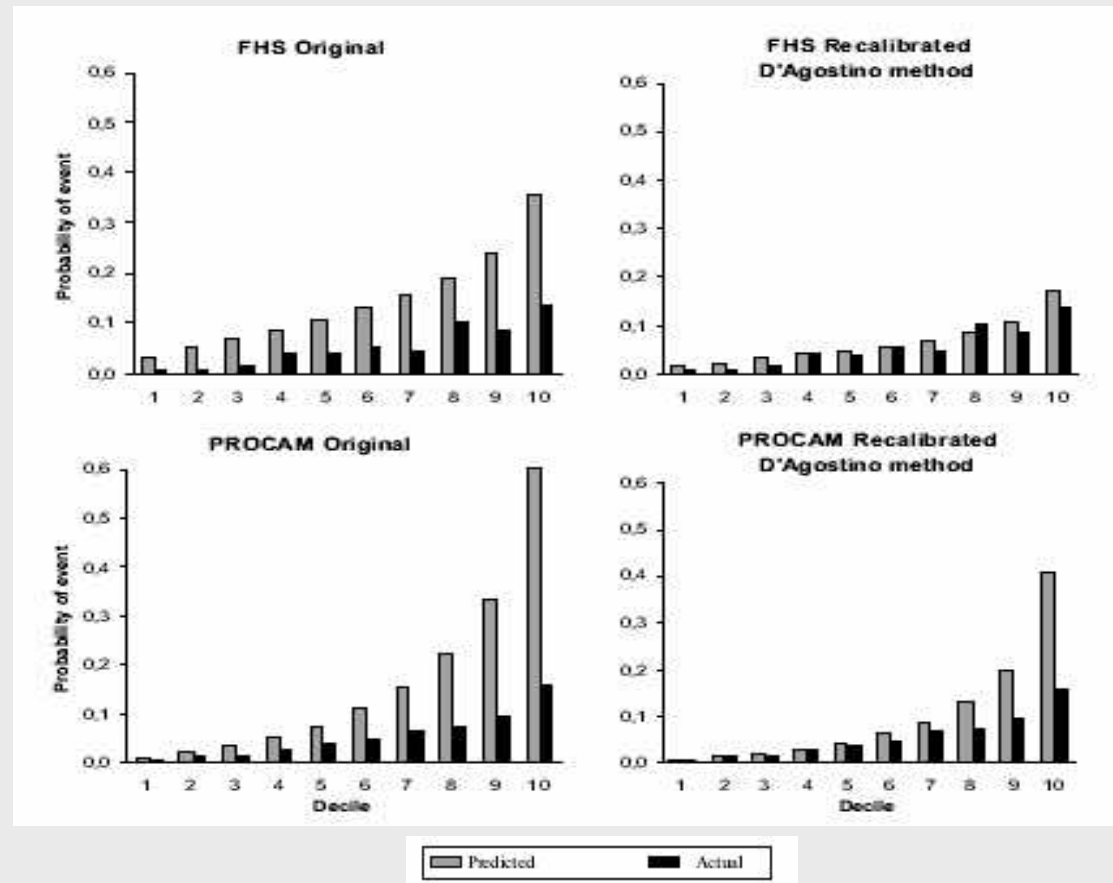
TOTAL	N	Events	Follow-up
Men	7,520	643	9.5
Women	13,127	328	8.0

Incidence:
 80 (men) and 31 (women)
 x10,000 person-years



Data analysis to identify risk factors and their aetiological role:

- risk factors description
- correlation analysis
- univariate analysis
- multivariate analysis (Cox model)
- model effectiveness testing (Receiver Operating Characteristic curve, Hosmer-Lemeshow test)
- best model choice
- validation (cross-validation, bootstrap)



Predicted and actual 10-year risk of incident major coronary events, for deciles of risk estimated by the Framingham and PROCAM equations, in the CUORE dataset

The Third Joint Task Force decided to focus not only on the prevention of coronary heart disease but also on the prevention of other clinical manifestations of atherothrombotic disease including thrombotic stroke and peripheral artery disease

