

# Prevalence of Diabetes and Prediabetes in Adult Romanian Population



Dr. Paul A. Gagniuc



# PREDATORR

Romanian National Study On The Prevalence of Diabetes, Prediabetes, Overweight and Obesity, Dyslipidemia, Hyperuricemia and Chronic Kidney Disease

- **Protocol number** SRDCEB/2012/001;
- **Eudra CT Number:** 2012-004803-12
- **Beneficiaries:**
  - Romanian Society of Diabetes, Nutrition and Metabolic Diseases (RSDNMD)
  - Romanian Society of Nephrology (RSN)
- **Investigators:** 101 General physician
- **CRO:** CEBIS International ([www.cebis-int.com](http://www.cebis-int.com))
- **Central Laboratory for the analysis of the study:** Synevo

# PREDATORR – Primary goals

- ❑ Estimating the prevalence of **DM and pre diabetes** in the adult population of Romania
- ❑ Estimating the prevalence of **overweight and obesity** in the adult population of Romania
- ❑ Estimating the prevalence of **the chronic kidney disease** in the adult population of Romania

**Note:** Prevalence distribution of the pre-specified subgroups (eg age groups etc) is also expected.

# PREDATORR – Secondary goals

- ❑ Estimating the prevalence of **DLP** in Romania
- ❑ Estimating the prevalence of **Hyperuricemia** in Romania
- ❑ Estimating the prevalence of **Metabolic Syndrome** in the population of Romania.
- ❑ Estimating the prevalence of **HTN** in Romania
- ❑ **CVR** assessment in the population of Romania: **SCORE diagram** for the high-risk areas
- ❑ Metabolic risk evaluation through **FINDRISC score**.

# PREDATORR – Subject inclusion

Subjects were randomly assigned for screening from the list of each GP via a random number generator

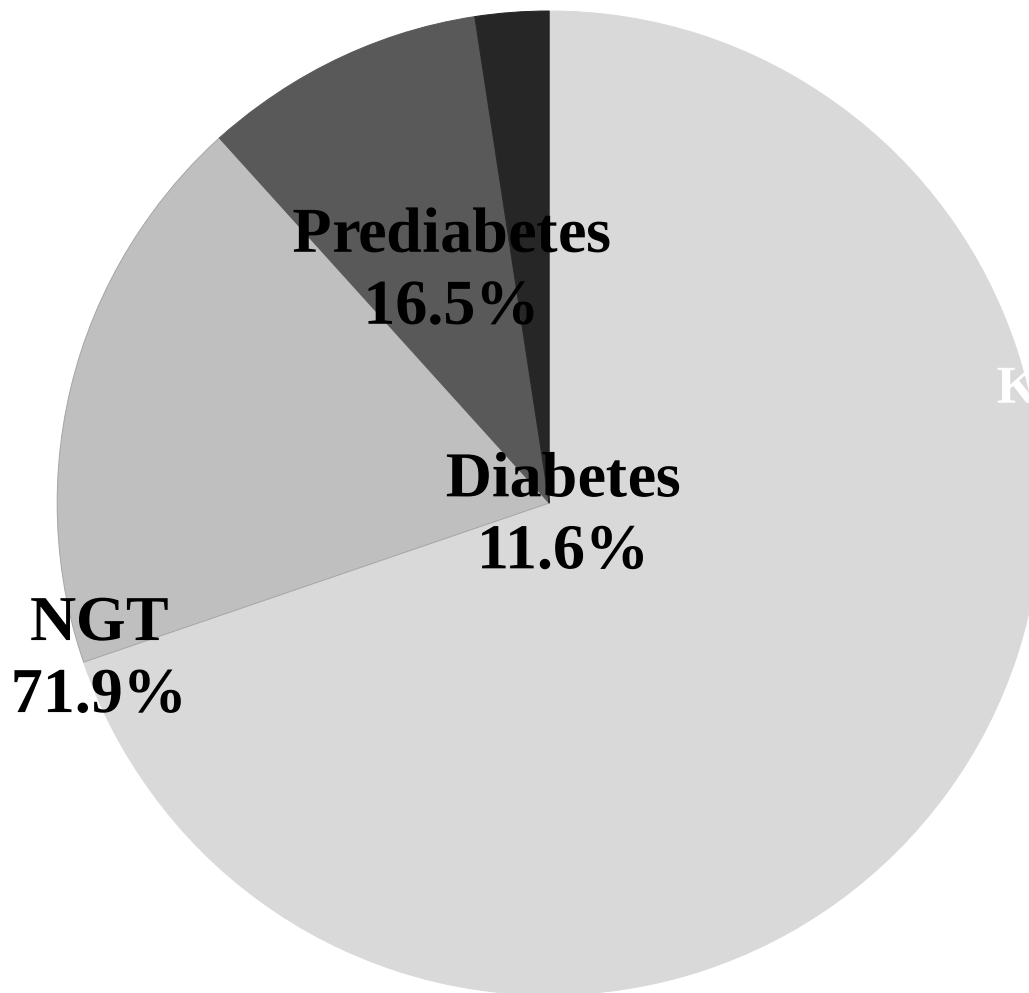
## Inclusion criteria

- Subjects aged 20-79 years
- Born and with residence in Romania
- Living for the past 10 years mainly in Romania
- Included on the list of a GP affiliated with CNAS
- Signing the I.C.

## Exclusion criteria

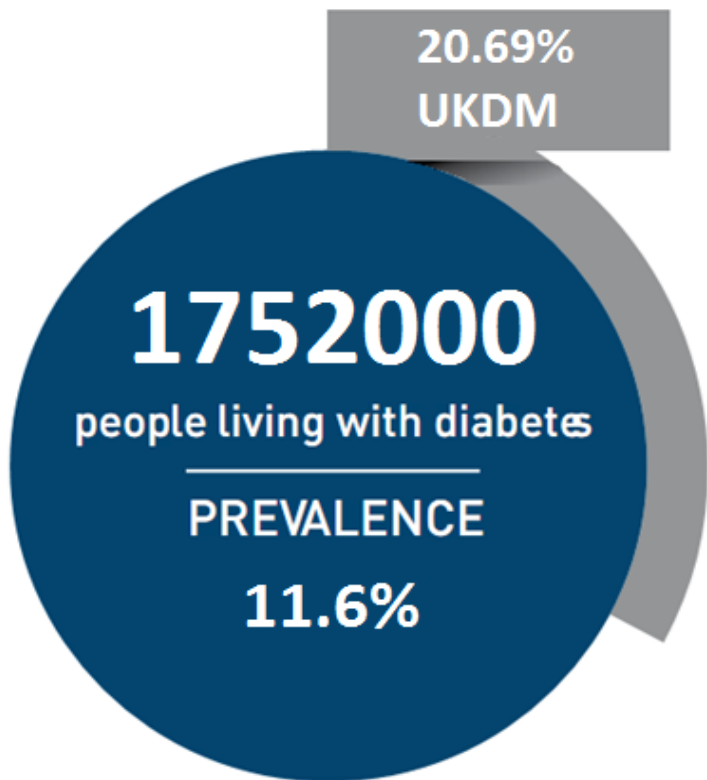
- Subjects aged <20 and >79 years
- Born outside Romania
- Living for the past 10 years mostly outside Romania
- Refuse or can not sign the informed consent
- Pregnant or breastfeeding women

# ROMANIA at a glance - PREDATORR 2013



# ROMANIA at a glance - PREDATORR 2013

## DIABETES



### Diabetes in Romania (20-79 years)

Adult Romanian population (20-79 years)	15097473
Number of people with diabetes	1752000
Age- and sex-adjusted prevalence of diabetes	11.6%
Undiagnosed cases (unknown diabetes mellitus - UKDM)	362340
Age- and sex-adjusted prevalence of UKDM	2.4%

# Diabetes worldwide ...

**i / 12**

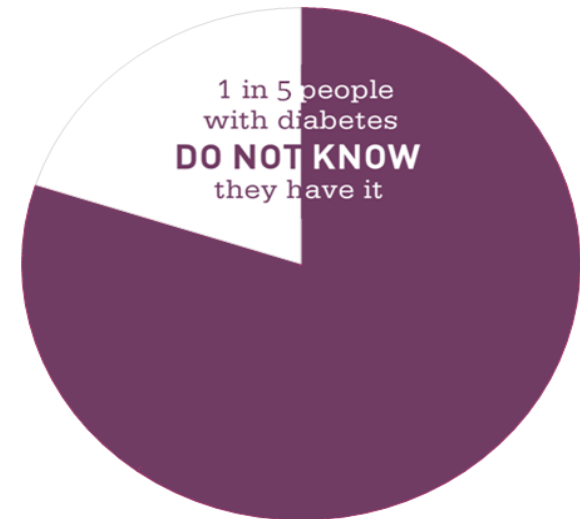
people with  
**DIABETES**



## Diabetes in Romania - PREDATORR 2013 ...

**i / 9**

people with  
**DIABETES**



(Adults 20-79 years); Source: IDF Diabetes Atlas Sixth Edition 2014



# Top 10 countries/territories for prevalence (20-79 years) 2013 and 2035

**Table 2.1** Top 10 countries/territories for prevalence\* (%) of diabetes (20-79 years), 2013 and 2035

<b>COUNTRY/ TERRITORY</b>	<b>2013 (%)</b>	<b>COUNTRY/ TERRITORY</b>	<b>2035 (%)</b>
Tokelau	37.5	Tokelau	37.9
Federated States of Micronesia	35.0	Federated States of Micronesia	35.1
Marshall Islands	34.9	Marshall Islands	35.0
Kiribati	28.8	Kiribati	28.9
Cook Islands	25.7	Cook Islands	25.7
Vanuatu	24.0	Saudi Arabia	24.5
Saudi Arabia	24.0	Vanuatu	24.2
Nauru	23.3	Nauru	23.3
Kuwait	23.1	Kuwait	23.2
Qatar	22.9	Qatar	22.8

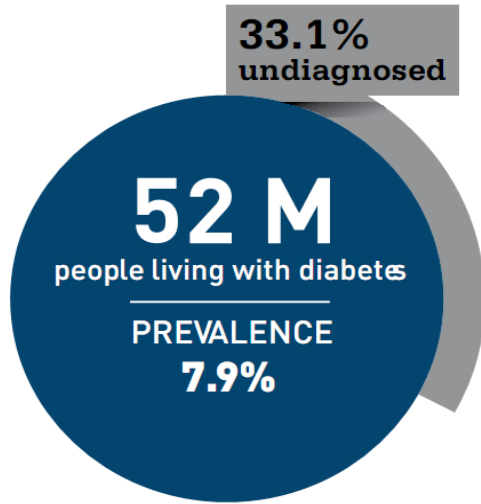
\*comparative prevalence

**Romania – PREDATORR 2013: 11,6%**

(Adults 20-79 years); Source: IDF Diabetes Atlas Sixth Edition 2014

Maria Mota, Simona Popa, E.Mota , PREDATORR study Group. Prevalence of Diabetes Mellitus and Prediabetes in the Adult Romanian Population: PREDATORR Study. Journal of diabetes. 2015 in press (available at <http://onlinelibrary.wiley.com/doi/10.1111/1753-0407.12297/abstract>)

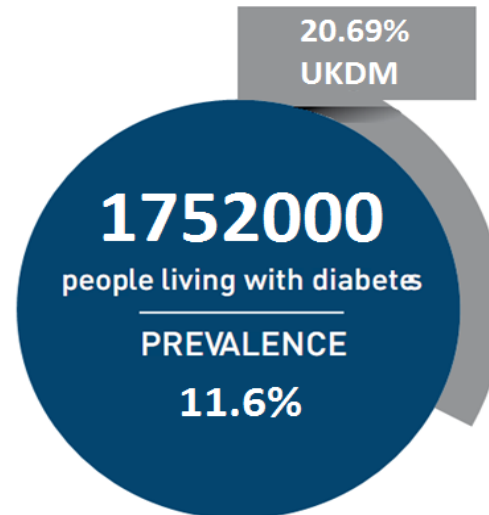
# EUROPE at a glance



Diabetes in Europe (20-79 years)	2014	2035
Total population (millions)	910	928
Adult population (millions)	660.6	668.7
Number of people with diabetes (millions)	52	68.9
Regional prevalence (%)	7.9	10.3
Comparative prevalence (%)	6.2	7.1
Undiagnosed cases (millions)	17.2	-
Total diabetes-related deaths (thousands)	537	-
Deaths under the age of 60 (%)	23.1	-
Total diabetes-related health expenditure (USD billions)	144.3	158.6

