

# Package ‘CVrisk’

October 27, 2020

**Title** Compute Risk Scores for Cardiovascular Diseases

**Version** 1.0.0

**Description** Calculate various cardiovascular disease risk scores from the Framingham Heart Study (FHS), the American College of Cardiology (ACC), and the American Heart Association (AHA) as described in D’agostino, et al (2008) <doi:10.1161/circulationaha.107.699579>, Goff, et al (2013) <doi:10.1161/01.cir.0000437741.48606.98>, and Mclelland, et al (2015) <doi:10.1016/j.jacc.2015.08.035>.

**License** GPL-3

**Depends** R (>= 2.10)

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.1

**URL** <https://github.com/vcastro/CVrisk>

**BugReports** <https://github.com/vcastro/CVrisk/issues>

**Imports** utils

**Suggests** testthat (>= 2.1.0), covr, tibble

**NeedsCompilation** no

**Author** Victor Castro [aut, cre] (<<https://orcid.org/0000-0001-7390-6354>>)

**Maintainer** Victor Castro <[vcastro@mh.harvard.edu](mailto:vcastro@mh.harvard.edu)>

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ascvd_10y_accaha	<i>ACC/AHA 2013 ASCVD risk score</i>
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### Description

Computes 10-year risk for hard ASCVD event (defined as first occurrence of non-fatal myocardial infarction (MI), congestive heart disease (CHD) death, or fatal or nonfatal stroke).

### Usage

```
ascvd_10y_accaha(
  race = "white",
  gender = c("male", "female"),
  age,
  totchol,
  hdl,
  sbp,
  bp_med,
  smoker,
  diabetes,
  ...
)
```

### Arguments

race	patient race (white, aa)
gender	patient gender (male, female)
age	patient age (years)
totchol	Total cholesterol (mg/dL)
hdl	HDL cholesterol (mg/dL)
sbp	Systolic blood pressure (mm Hg)
bp_med	Patient is on a blood pressure medication (1=Yes, 0=No)
smoker	Current smoker (1=Yes, 0=No)
diabetes	Diabetes (1=Yes, 0=No)
...	Additional predictors can be passed and will be ignored

**Value**

Estimated 10-Y Risk for hard ASCVD (percent)

**References**

Goff, David C., et al. "2013 ACC/AHA guideline on the assessment of cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines." *Journal of the American College of Cardiology* 63.25 Part B (2014): 2935-2959.

**Examples**

```
library(CVrisk)
ascvd_10y_accaha(
  race = "aa", gender = "male", age = 55,
  totchol = 213, hdl = 50, sbp = 140,
  bp_med = 0, smoker = 0, diabetes = 0
)
```

---

ascvd\_10y\_frs

*Framingham 2008 ASCVD risk score (with lab measurement)*


---

**Description**

Computes 10-year risk for ASCVD event (coronary death, myocardial infarction (MI), coronary insufficiency, angina, ischemic stroke, hemorrhagic stroke, transient ischemic attack, peripheral artery disease, or heart failure).

**Usage**

```
ascvd_10y_frs(
  gender = c("male", "female"),
  age,
  hdl,
  totchol,
  sbp,
  bp_med,
  smoker,
  diabetes,
  ...
)
```

**Arguments**

gender	patient gender (male, female)
age	patient age (years), between 30 and 74
hdl	HDL cholesterol (mg/dL)
totchol	Total cholesterol (mg/dL)

sbp	Systolic blood pressure (mm Hg)
bp_med	Patient is on a blood pressure medication (1=Yes, 0=No)
smoker	Current smoker (1=Yes, 0=No)
diabetes	Diabetes (1=Yes, 0=No)
...	Additional predictors can be passed and will be ignored

**Value**

Estimated 10-Y Risk for hard ASCVD event (percent)

**References**

D'agostino, R.B., Vasan, R.S., Pencina, M.J., Wolf, P.A., Cobain, M., Massaro, J.M. and Kannel, W.B., 2008. General cardiovascular risk profile for use in primary care: the Framingham Heart Study. *Circulation*, 117(6), pp.743-753.