EASD
European Association
for the Study of Diabetes

International Diabetes Federation

Wondra
With International Cardiology
Europe



Reprinted from the European Heart Journal
www.eurheartj.org

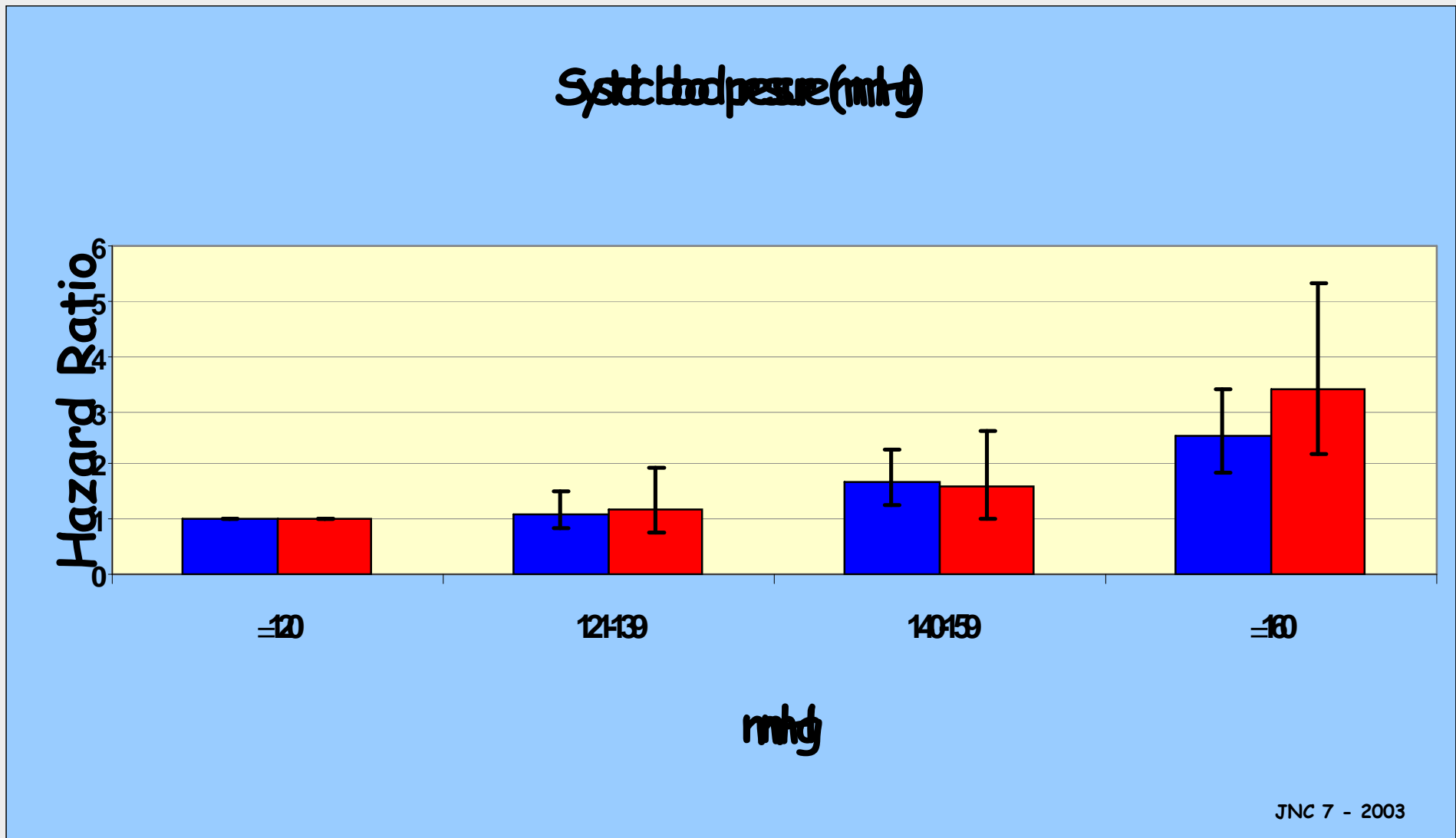
Baseline descriptive statistics, men and women ages 35-69 years, free of previous CVD (1)

