

# Prevalence of Impaired Fasting Glucose in Healthy Middle-Aged Adults: Insight from the Primary cARe AuDIt of Global risk Management (PARADIGM) Study

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## BACKGROUND

- The PARADIGM study is an observational registry, the primary objective of which is to evaluate primary care physician assessment of global cardiovascular (CV) risk in healthy individuals
- In 2009/2010, primary care physician investigators from 105 sites across Canada prospectively enrolled 3015 healthy middle-aged adults in PARADIGM to assess the prevalence of CV risk factors and trends in CV risk assessment using traditional biochemical and novel inflammatory and structural biomarkers of atherosclerosis
- Impaired fasting glucose (IFG) is associated with an increased risk of type 2 diabetes, cardiovascular disease, and all-cause mortality
- We assessed the prevalence of IFG and associated clinical characteristics in healthy, middle-aged subjects in the PARADIGM study

## METHODS

- The PARADIGM study enrolled 3015 generally healthy, middle-aged patients in an observational registry
- Subjects with diabetes or vascular disease were excluded, as were subjects receiving lipid-lowering therapy
- PARADIGM represents a pure primary prevention cohort
- This analysis reports on those subjects who were found to have IFG, defined as fasting blood glucose level 100-125 mg/dl within this cohort

## Inclusion Criteria

- Men ≥40y, women ≥50y
- Absence of known high Framingham Risk Score
- Absence of type 1 or type 2 diabetes
- Absence of lipid lowering treatment (current or past)
- No previous history of atherosclerosis (angina, TIA, myocardial Infarction, stroke, peripheral arterial disease)
- Willingness to give informed consent

## PARADIGM STUDY OBJECTIVES

- To evaluate primary care physician assessment of global cardiovascular risk in healthy individuals
- To determine the prevalence of IFG and associated clinical characteristics in healthy, middle-aged subjects
- To evaluate the risk category of subjects with IFG based on the total CV Framingham Risk Score

## STUDY SETTING

- This analysis reports on 2950 PARADIGM subjects with IFG (34%) compared to those without IFG (66%)
- Subjects with a fasting blood sugar (FBS) ≥126 mg/dl (n=53) or without a reported FBS (n=12) were excluded from this analysis