**Examples**

```
library(CVrisk)
ascvd_10y_frs(
  gender = "male", age = 55,
  hdl = 50, totchol = 213, sbp = 140,
  bp_med = 0, smoker = 0, diabetes = 0
)

# 16.7
```

---

ascvd\_10y\_frs\_simple *Framingham 2008 ASCVD risk score (no lab measurement)*

---

**Description**

Computes 10-year risk for ASCVD event (coronary death, myocardial infarction (MI), coronary insufficiency, angina, ischemic stroke, hemorrhagic stroke, transient ischemic attack, peripheral artery disease, or heart failure).

**Usage**

```
ascvd_10y_frs_simple(
  gender = c("male", "female"),
  age,
  bmi,
  sbp,
  bp_med,
  smoker,
  diabetes,
  ...
)
```

**Arguments**

gender	patient gender (male, female)
age	patient age (years), between 30 and 74
bmi	Body mass index (kg/m <sup>2</sup> )
sbp	Systolic blood pressure (mm Hg)
bp_med	Patient is on a blood pressure medication (1=Yes, 0=No)
smoker	Current smoker (1=Yes, 0=No)
diabetes	Diabetes (1=Yes, 0=No)
...	Additional predictors can be passed and will be ignored

**Value**

Estimated 10-Y Risk for hard ASCVD (percent)

**References**

D'agostino, R.B., Vasan, R.S., Pencina, M.J., Wolf, P.A., Cobain, M., Massaro, J.M. and Kannel, W.B., 2008. General cardiovascular risk profile for use in primary care: the Framingham Heart Study. *Circulation*, 117(6), pp.743-753.

**Examples**

```
library(CVrisk)
ascvd_10y_frs_simple(
  gender = "male", age = 55,
  bmi = 30, sbp = 140,
  bp_med = 0, smoker = 0, diabetes = 0
)

# 16.7
```

---

ascvd\_pooled\_coef      *Model coefficients for ASCVD 10y ACC/AHA model*

---

**Description**

A data set containing the 2013 ACC/AHA ASCVD 10-year risk pooled cohort coefficients

**Usage**

```
ascvd_pooled_coef
```

**Format**

A data frame with 4 obs. and 17 variables:

**race** Patient race, either white or aa

**gender** Patient gender, either female or male

**ln\_age** Natural log of patient age

**ln\_age\_squared** Natural log of patient age in years, squared

**ln\_totchol** Natural log of total cholesterol level

**ln\_age\_totchol** Natural log of combined age and total cholesterol

**ln\_hdl** Natural log of HDL level

**ln\_age\_hdl** Natural log of HDL and age

**ln\_treated\_sbp** Natural log of treated systolic blood pressure

**ln\_age\_treated\_sbp** Natural log of treated systolic blood pressure and age

**ln\_untreated\_sbp** Natural log of untreated systolic blood pressure

**ln\_age\_untreated\_sbp** Natural log of untreated systolic blood pressure and age

**smoker** Smoking status

**ln\_age\_smoker** Natural log of smoking status and age

**diabetes** Diabetes status

**group\_mean** Grouped mean

**baseline\_survival** Baseline survival

**References**

Goff, David C., et al. "2013 ACC/AHA guideline on the assessment of cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines." *Journal of the American College of Cardiology* 63.25 Part B (2014): 2935-2959.

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compute\_CVrisk

*Compute multiple CV risk scores*

---

**Description**

Compute multiple CV risk scores

**Usage**

```
compute_CVrisk(  
  df,  
  scores = c("ascvd_10y_accaha", "ascvd_10y_frs", "ascvd_10y_frs_simple"),  
  age,  
  gender,  
  race,  
  sbp = NULL,  
  bmi = NULL,  
  hdl = NULL,  
  totchol = NULL,  
  bp_med = NULL,  
  smoker = NULL,  
  diabetes = NULL  
)
```

**Arguments**

df	input dataframe
scores	scores to compute, default is all scores
age	patient age in years (required for all scores)
gender	patient gender (male or female)
race	character string for patient race (white, aa, other) column
sbp	character string of systolic blood pressure (in mm Hg) column
bmi	character string of Body mass index (kg/m2) column
hdl	character string of HDL column
totchol	character string of total cholesterol column
bp_med	character string of blood pressure medication column
smoker	character string of smoking status column
diabetes	character string of diabetes status column

**Value**

input data frame with risk score results appended as columns

**Examples**

```
library(CVrisk)  
compute_CVrisk(sample_data,  
  age = "age", race = "race", gender = "gender", bmi = "BMI", sbp = "sbp",  
  hdl = "hdl", totchol = "totchol", bp_med = "bp_med", smoker = "smoker",  
  diabetes = "diabetes"  
)
```

---

 CVrisk

*CVrisk: Compute Risk Scores for Cardiovascular Diseases*


---

### Description

This package calculate various cardiovascular disease risk scores from the Framingham Heart Study, the American College of Cardiology, American Heart Association and others.