Variables	Men		Women	
	mean	s.d.	mean	s.d.
Age (years)	50.6	9.2	50.3	8.5
Systolic Pressure (mm Hg)	138.7	20.5	135.9	22.0
Diastolic Pressure (mm Hg)	86.9	11.1	83.4	11.2
Serum Total Cholesterol (mg/dl)	225.4	44.4	229.0	44.6
Serum HDL-Cholesterol (mg/dl)	50.4	14.0	60.0	15.4
Serum Non HDL-Cholesterol (mg/dl)	174.8	45.0	168.9	45.0
(Total / HDL) Cholesterol	4.8	1.6	4.1	1.3
(Non HDL / HDL) Cholesterol	3.8	1.6	3.1	1.3
Body Mass Index (BMI) (kg/m ²)	26.7	3.7	27.2	4.8
BMI (kg/m ²) [Current Smokers]	26.3	3.7	26.1	4.3
BMI (kg/m ²) [Never/Past Smokers]	27.0	3.6	27.6	5.0
Plasma Fasting Glucose (mg/dl)	98.0	25.0	92.6	22.7
Cigs [^] /Day (All)	6.9	10.8	3.2	7.0
Cigs [^] /Day (Current Smokers only)	17.3	10.7	12.5	8.5
Waist circumference (cm)	93.2	9.9	84.3	11.2
Hip circumference (cm)	100.2	7.7	102.2	9.7
Waist/Hip	0.9	0.1	0.8	0.1
Serum LDL-Cholesterol (mg/dl)	143.6	37.9	145.8	40.3
Triglycerides (mg/dl)	152.2	107.6	115.5	67.5

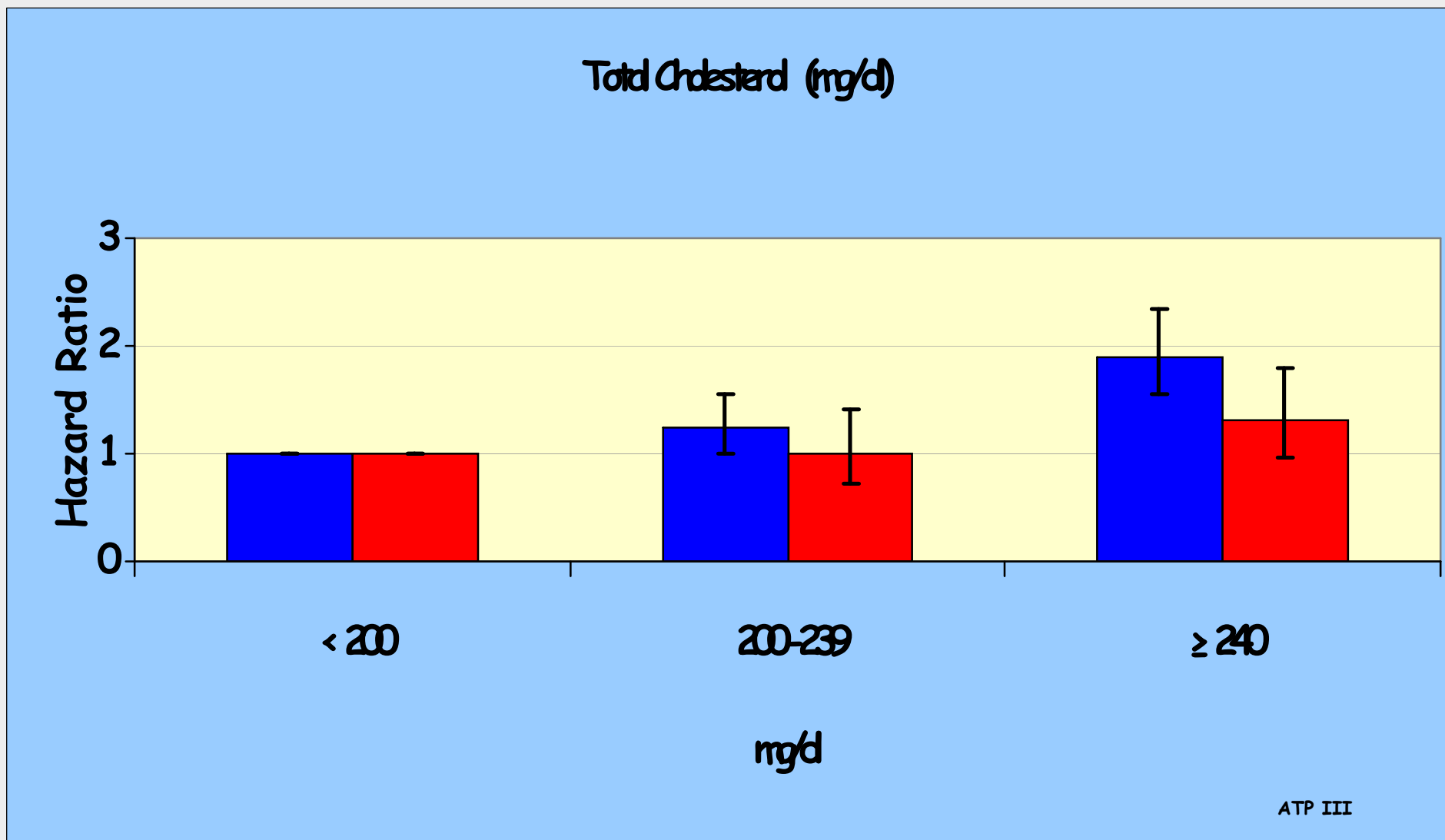
Baseline descriptive statistics, men and women ages 35-69 years, free of previous CVD (2)