Source: IDF Diabetes Atlas Sixth Edition 2014

## Romania at glance PREDATORR 2013 ...

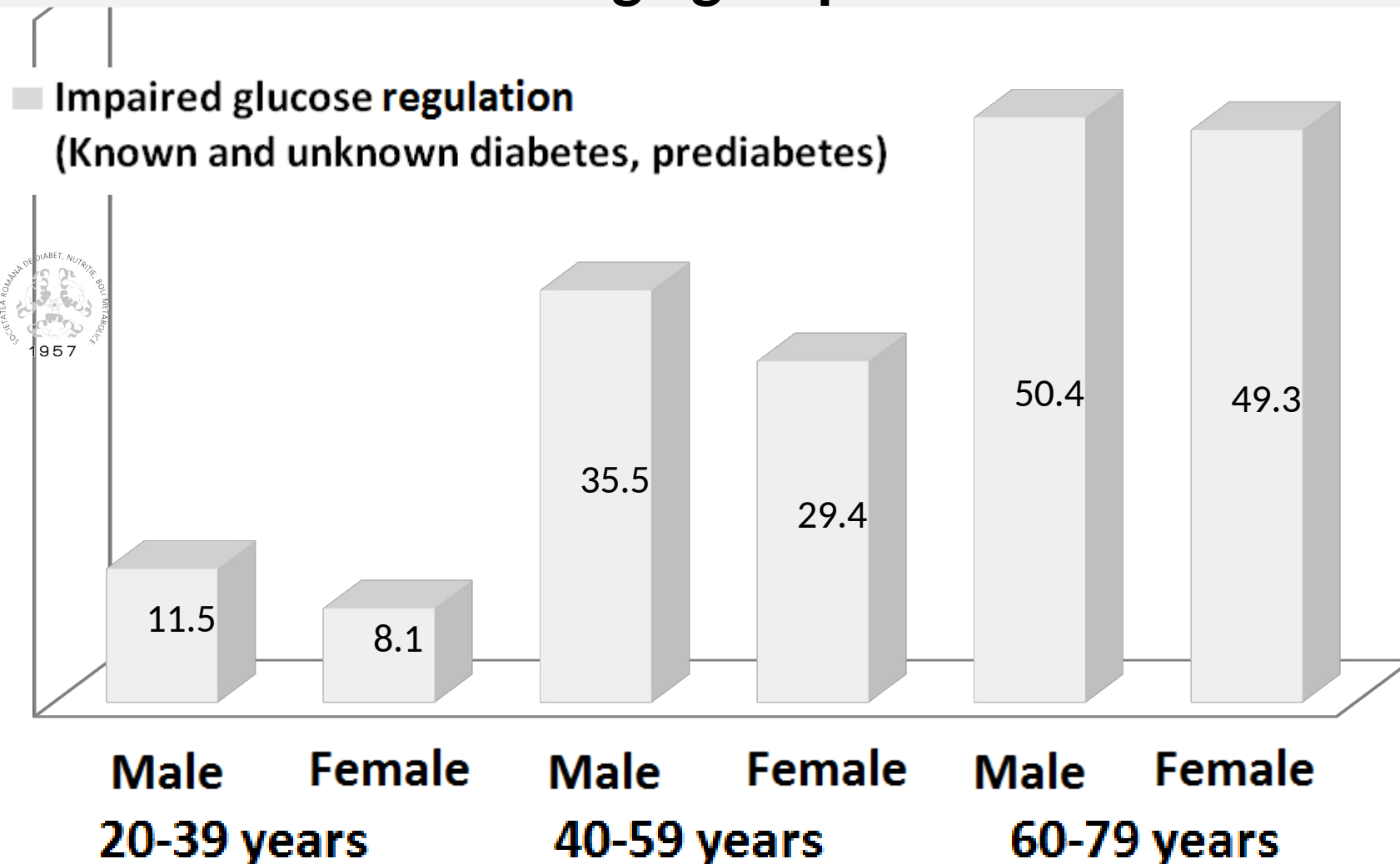


(Adults 20-79 years); Source: IDF Diabetes Atlas Sixth Edition 2014

Maria Mota, Simona Popa, E.Mota, PREDATORR study Group. Prevalence of Diabetes Mellitus and Prediabetes in the Adult Romanian Population: PREDATORR Study. Journal of diabetes. 2015 in press (available at <http://onlinelibrary.wiley.com/doi/10.1111/1753-0407.12297/abstract>)