## RESULTS

Figure 1: Prevalence of impaired fasting glucose in the PARADIGM cohort

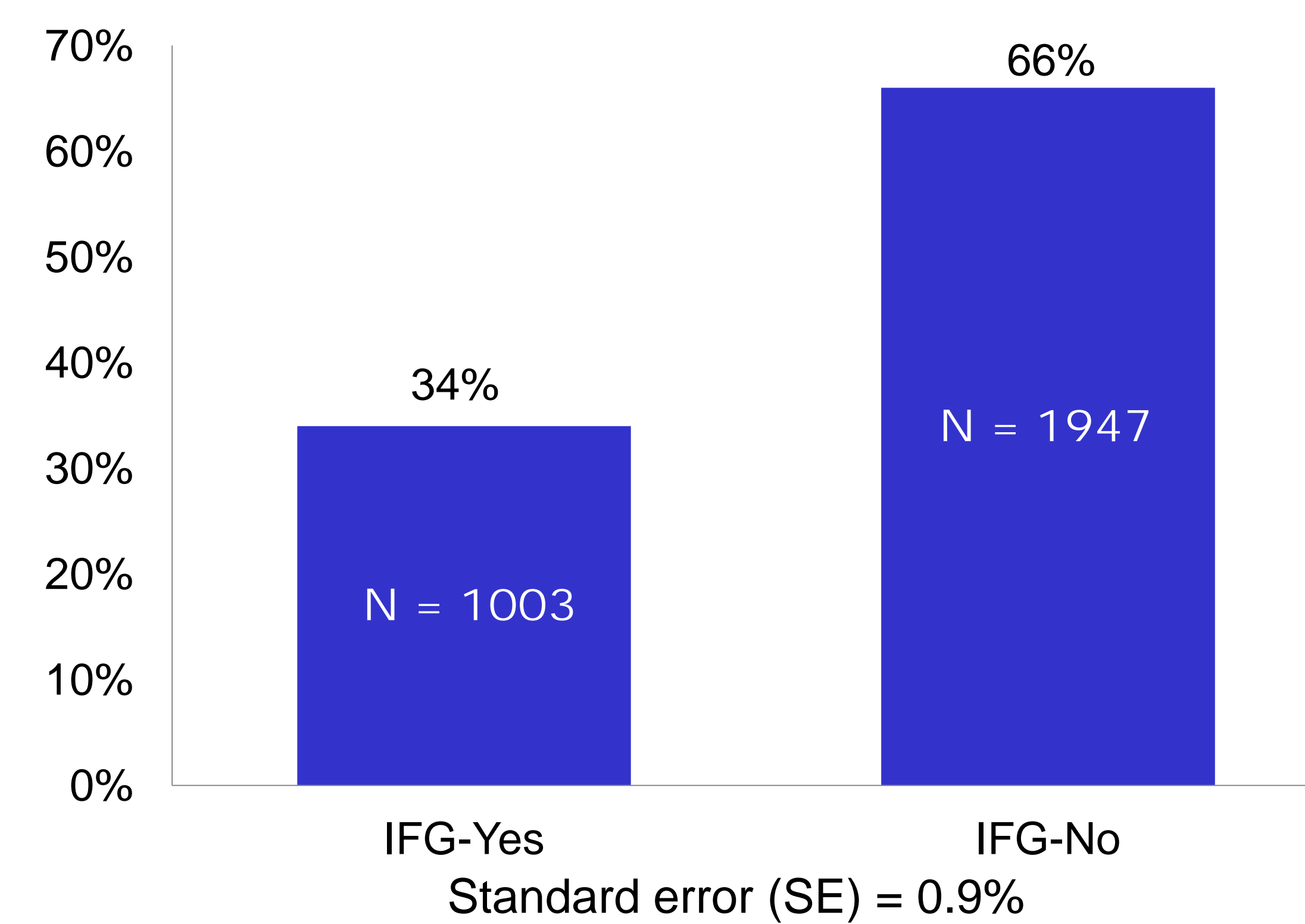
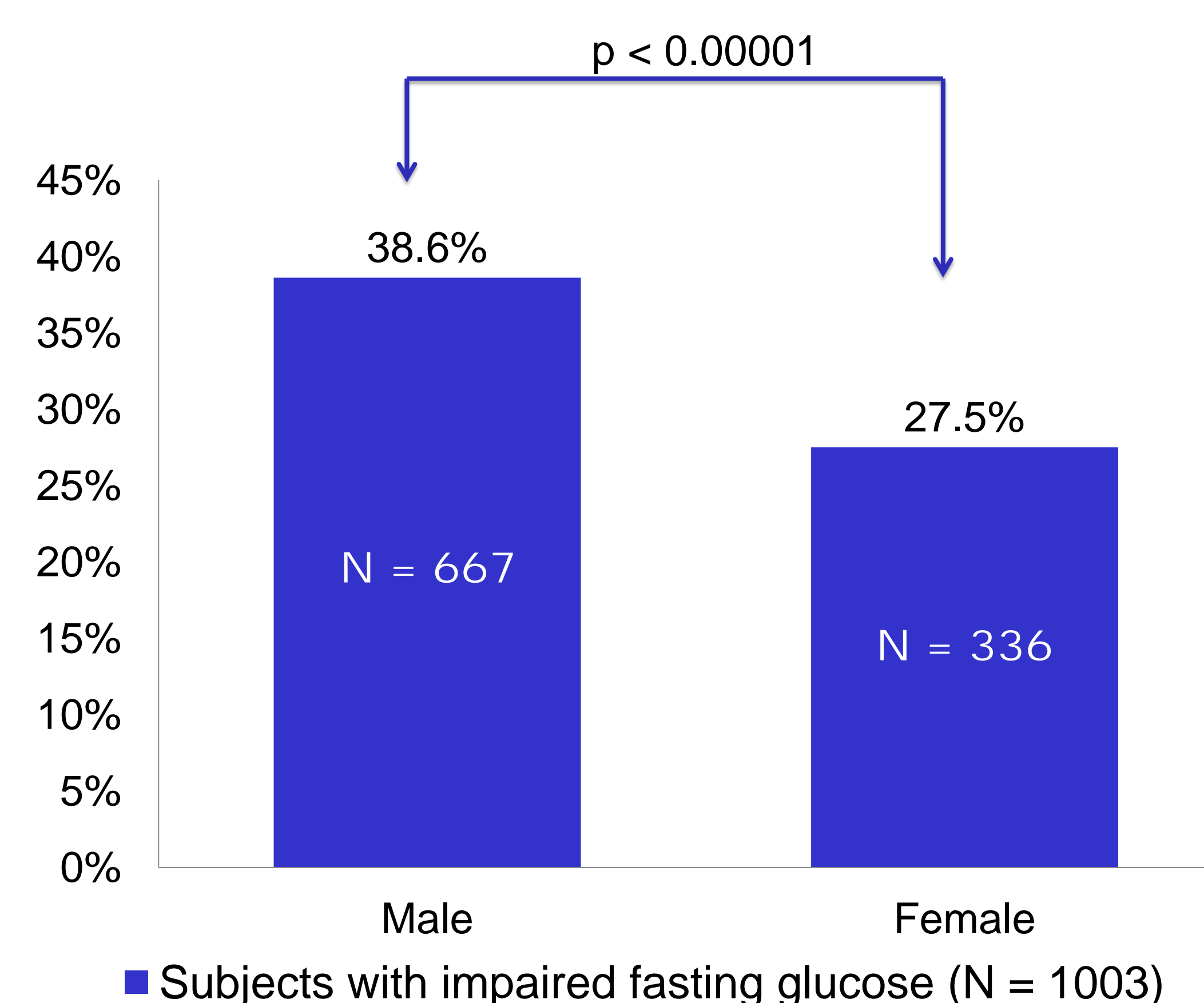