Variables	Men	Women
	percent	percent
Diabetes	5.9	3.8
Hypertension Treatment	9.4	14.5
Family History of CVD	26.5	27.2
Cigarette Smoking		
Never	25.5	61.4
Past	34.5	12.7
Current	40.1	25.9
Cigarette Smoking		
Never/Past	60.0	74.1
< 10	8.5	9.8
10-19	11.5	8.5
≥ 20	20.0	7.6
Blood Pressure -- SBP/DBP		
Normal	13.8	23.1
Prehypertension	30.8	30.6
Hypertension-Stage I	29.7	21.8
Hypertension-Stage II or treated	25.7	24.5

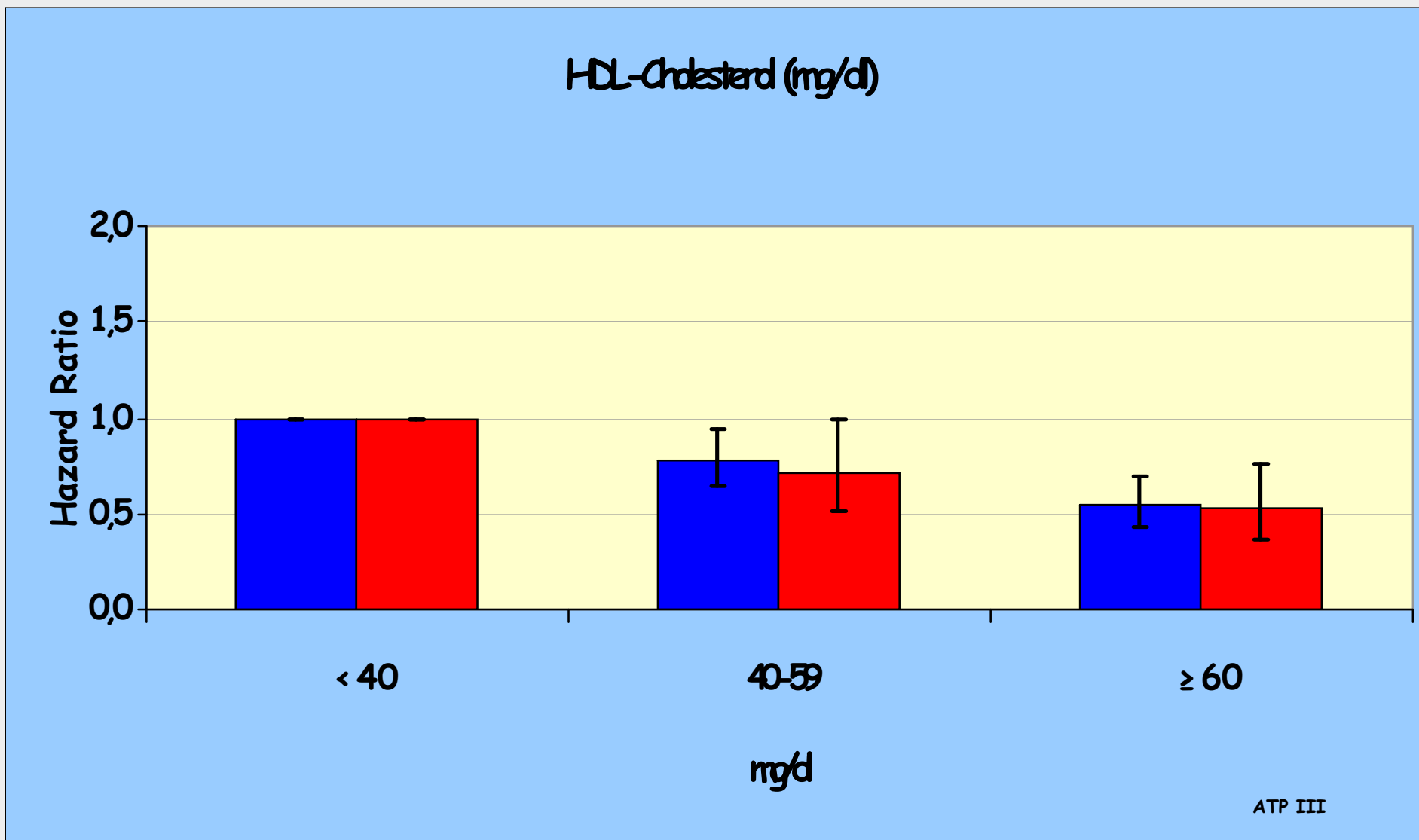
Men and Women 35-69 years



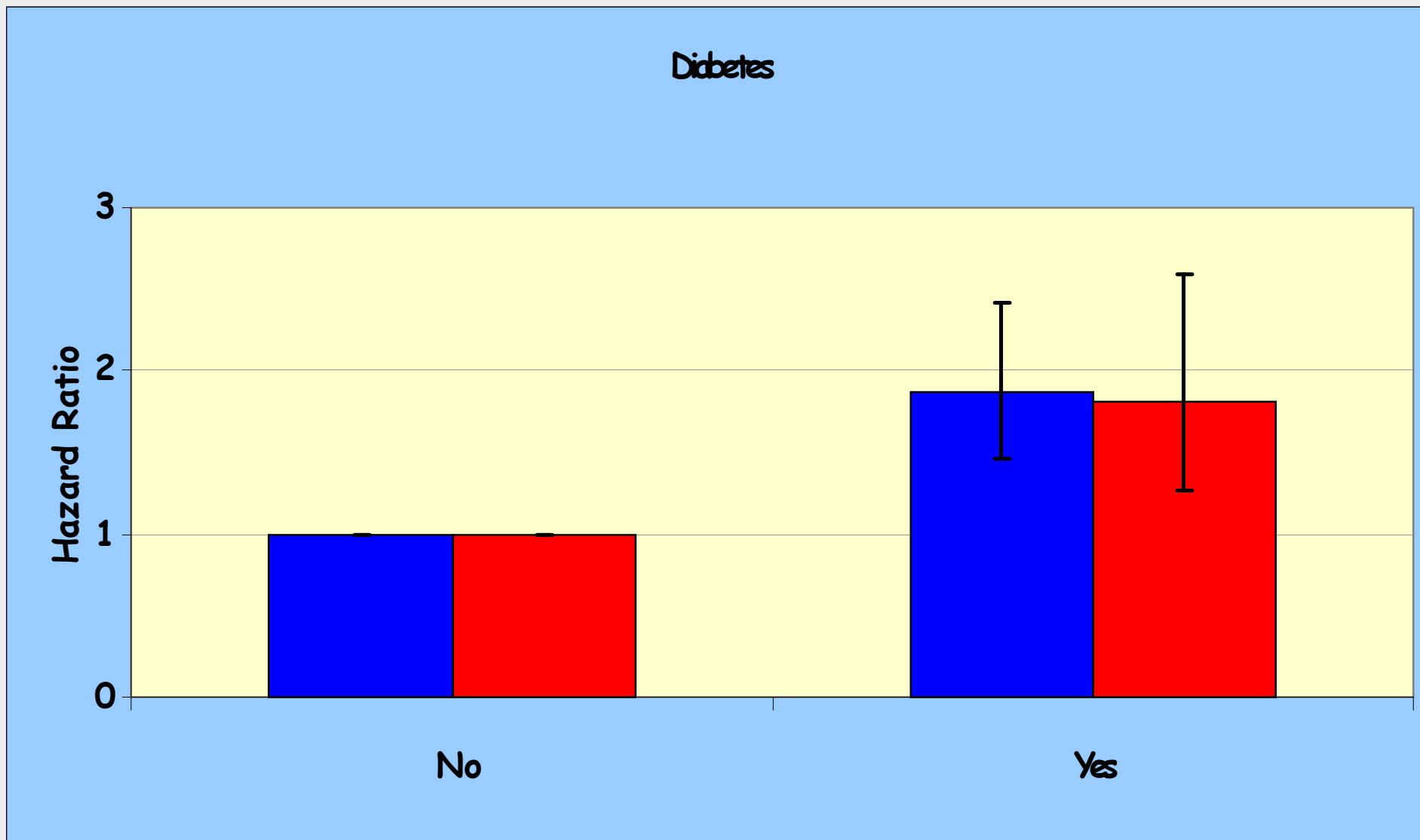
Men and Women, 35-69 years



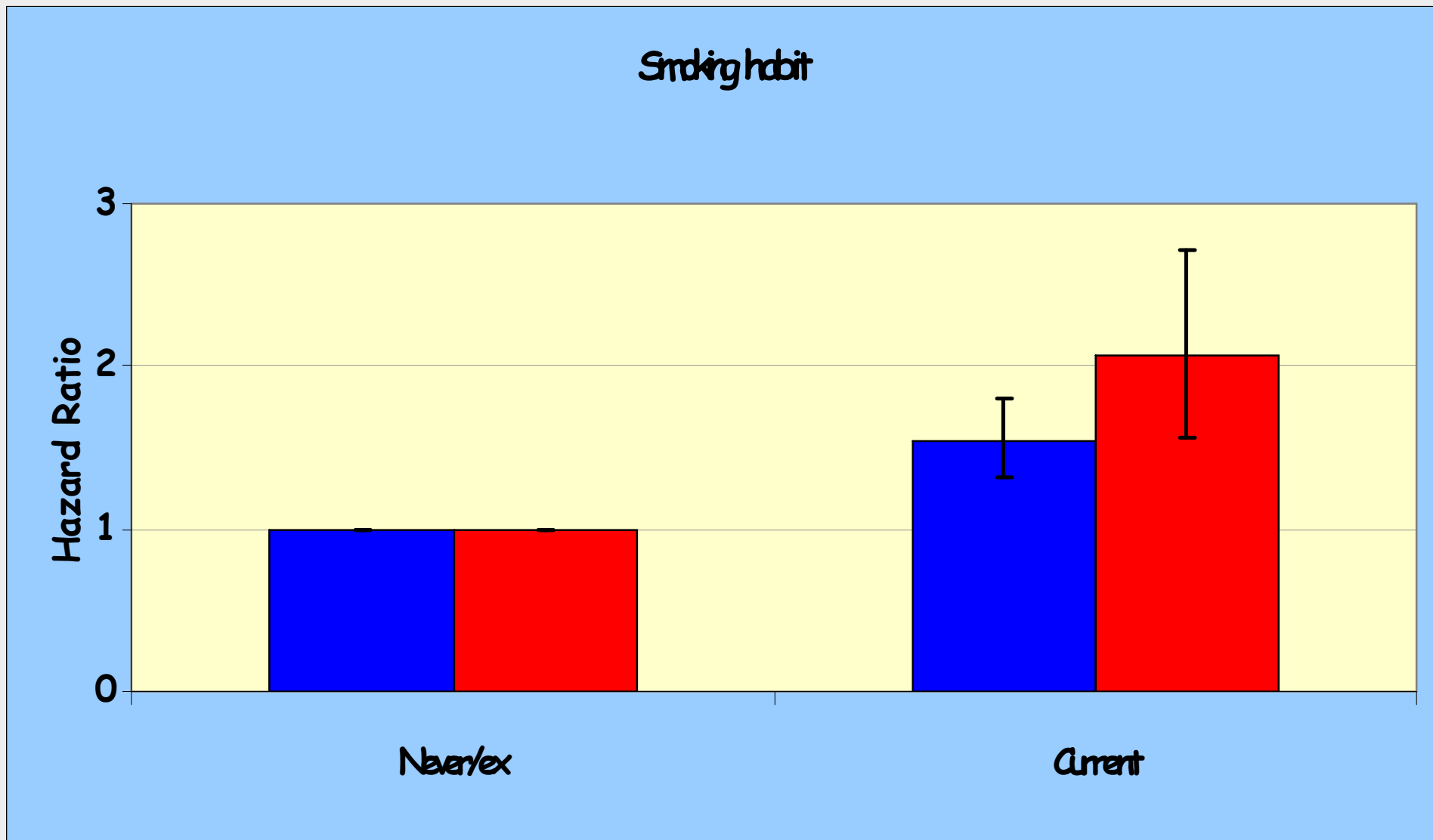
Men and **Women**, 35-69 years



Men and **Women**, 35-69 years