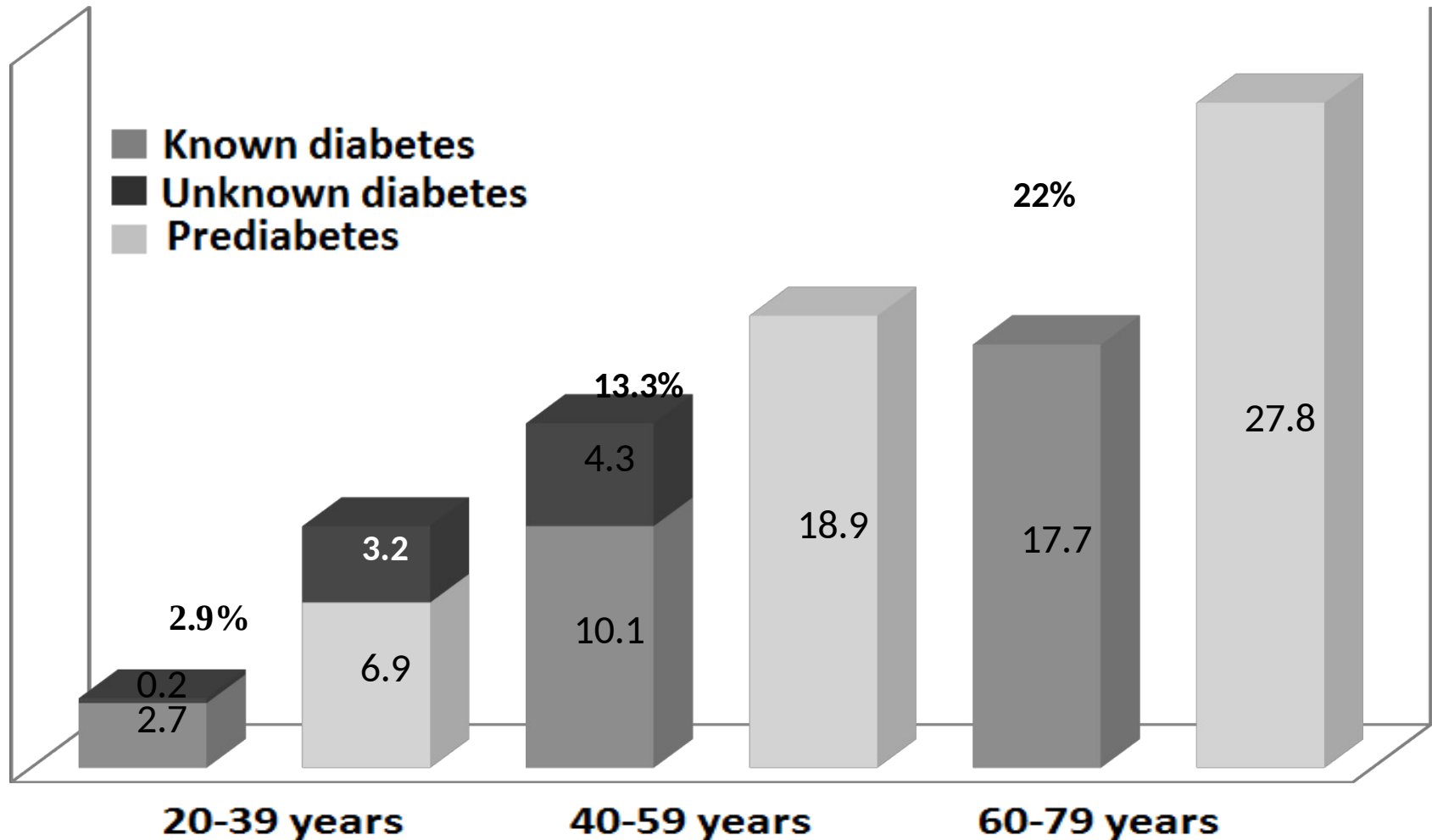
# ROMANIA at a glance - PREDATORR 2013

## Prevalence of impaired glucose regulation by sex and age groups



# ROMANIA at a glance - PREDATORR 2013

## Prevalence of DIABETES and PREDIABETES by age groups

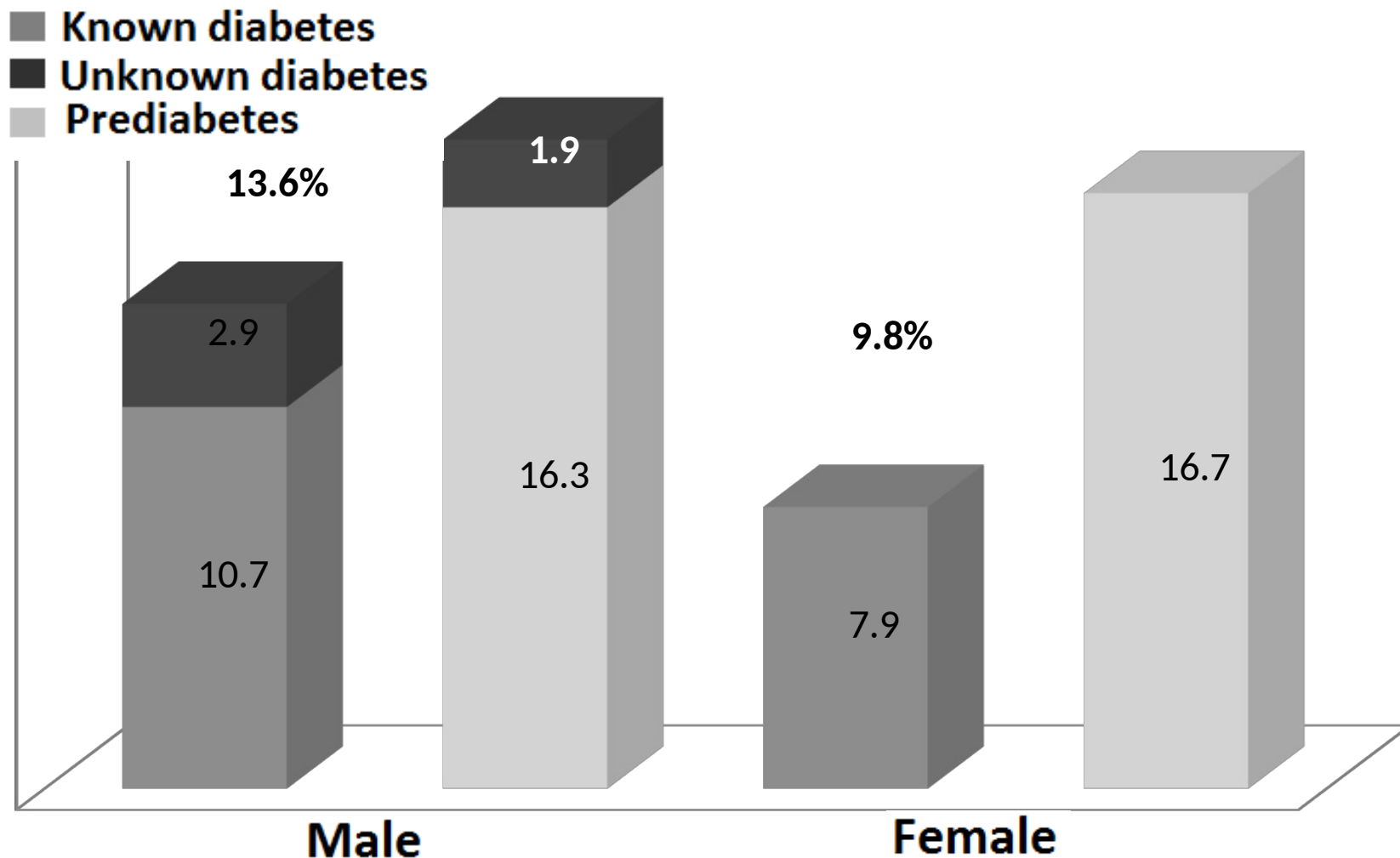


(Adults 20-79 years); Source: IDF Diabetes Atlas Sixth Edition 2014

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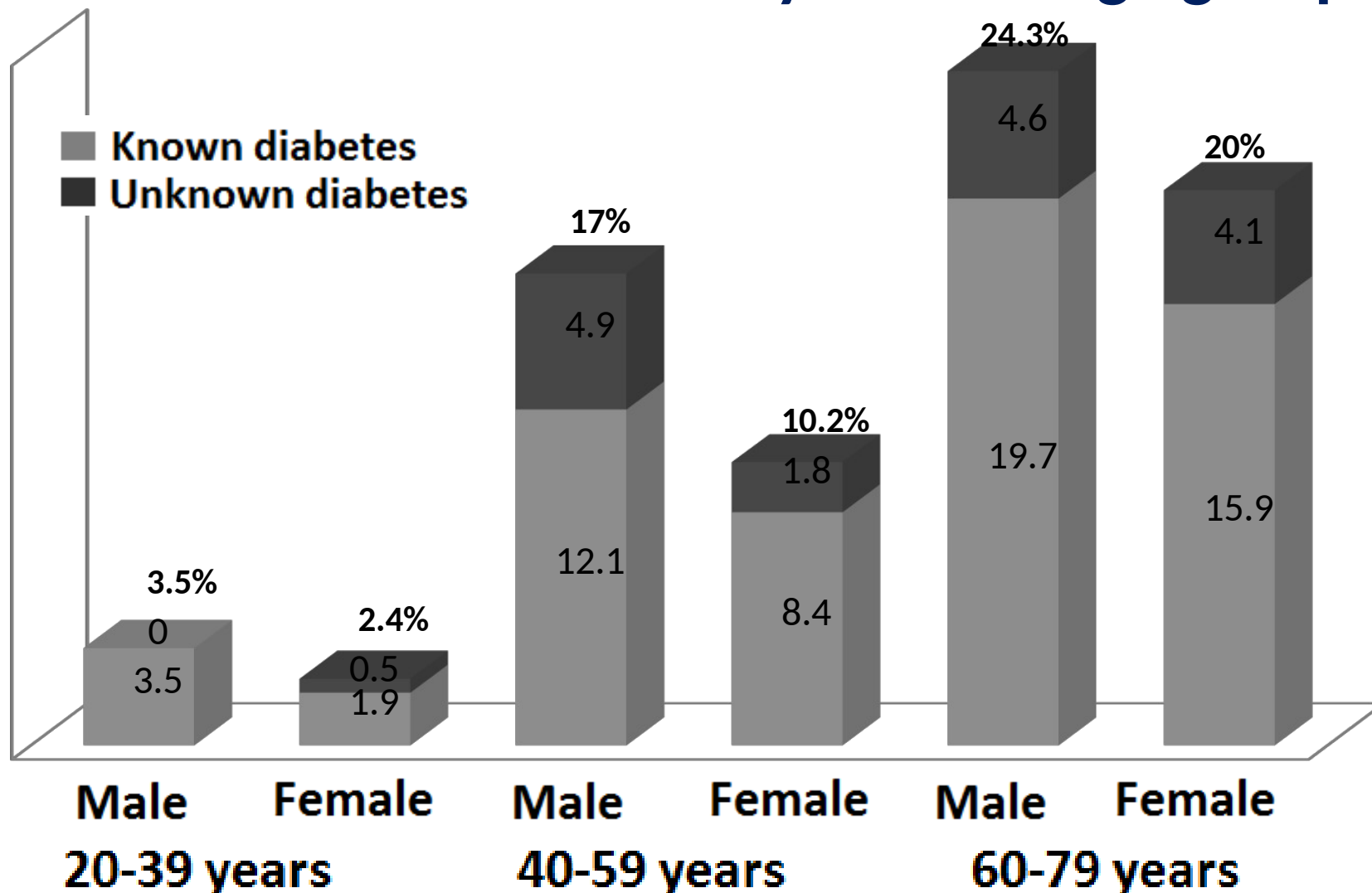
# ROMANIA at a glance - PREDATORR 2013

## Prevalence of DIABETES and PREDIABETES by sex



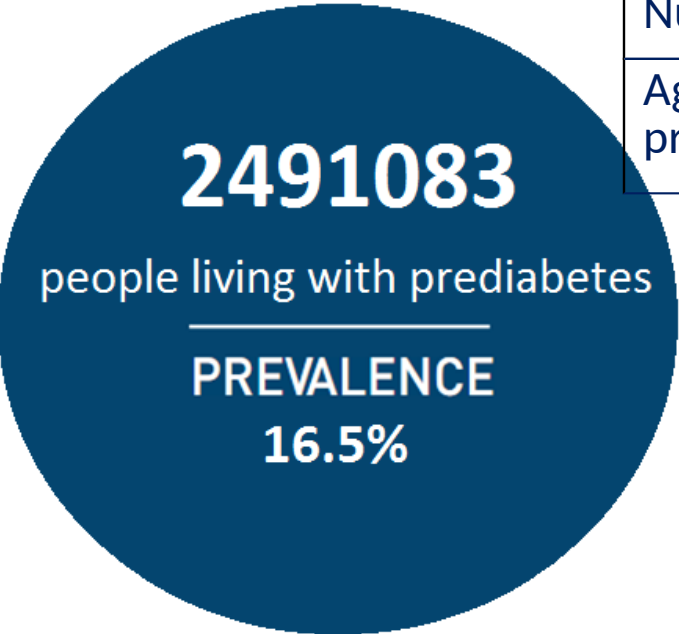
# ROMANIA at a glance - PREDATORR 2013

## Prevalence of DIABETES by sex and age groups



# ROMANIA at a glance - PREDATORR 2013

## PREDIABETES



Prediabetes in Romania (20-79 years)	
Adult Romanian (20-79 years)	15097473
Number of people with prediabetes	2491083
Age- and sex-adjusted prevalence of prediabetes	16.5%

# Prediabetes worldwide ...

Study population	Prediabetes prevalence	Observations
US; $\geq 20$ years	37%	Prediabetes
Portuguese; 20-79 years	27%	IFG and/or IGT
Spanish; $\geq 18$ years	14.8%	IFG and/or IGT
European; 20-79 years	9.2%	IGT
<b>Romanian; 20-79 years</b>	<b>16.5%</b>	<b>Prediabetes</b>

Source: 2009–2012 National Health and Nutrition Examination Survey estimates applied to 2012 U.S. Census data

Gardete-Correia L et al. First diabetes prevalence study in Portugal: PREVADIAB study. *Diabet Med.* 2010; 27: 879–81

Soriguer F et al. Prevalence of diabetes mellitus and impaired glucose regulation in Spain: The Di@bet.es Study. *Diabetologia.* 2012; 55:88–93.

IDF Diabetes Atlas Sixth Edition 2013

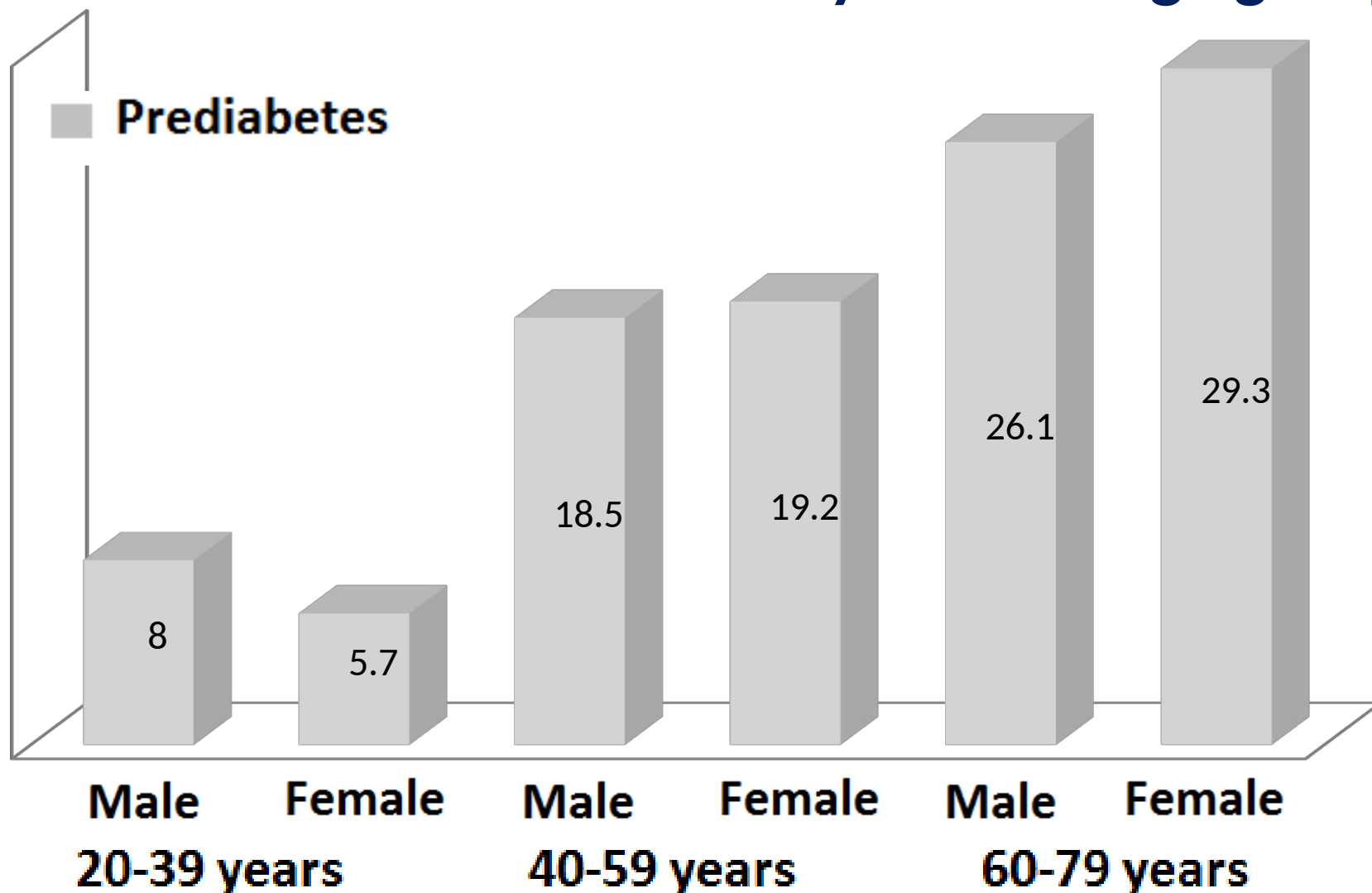
Maria Mota, Simona Popa, E.Mota , PREDATORR study Group. Prevalence of Diabetes Mellitus and Prediabetes in the Adult Romanian Population:

PREDATORR Study. *Journal of diabetes.* 2015 in press (available at <http://onlinelibrary.wiley.com/doi/10.1111/1753-0407.12297/abstract>)