Figure 2: IFG prevalence by gender in the PARADIGM cohort



■ Subjects with impaired fasting glucose (N = 1003)

## RESULTS

Table 1. Clinical variables

Variable (% (n) or mean ± SD)	IFG - Yes (n=1003)	IFG - No (n=1947)	p-value
Age	56.8y ± 8.5	55.9y ± 8.3	p<0.01
Male	66.5% (667)	54.5% (1062)	p<0.00001
Hypertension	35.4% (355)	27.3% (531)	p<0.0001
Smoking Hx* (P/C)**	39.1% (192)	32.1% (625)	p<0.001
Family Hx CVD***	25.1% (251)	24.1% (469)	p=ns
Mean BMI****(kg/m <sup>2</sup> )	28.7 ± 5.5	27.2 ± 4.8	p<0.00001
WC†(Inches)	38.6 ± 5.5	36.5 ± 5.1	p<0.00001
Metabolic syndrome	49.7% (498)	17% (331)	p<0.00001

\*Hx (history)  
\*\*P/C (past or current smoker)  
\*\*\*CVD (cardiovascular Disease)  
\*\*\*\*BMI (body mass index)  
†WC (waist circumference)

Table 3. Lab results

Variable (% (n) or mean ± SD)	IFG - Yes (n=1003)	IFG - No (n=1947)	p-value
TC (mg/dl)*	220.1 ± 37.9	217.4 ± 37.7	p=ns
LDL (mg/dl)**	139.2 ± 32.3	137.6 ± 32.4	p=ns
HDL (mg/dl)***	51.6 ± 14.2	54.5 ± 15.5	p<0.00001
TG (mg/dl)****	154.1 ± 100.2	129 ± 85.3	p<0.00001
HbA1c	5.8%	5.6%	p<0.00001
Fasting glucose (mg/dl)	107 ± 6	90 ± 7	p<0.00001
hsCRP (mg/L)	3.4 ± 4.5	2.7 ± 4.1	p<0.001