Men and **Women**, 35-69 years



Best model for predicting first CVD event within 10 years

	10-year CVD risk MEN			10-year CVD risk WOMEN		
	β	More adverse level HR	More favourable level HR	β	More adverse level HR	More favourable level HR
AGE, years	0.076	2.01	0.50	0.079	1.95	0.51
Systolic BP, mmHg	0.013	1.31	0.76	0.016	1.41	0.71
T-CHOL mg/dl	0.006	1.31	0.76	0.003	1.14	0.88
HDL-CHOL mg/d	-0.013	1.20	0.83	-0.015	1.26	0.80
SMOKING, yes vs no	0.508	1.66	0.60	0.773	2.17	0.46
DIABETES, yes vs no	0.462	1.59	0.63	0.339	1.40	0.71
TREATMENT, yes vs no	0.490	1.63	0.61	0.590	1.80	0.55
$G(\mu)$	6.583			6.016		
Survival at baseline, $S(t)$	0.953			0.989		

Study limitations

- ✓ Only one measure of the risk factors
- ✓ Cohorts enrolled in different time periods
- ✓ Classic MONICA diagnostic criteria for event validation

Improvements over previous studies

- ✓ cohorts enrolled between 80s and 90s
- ✓ end-points included fatal and non fatal, coronary and cerebrovascular events and revascularizations
- ✓ women were involved
- ✓ cohorts were distributed throughout Italy (North, Centre and South)
- ✓ International standardized validation criteria

Software CUORE.exe available at www.cuore.iss.it

Anagrafica dell'assistito

Nome: **Cognome:**

Codice Regionale: (facoltativo)