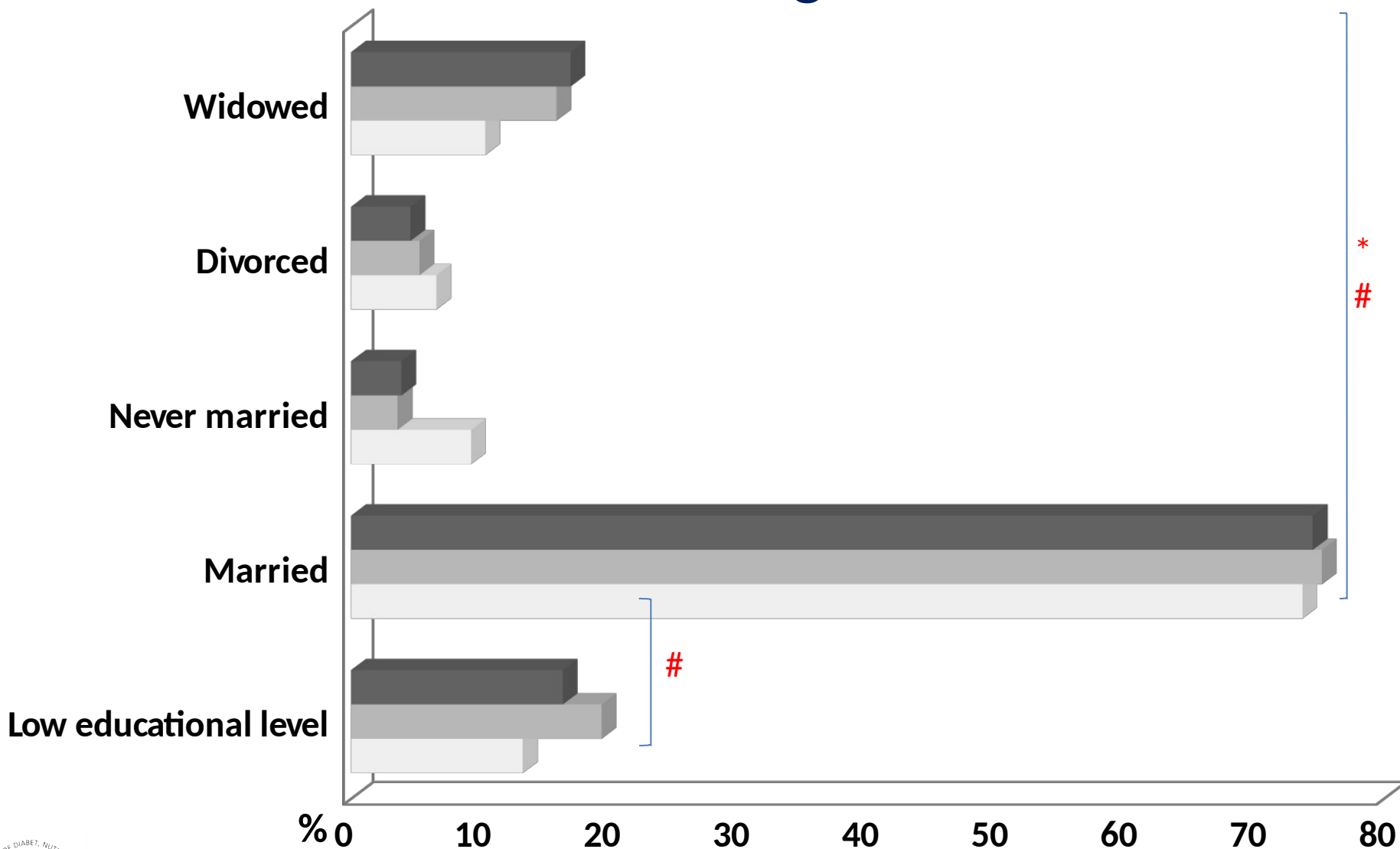


# ROMANIA at a glance - PREDATORR 2013

## Prevalence of PREDIABETES by sex and age groups



# Socio-demographic factors in impaired glucose metabolism regulation

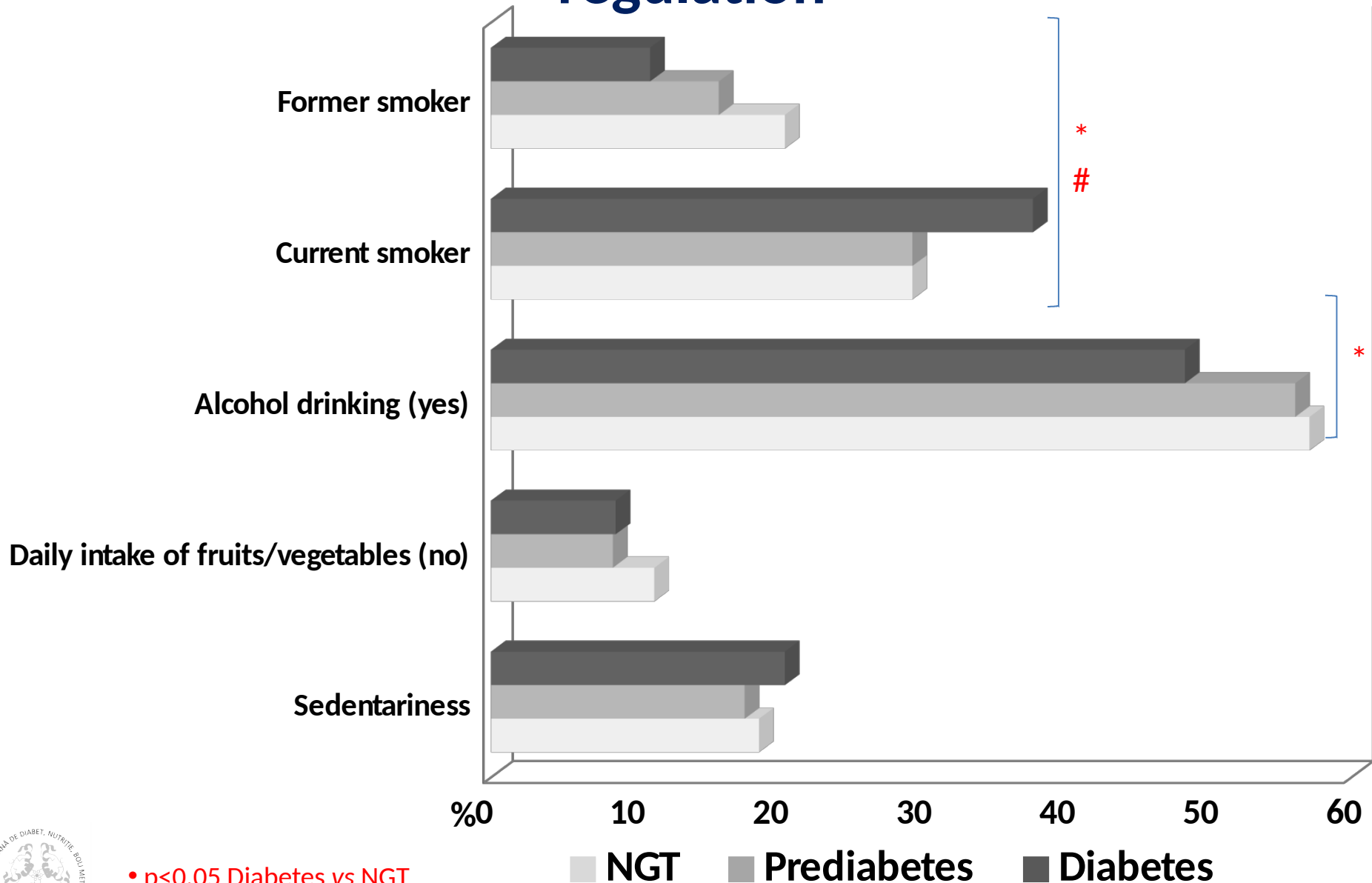


p < 0.05 Diabetes vs NGT  
 # p < 0.05 Prediabetes vs NGT

■ NGT    ■ Prediabetes    ■ Diabetes



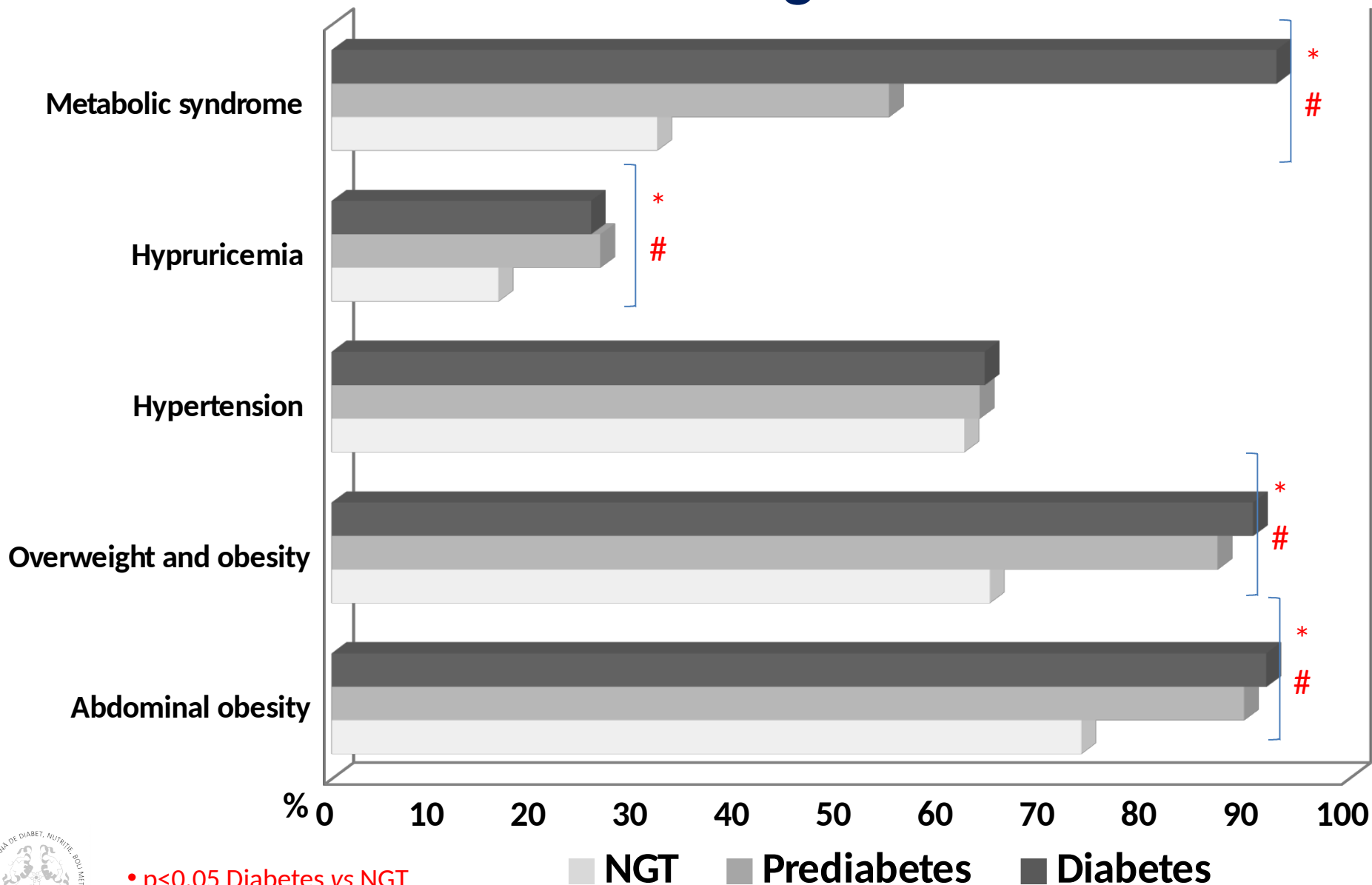
# Lifestyle factors in impaired glucose metabolism regulation



•  $p < 0.05$  Diabetes vs NGT

#  $p < 0.05$  Prediabetes vs NGT

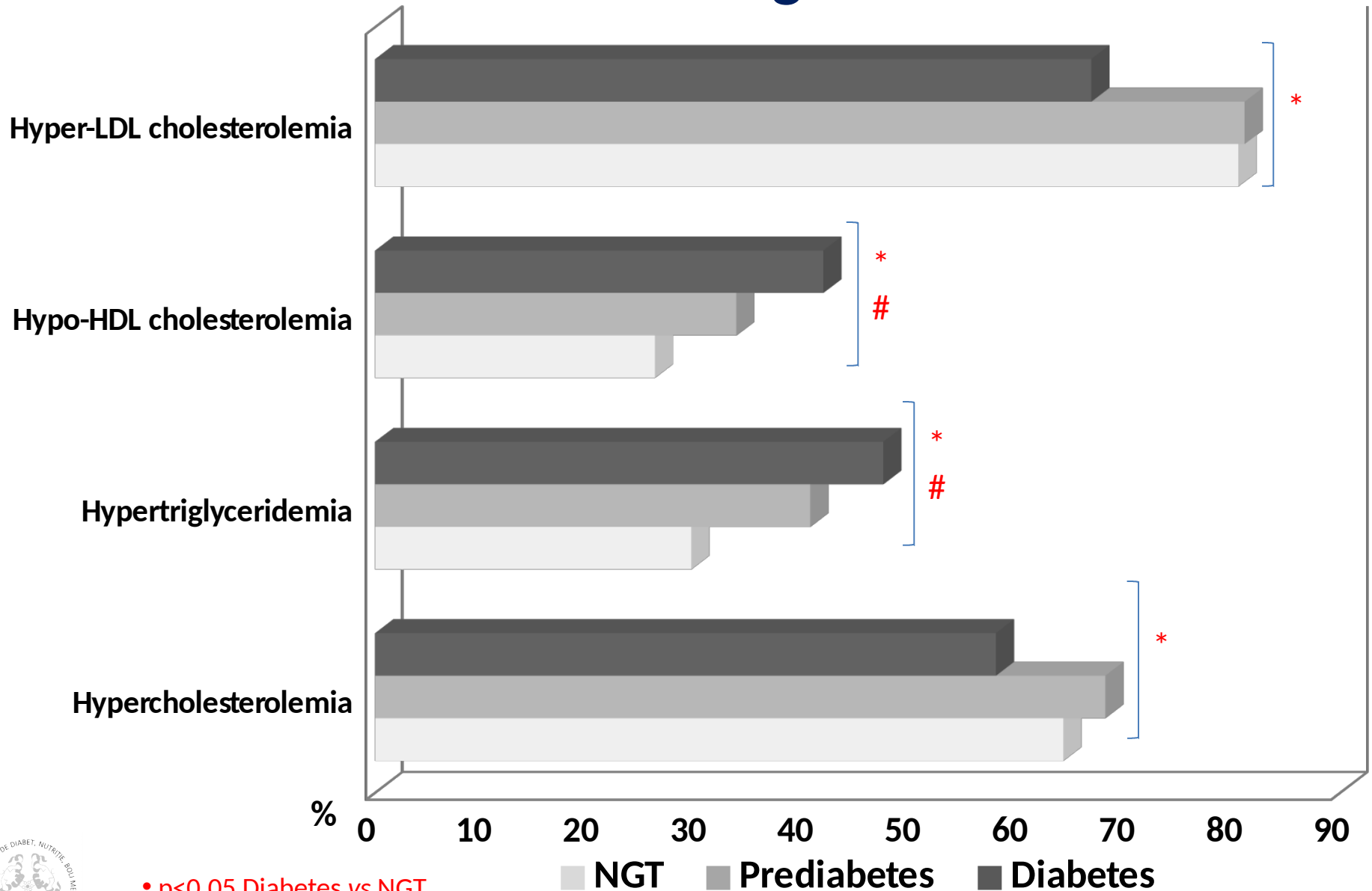
# Cardio-metabolic disorders in impaired glucose metabolism regulation