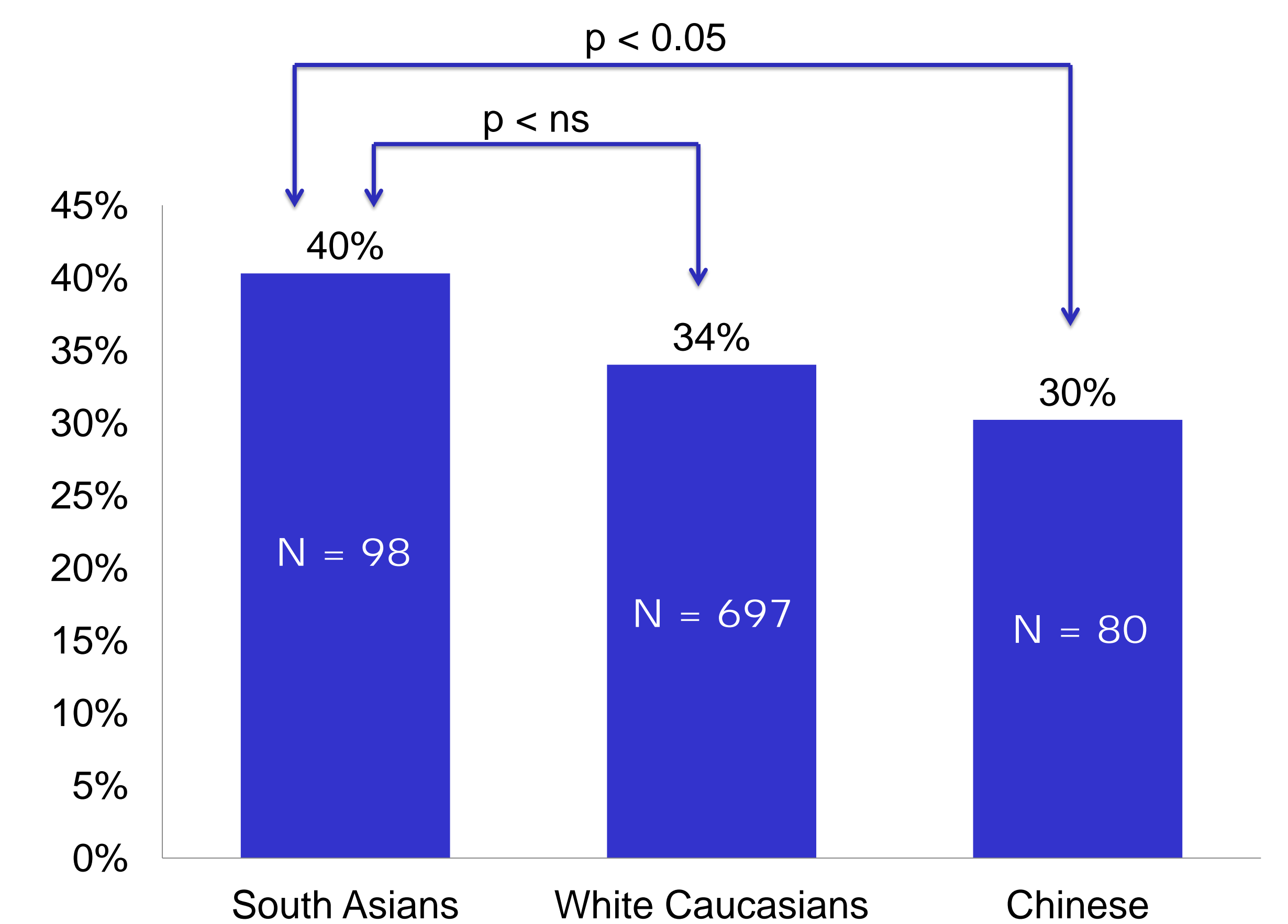
\*TC (total cholesterol)  
\*\*LDL (low density lipoprotein)  
\*\*\*HDL (high density lipoprotein)  
\*\*\*\*TG (triglycerides)

Table 2. Categories of risk by total cardiovascular Framingham Risk Score

Variable % (n)	IFG - Yes (n=1003)	IFG - No (n=1947)	p-value
Mean total CV FRS	17.3%	13.3%	p<0.00001
Low FRS	32.1% (322)	50.3% (979)	p<0.00001
Intermediate FRS	38.2% (383)	31.5% (613)	p<0.00001
High FRS	29.7% (298)	18.2% (354)	p<0.00001

## RESULTS

Figure 3: Prevalence of impaired fasting glucose in various ethnic groups



## SUMMARY AND CLINICAL IMPLICATIONS

- Approximately 34% of otherwise healthy middle-aged subjects have IFG
- The majority of subjects with IFG have an increased FRS, and almost one third are at high CV risk, even in the absence of diabetes
- The risk of IFG is highest in the South Asian population
- Screening for IFG may uncover otherwise healthy subjects who are at substantial risk for CVD and who may benefit from preventive treatments

## ACKNOWLEDGEMENTS

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