Dati per il calcolo

Sesso:

Anno di nascita: **Eta':**

Abitudine al fumo di sigaretta: Si riferisce a chi fuma ogni giorno (anche 1 sigaretta) o ha smesso da meno di 12 mesi

Valore della pressione arteriosa sistolica: (espressa in mmHg)

Valore della colesterolemia totale: (espressa in mg/dl)

Valore della colesterolemia HDL: (espressa in mg/dl)

E' mai stato diagnosticato il diabete?:

Presenza di ipertensione arteriosa per cui il medico ha prescritto farmaci anti-ipertensivi: (si considera sotto trattamento chi assume regolarmente questi farmaci)

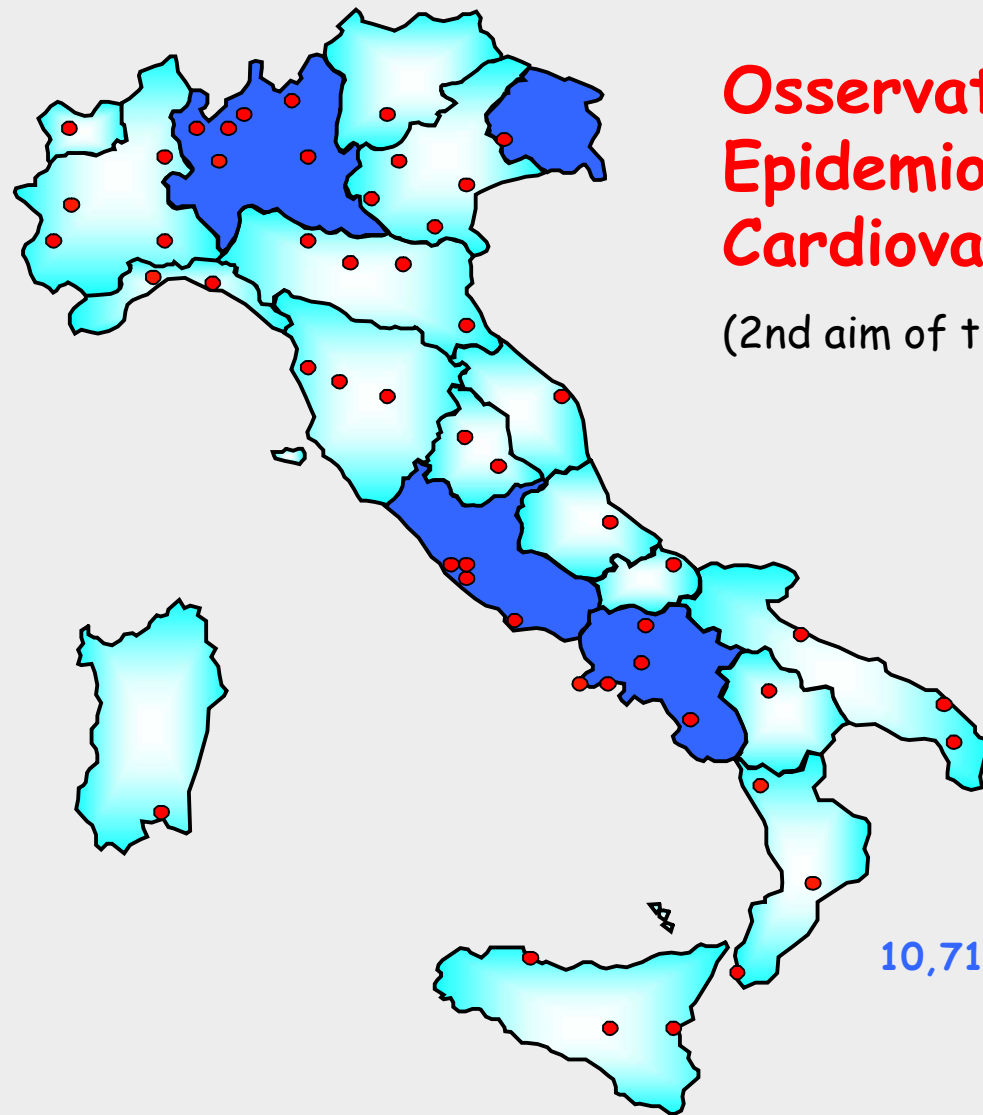
Benefits from using risk charts in clinical practice