•  $p < 0.05$  Diabetes vs NGT  
 #  $p < 0.05$  Prediabetes vs NGT

■ NGT   ■ Prediabetes   ■ Diabetes

# Cardio-metabolic disorders in impaired glucose metabolism regulation



•  $p < 0.05$  Diabetes vs NGT

#  $p < 0.05$  Prediabetes vs NGT

# Predictive factors of diabetes and prediabetes

## (multivariate logistic regression)

Variable	Prediabetes OR (95% CI)	Known diabetes OR (95% CI)	Unknown diabetes OR (95% CI)
Men	1.0 (0.8 - 1.3)	<b>1.5 (1.1 - 2.1)<sup>a</sup></b>	1.7 (0.9 - 3.1)
Age	1.0 (0.9 - 1.0)	1.0 (0.9 - 1.0)	0.6 (0.3 - 1.1)
Smoking status	Current smoker	0.8 (0.6 - 1.0)	1.0 (0.5 - 1.8)
	Former smoker	0.8 (0.6 - 1.1)	<b>1.1 (0.5 - 2.2)</b>
Sedentariness	Widowed	1.1 (0.9 - 1.5)	1.1 (0.6 - 2.1)
	Divorced	1.1 (0.8 - 1.6)	<b>1.2 (0.5 - 2.8)</b>
Marital status	Single	0.7 (0.4 - 1.1)	1.7 (0.7 - 4.2)
		<b>0.5 (0.3 - 0.9)<sup>a</sup></b>	1.0 (0.4 - 2.9)
Low education level	<b>1.7 (1.2 - 2.3)<sup>b</sup></b>	1.1 (0.8 - 1.7)	1.5 (0.7 - 3.1)
Family history of diabetes, (yes)	0.8 (0.6 - 1.1)	<b>3.3 (2.5 - 4.4)<sup>c</sup></b>	<b>1.8 (1.1 - 3.1)<sup>a</sup></b>

Normal glucose tolerance was considered the reference category. <sup>a</sup>p <0.05; <sup>b</sup>p <0.01; <sup>c</sup>p <0.001.

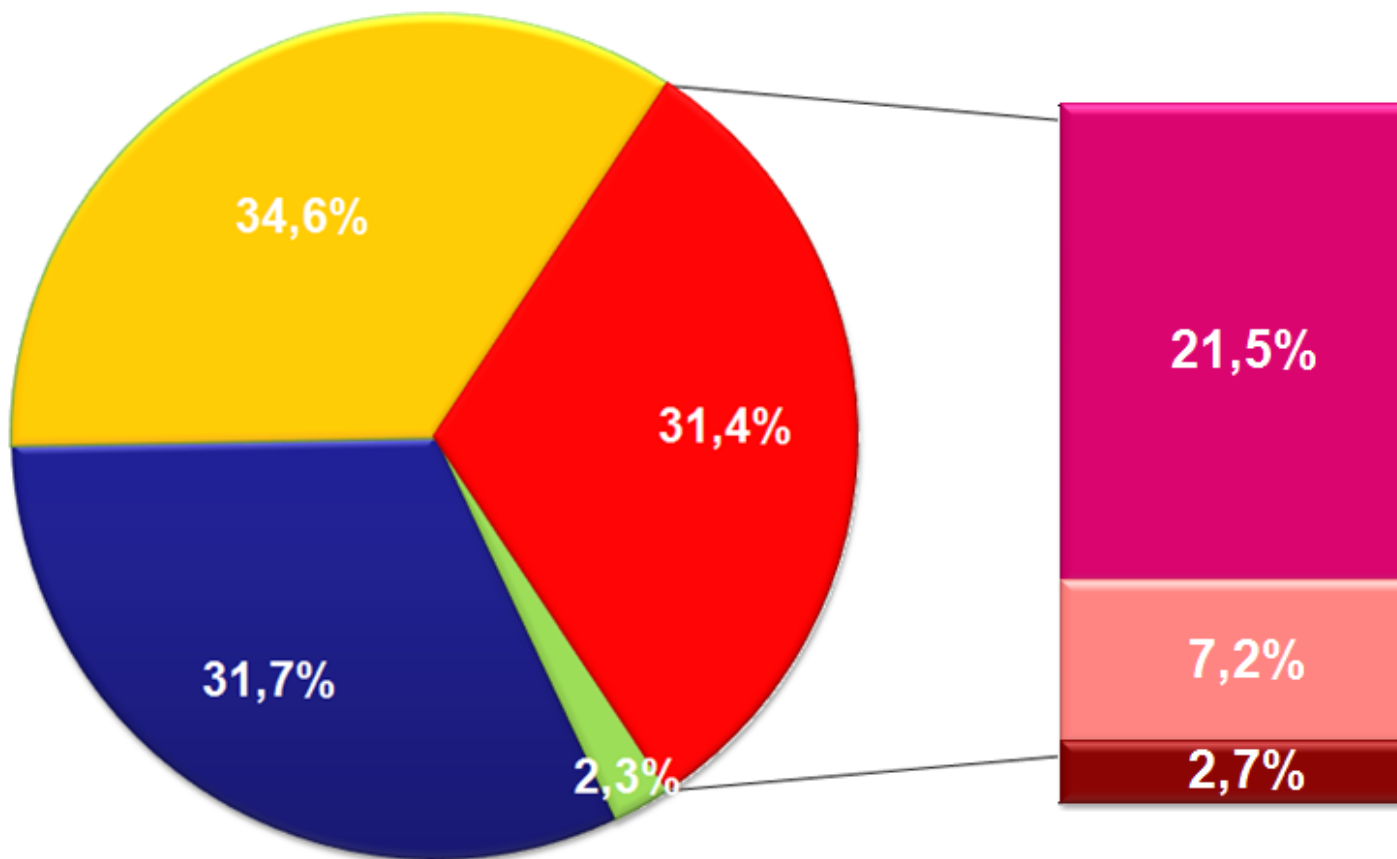
# Predictive factors of diabetes and prediabetes (multivariate logistic regression)

Variable		Prediabetes OR (95% CI)	Known diabetes OR (95% CI)	Unknown diabetes OR (95% CI)
BMI (kg/m <sup>2</sup> )	25-29.99	2.3 (1.6 - 3.2) <sup>c</sup>	2.9 (1.8 - 4.7) <sup>c</sup>	3.9 (1.3 - 11.5) <sup>a</sup>
	≥30	3.1 (2.2 - 4.3) <sup>c</sup>	4.8 (3.0 - 7.7) <sup>c</sup>	8.0 (2.8 - 23.4) <sup>c</sup>
Abdominal obesity		1.4 (1.1 - 1.8) <sup>a</sup>	2.4 (1.6 - 3.6) <sup>c</sup>	4.4 (1.6 - 12.0) <sup>b</sup>
Hypertension		1.4 (0.9 - 1.8)	1.3 (0.9 - 1.8)	1.1 (0.6 - 2.1)
Hyper-LDL cholesterolemia		1.3 (0.9 - 1.7)	0.4 (0.3 - 0.5) <sup>c</sup>	0.5 (0.3 - 0.8)
Hypertriglyceridemia		1.3 (1.0 - 1.6)	1.7 (1.2 - 2.3) <sup>b</sup>	1.5 (0.9 - 2.6)
Hypo-HDL cholesterolemia		1.0 (0.8 - 1.3)	0.9 (0.7 - 1.3)	0.9 (0.5 - 1.6)

Normal glucose tolerance was considered the reference category. <sup>a</sup>p <0.05; <sup>b</sup>p <0.01; <sup>c</sup>p <0.001.

# Prevalence of Obesity / Overweight 2013

Population 20-79 Years (Adjusted to Population Distribution — Census)



Underweight

Normal Weight

Overweight

Obesity class I

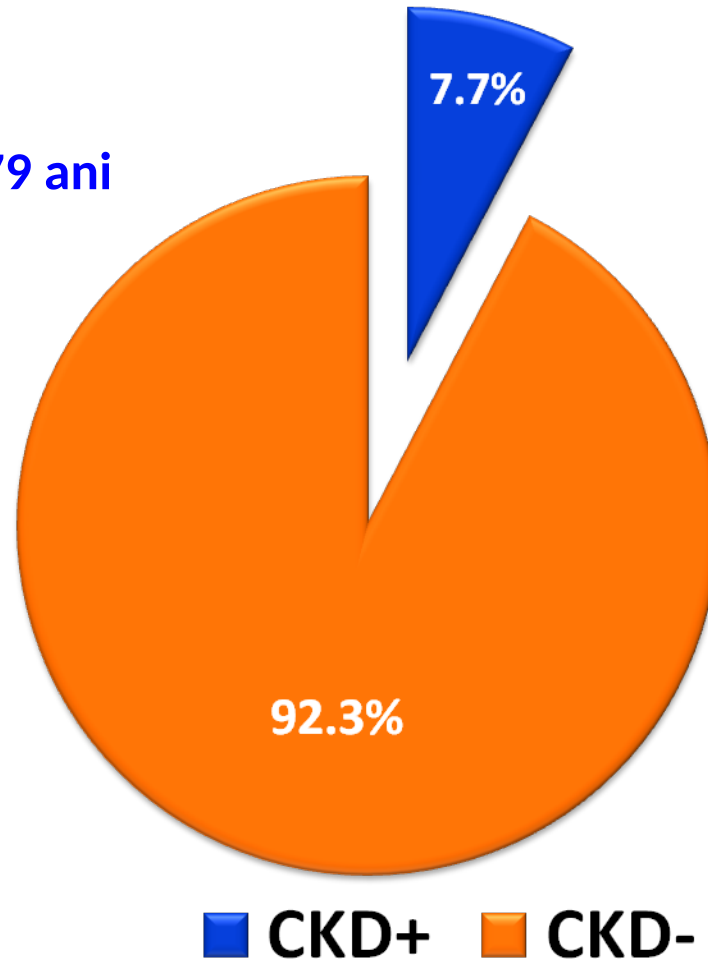
Obesity class II

Obesity class III



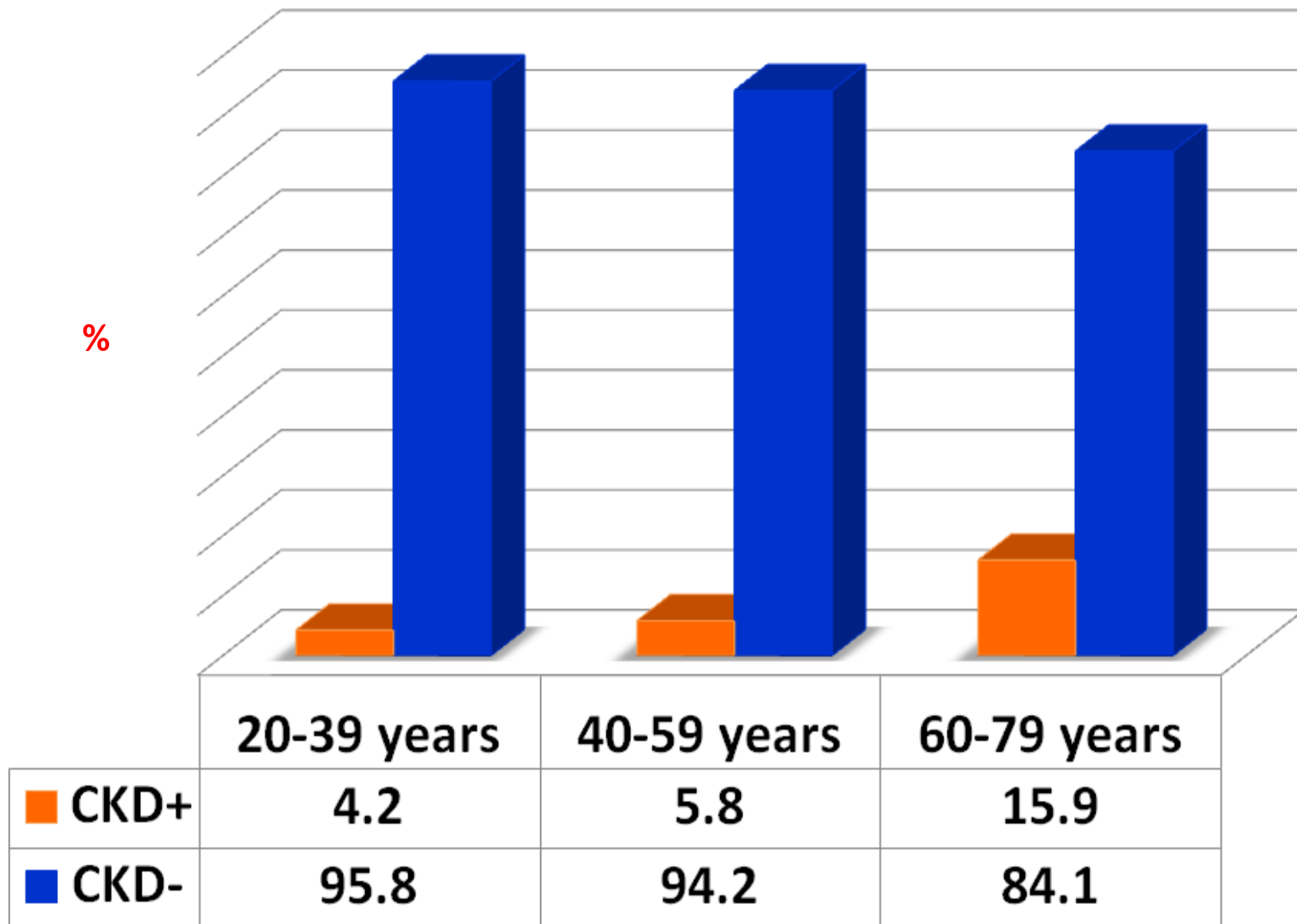
# Prevalence of CKD (eGFR: MDRD) in Romania – 2013 (Adjusted to population distribution – Census)

1.162.505 adulti 20-79 ani



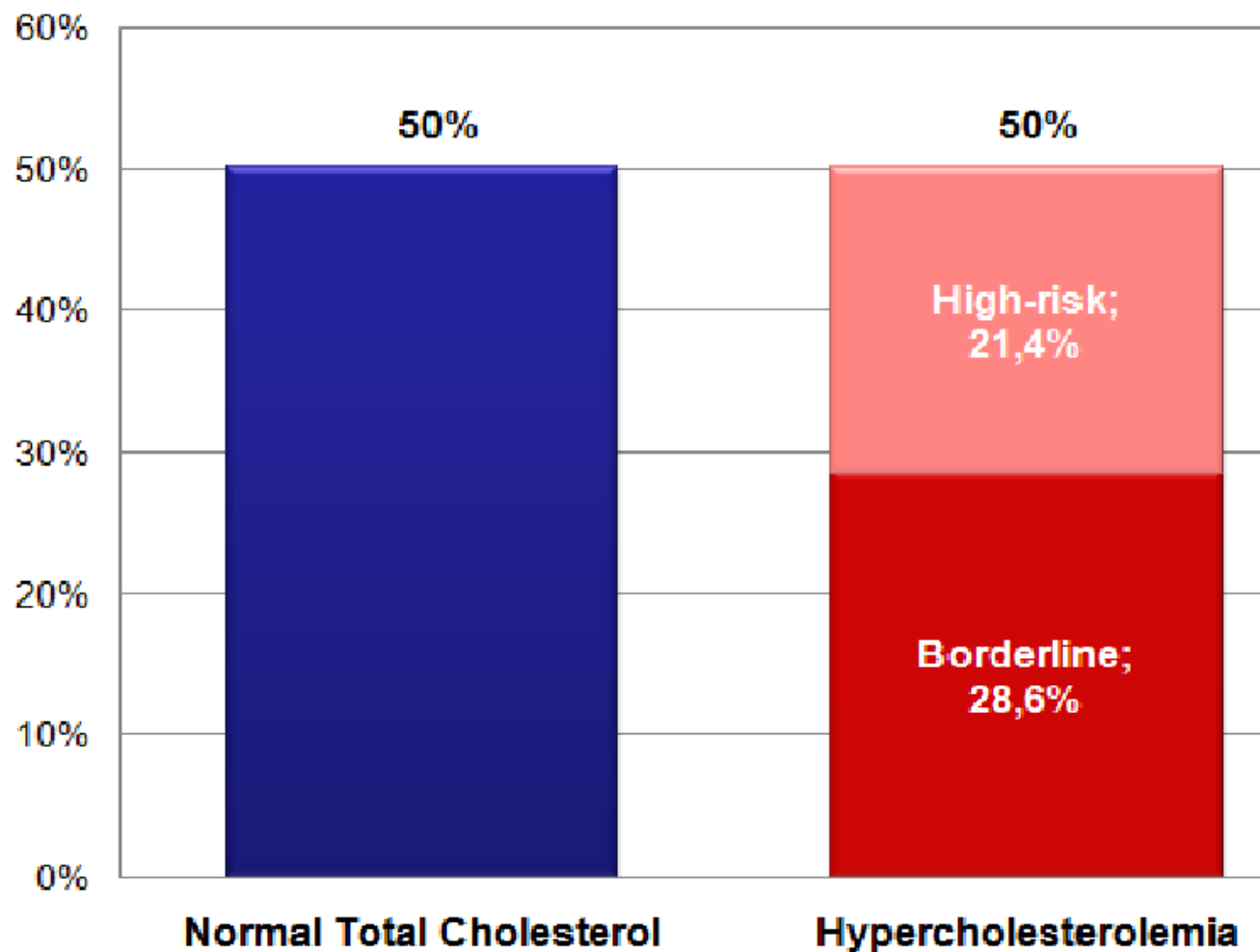
CKD+: eGFR (MDRD) < 60 ml/min/1,73m<sup>2</sup> and/or ACR ≥ 30 mg/g  
CKD-: eGFR (MDRD) ≥ 60 ml/min/1,73m<sup>2</sup> and ACR < 30 mg/g

# Prevalence of CKD (eGFR: MDRD) in Romania by age groups - 2013 (Adjusted to population distribution - Census)



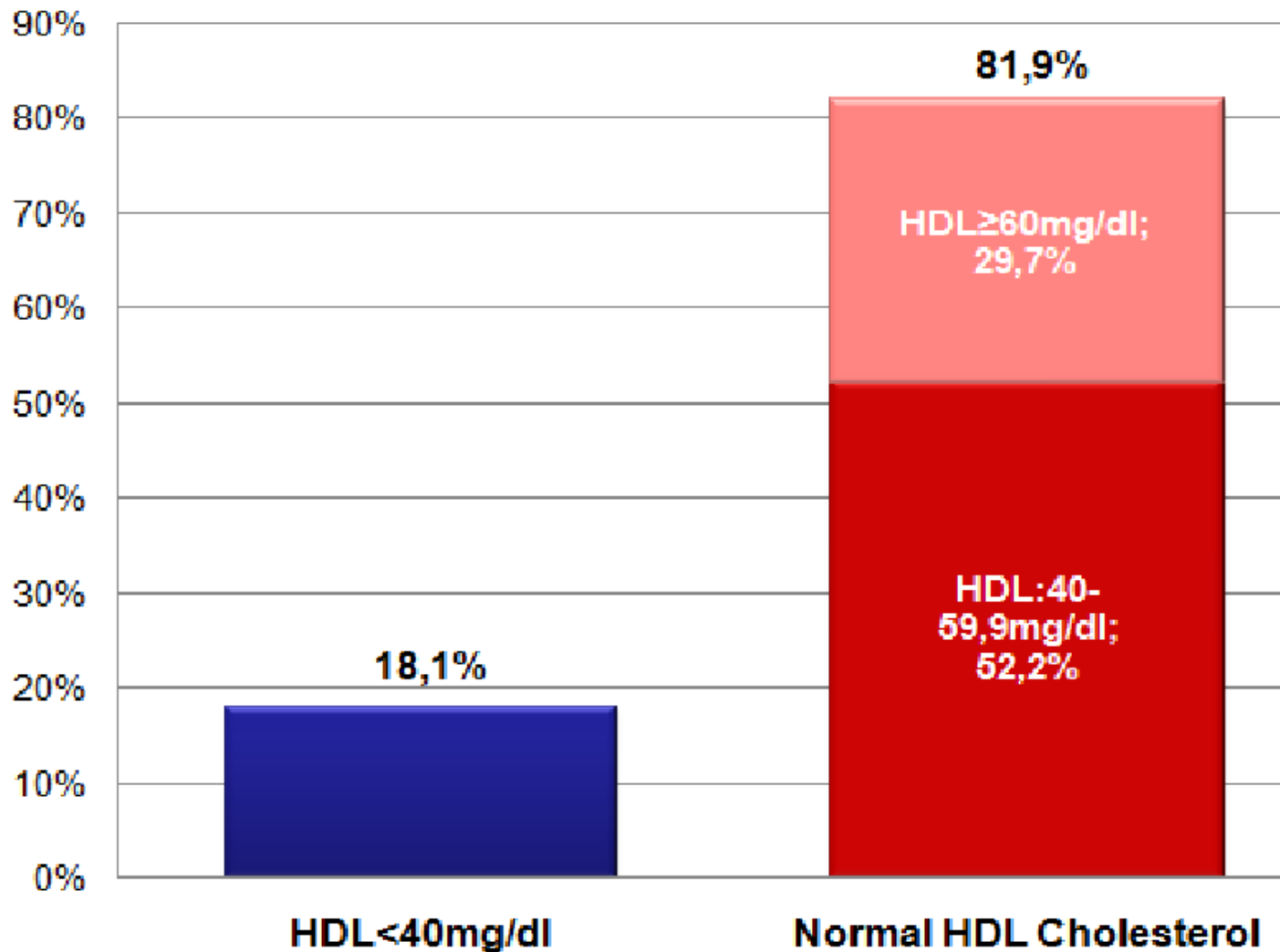
# Prevalence of Hypercholesterolemia - 2014

Population 20-79 Years (Adjusted to Population Distribution — Census)



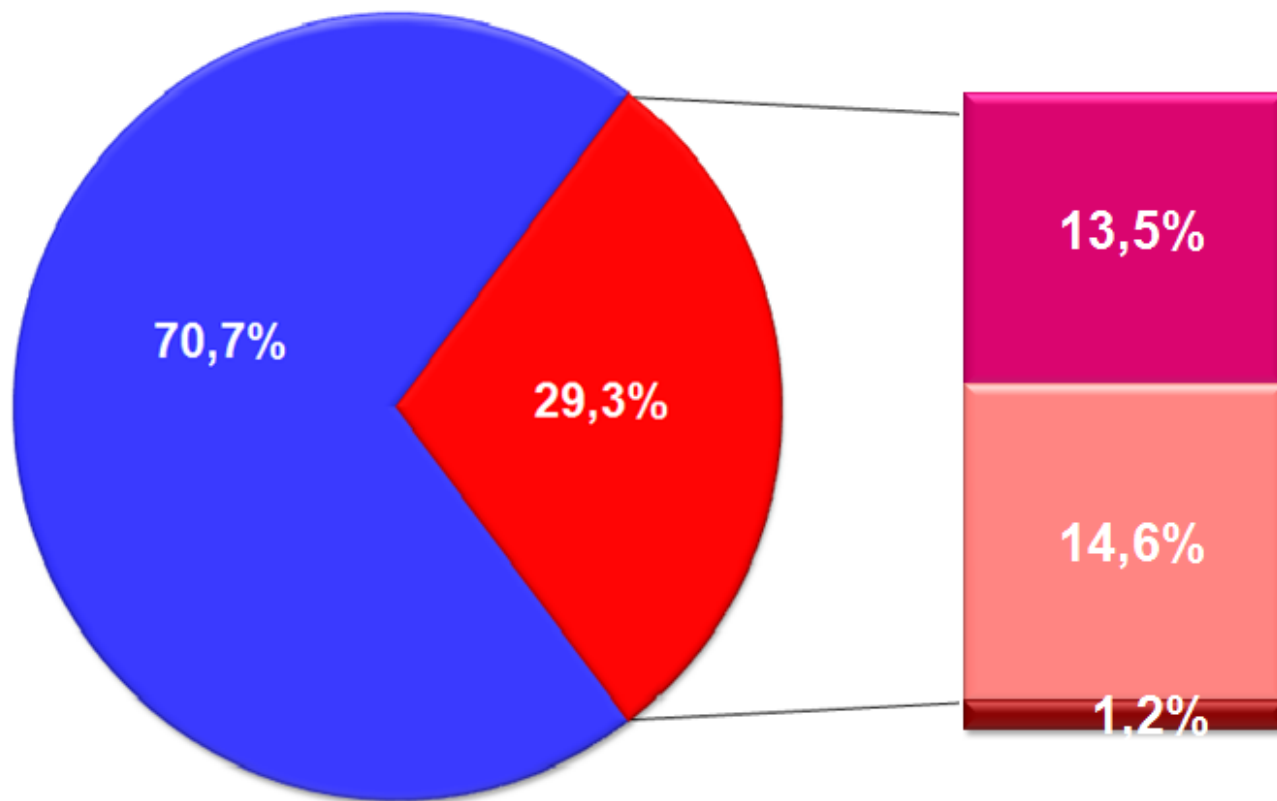
# Prevalence of Low HDL Cholesterol- 2014