- Simple tools
- Respect the multifactorial aetiology of cardiovascular diseases
- Provide multiple options of treatment
- Make assessment more objective and comparable over time
- Cost/benefit ratio can be calculated

....future

Risk chart updating - Istituto Superiore di Sanità, Rome

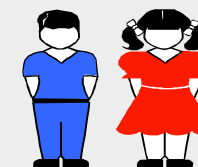
- New cohorts whose baseline is to be found in 90s have been enrolled: 10,711 men and 14,870 women ages 35-74 years
- Vital status of all cohorts has been checked. Death certificates have been collected and coded
- Non-fatal events are to be identified
- Suspected fatal events need to be validated



Osservatorio Epidemiologico Cardiovascolare

(2nd aim of the Progetto CUORE)

10,711



14,870

35-74 years



....and then?

Progetto RIACE

RIschio Assoluto Cardiovascolare Epidemiologia

Agenzia Italiana del Farmaco

The RIACE project was launched by the National Drug Governance Agency following the decision that in primary prevention reimbursement of lowering cholesterol treatment is correlated to global absolute risk assessment

Aims

- ✓ distributing the risk charts to GPs
- ✓ training GPs to use global absolute risk as a tool for the identification of high risk individuals
- ✓ promoting rational prescription of drugs useful to the prevention of global absolute cardiovascular risk
- ✓ training GPs to counsel patients against smoking and to recommend a regular physical activity and an healthier diet and lifestyle

 il progetto cuore

La Carta del rischio
cardiovascolare
nella pratica clinica

www.cuore.iss.it

....and then?

Agreement between Italian government and regions
Cernobbio 2004

Active preventive plan (2005-2007) with 4 health priorities:

1. Cardiovascular diseases (risk assessment, obesity, complications of diabetes, secondary prevention)
2. Cancer (oncological screenings)
3. Infectious diseases (vaccinations)
4. Accidents

.....and then?

Italian Ministry of Health

Centre of Disease Control

Progetto CUORE - 2005-2006

Aims

To implement of global absolute risk assessment among GPs through a national training programme

To promote and support at regional level preventive activities in order to reduce risk factors (population and individual strategies)

Conclusions

The assessment of absolute risk is currently accepted as a clinical decision aid

If **absolute risk** is misclassified, part of the population will be inappropriately elected for medical treatment, therefore charts and scores need to be based on local **updated** epidemiological data

A close **cooperation** among Italian Ministry of Health, National Drug Governance Agency, Institute of Health, Federation of Cardiologists and College of General Practitioners is the greatest step forward **sustainable** disease prevention strategies