Population 20-79 Years (Adjusted to Population Distribution — Census)



## Prevalence of Hypertriglyceridemia - 2014

Population 20-79 Years (Adjusted to Population Distribution — Census)



■ Normal

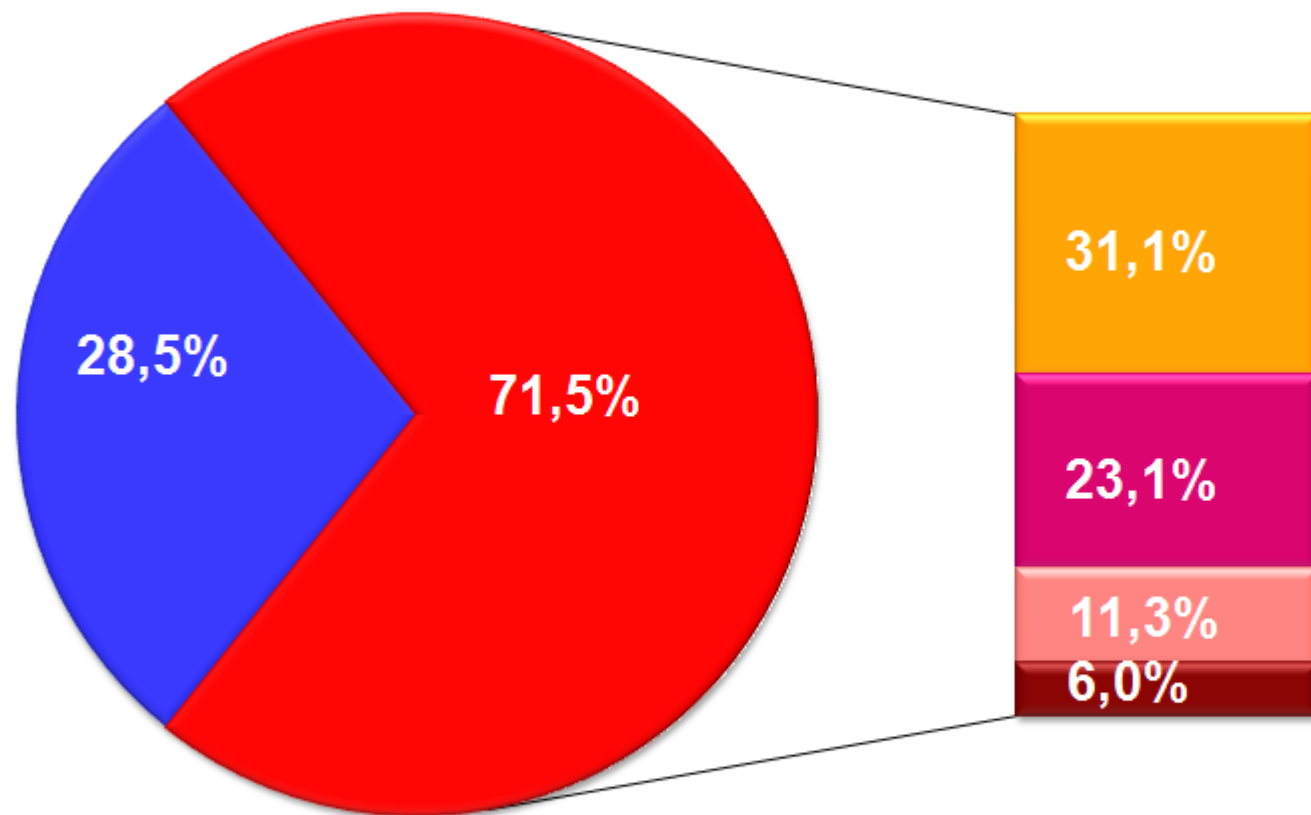
■ Borderline-high

■ High

■ Very high

## Prevalence of High LDL Cholesterol - 2014

Population 20-79 Years (Adjusted to Population Distribution — Census)



■ Normal LDL (<100mg/dl)

■ LDL: 100-129,99mg/dl

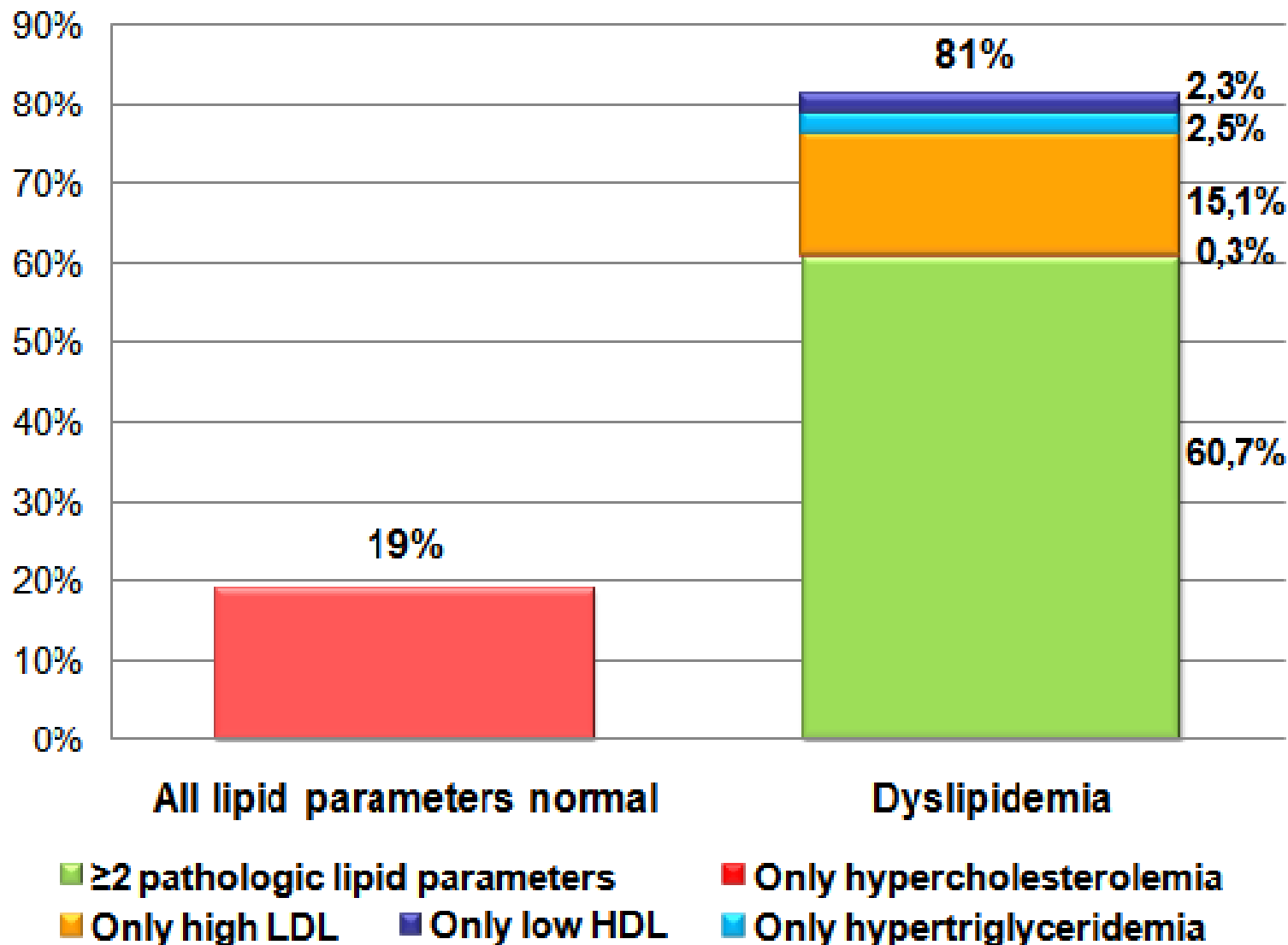
■ LDL: 130-159,99mg/dl

■ LDL: 160-189,99mg/dl

■ LDL ≥190mg/dl

# Prevalence of Dyslipidemia - 2014

(Adjusted to Population Distribution — Census)



# Harmonizing the MetS: IDF Task Force on Epidemiology and Prevention; NHLB; AHA; WHF; IAS; IASO -2009

Measure	Categorical Cut Points
Elevated <b>waist circumference</b> *	Population- and country-specific definitions (Europid: Men $\geq 94$ cm, Women $\geq 80$ cm)
Elevated <b>triglycerides</b> (or drug treatment for elevated triglycerides <sup>†</sup> )	$\geq 150$ mg/dL (1.7 mmol/L)
Reduced <b>HDL-C</b> (or drug treatment for reduced HDL-C <sup>†</sup> )	$< 40$ mg/dL (1.0 mmol/L) in males; $< 50$ mg/dL (1.3 mmol/L) in females
Elevated <b>blood pressure</b> (or antihypertensive drug treatment in a patient with a history of hypertension)	Systolic $\geq 130$ and/or diastolic $\geq 85$ mm Hg
Elevated <b>fasting glucose</b> <sup>‡</sup> (or drug treatment of elevated glucose)	$\geq 100$ mg/dL

\*It is recommended that the IDF or AHA/NHLBI cut points used for people of European origin until more data are available.

<sup>†</sup>The most commonly used drugs for elevated triglycerides and reduced HDL-C are fibrates and nicotinic acid. A patient taking 1 of these drugs can be presumed to have high triglycerides and low HDL-C. High-dose  $\omega$ -3 fatty acids presumes high triglycerides.

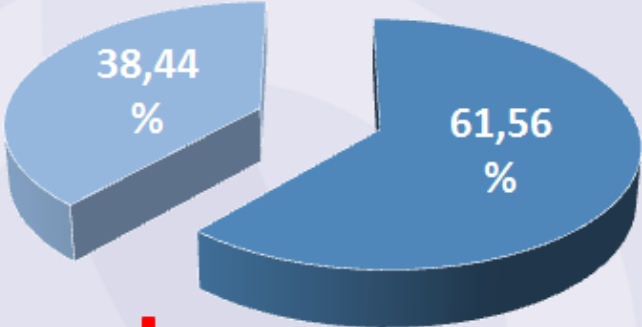
<sup>‡</sup>Most patients with type 2 diabetes mellitus will have the metabolic syndrome by the proposed criteria.

**The presence of any 3 of 5 risk factors constitutes a diagnosis of MetS**



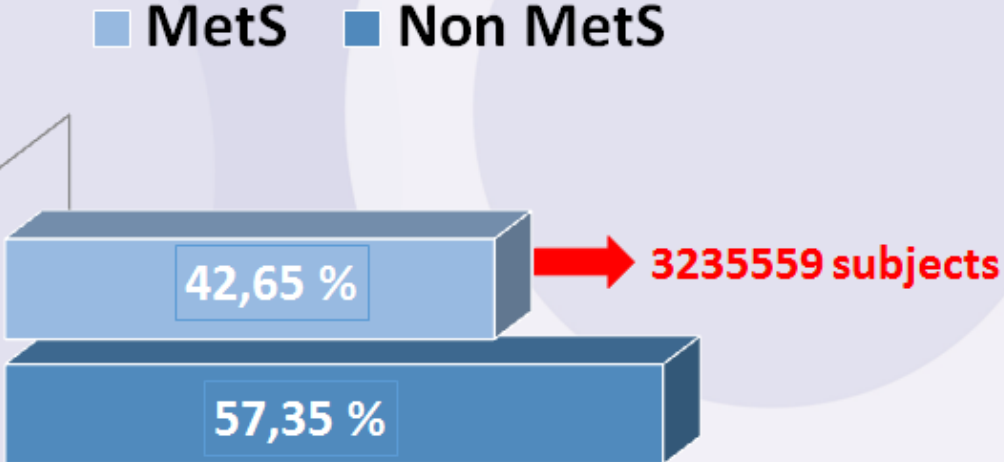
# PREVALENCE OF METABOLIC SYNDROME IN ROMANIA – ADULT POPULATION (20-79 years)

weighted data

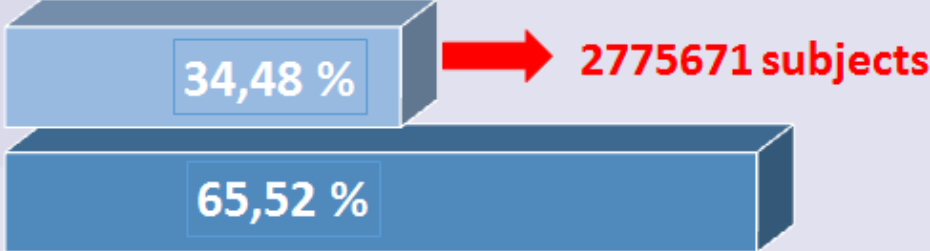


6011230 subjects

MALE



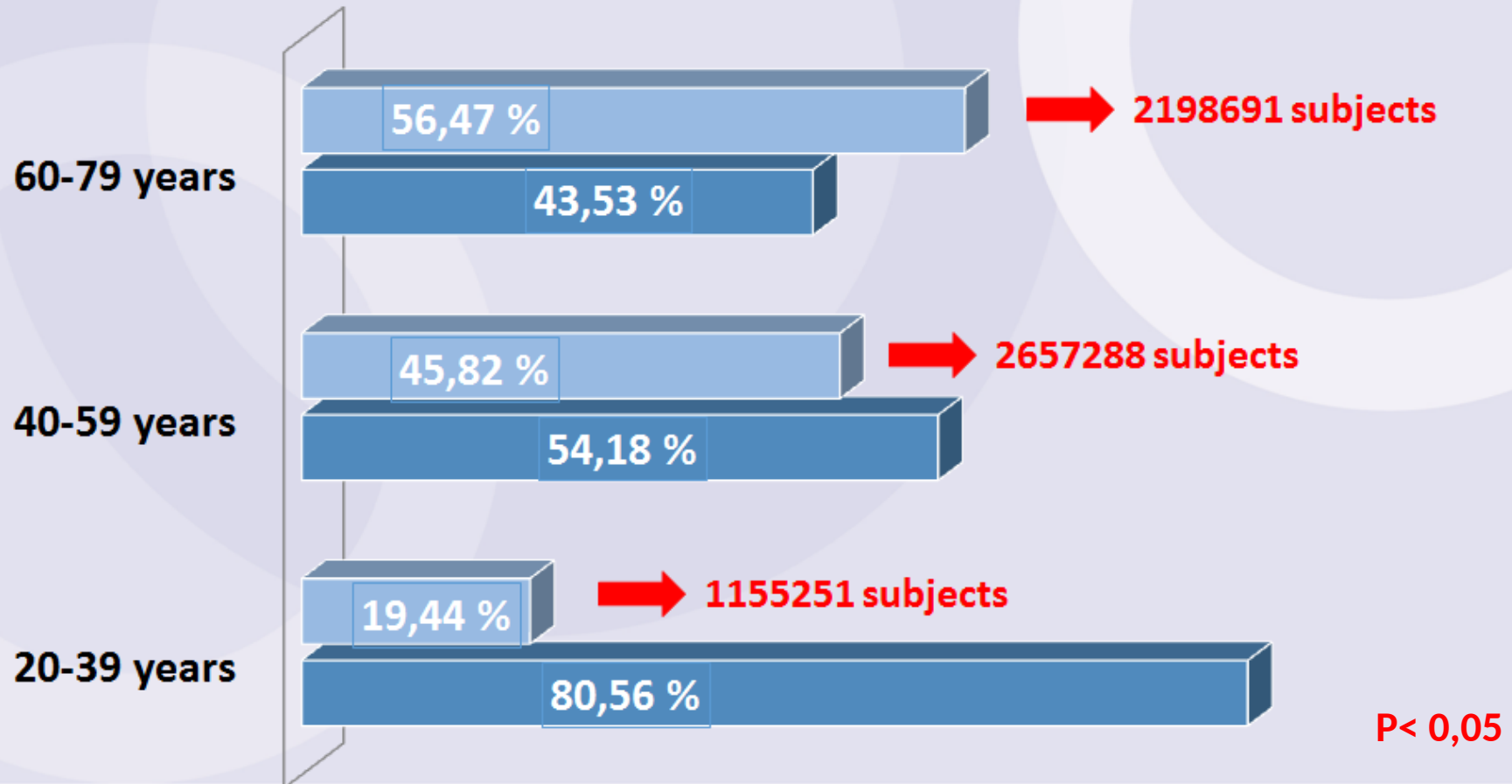
FEMALE



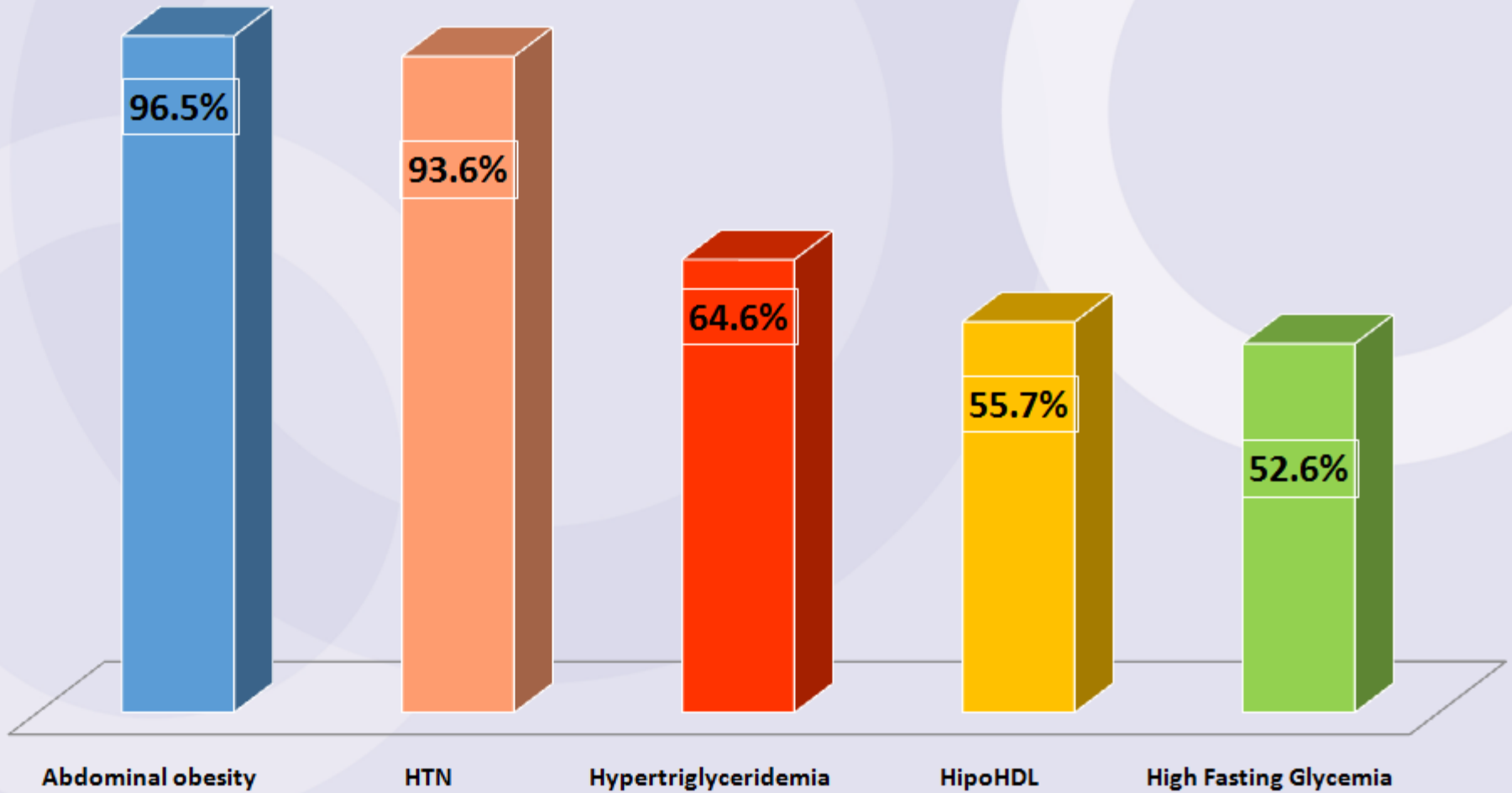
P < 0,05

# METABOLIC SYNDROME PREVALENCE BY AGE GROUPS IN ROMANIA – ADULT POPULATION (20-79 years)

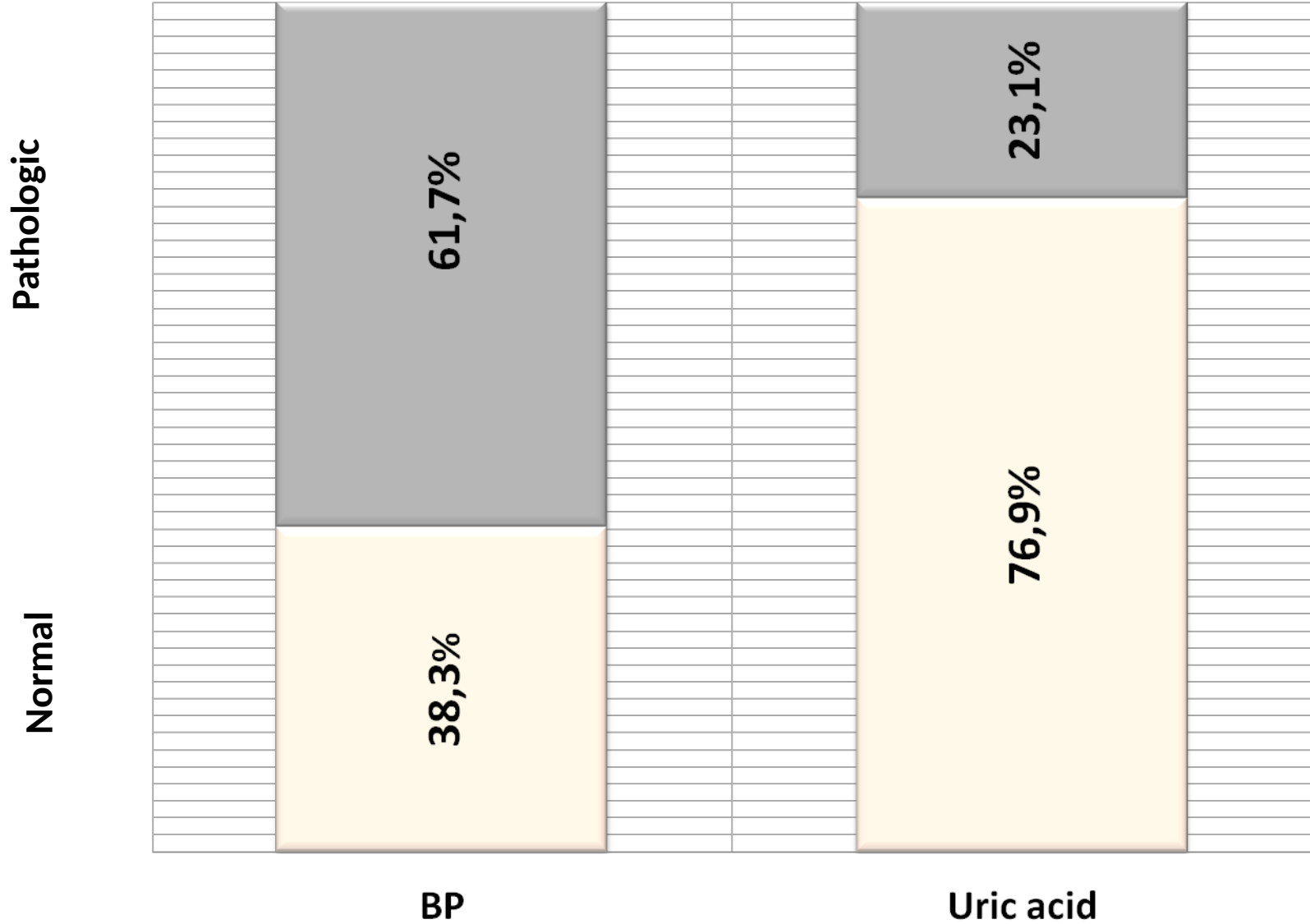
■ MetS ■ Non MetS



# METABOLIC ELEMENTS FREQUENCY



# BP and Uric acid



# Conclusions

- The PREDATORR study, for the first time, provides data for Romania on the prevalence of DM and prediabetes and their relationship with important risk factors in a representative sample of the Romanian adult population.
- The final data of the PREDATORR study indicate an increased prevalence of diabetes and prediabetes, which has doubled compared to previous estimations

# Conclusions

- The prevalence of overweight / obesity is above previous estimates, explaining, at least partially, the increased prevalence of diabetes, prediabetes, dyslipidemias, hyperuricemia, hypertension.
- These results are of high value for the health authorities and can be used to help inform decision making in order to initiate the implementation of Prevention program that may reduce the human and economic burden of DM in Romania.