### Details

Functions are provided to compute individual risk scores based on predictors such as age, body mass index, HDL, total cholesterol and others.

A multiple scoring function also accepts a data frame and appends results to score large datasets.

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 frs\_coef

*Model coefficients for ASCVD 10y FRS model*


---

### Description

A data set containing the Framingham risk score coefficients (full model with lab features)

### Usage

```
frs_coef
```

### Format

A data frame with 2 obs. and 10 variables:

**gender** Patient gender, either female or male

**ln\_age** Natural log of patient age

**ln\_totchol** Natural log of total cholesterol level

**ln\_hdl** Natural log of HDL level

**ln\_untreated\_sbp** Natural log of untreated systolic blood pressure

**ln\_treated\_sbp** Natural log of treated systolic blood pressure

**smoker** Smoking status

**diabetes** Diabetes status

**group\_mean** Grouped mean

**baseline\_survival** Baseline survival

### References

D'agostino, R.B., Vasan, R.S., Pencina, M.J., Wolf, P.A., Cobain, M., Massaro, J.M. and Kannel, W.B., 2008. General cardiovascular risk profile for use in primary care. *Circulation*, 117(6), pp.743-753.



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frs_simple_coef	<i>Model coefficients for ASCVD 10y FRS simple model</i>
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**Description**

A data set containing the Framingham risk score coefficients (simple model without lab features)

**Usage**

frs\_simple\_coef

**Format**

A data frame with 2 obs. and 10 variables:

**gender** Patient gender, either female or male

**ln\_age** Natural log of patient age (years)

**ln\_bmi** Natural log of body mass index kg/m<sup>2</sup>

**ln\_untreated\_sbp** Natural log of untreated systolic blood pressure

**ln\_treated\_sbp** Natural log of treated systolic blood pressure

**smoker** Smoking status

**diabetes** Diabetes status

**group\_mean** Grouped mean

**baseline\_survival** Baseline survival

**References**

D'agostino, R.B., Vasan, R.S., Pencina, M.J., Wolf, P.A., Cobain, M., Massaro, J.M. and Kannel, W.B., 2008. General cardiovascular risk profile for use in primary care. *Circulation*, 117(6), pp.743-753.

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mesa_cac_coef	<i>mesa_cac_coef</i>
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**Description**

A data set containing the MESA risk score coefficients (model with CAC)

**Usage**

mesa\_cac\_coef

**Format**

A data frame with 1 obs. and 15 variables:

**age** Coefficient for age

**gender\_male** Coefficient for male gender

**race\_chinese** Coefficient for Chinese race

**race\_aa** Coefficient for African American race

**race\_hispanic** Coefficient for Hispanic race

**diabetes** Coefficient for diabetes status

**smoker** Coefficient for current smoker

**totchol** Coefficient for total cholesterol level

**hdl** Coefficient for HDL level

**hdl\_med** Coefficient for antihyperlipidemic medication

**sbp** Coefficient for systolic blood pressure

**bp\_med** Coefficient for antihypertensive medication

**fh\_heartattack** Coefficient for family history of heart attacks

**log1p\_cac** Coefficient for  $\ln(\text{coronary artery calcification (units)+1})$

**baseline\_survival** Baseline survival

**References**

McClelland RL, Jorgensen NW, Budoff M, et al. 10-Year Coronary Heart Disease Risk Prediction Using Coronary Artery Calcium and Traditional Risk Factors: Derivation in the MESA (Multi-Ethnic Study of Atherosclerosis) With Validation in the HNR (Heinz Nixdorf Recall) Study and the DHS (Dallas Heart Study). *J Am Coll Cardiol.* 2015;66(15):1643-1653. doi:10.1016/j.jacc.2015.08.035

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mesa\_coef

*mesa\_coef*

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**Description**

A data set containing the MESA risk score coefficients (model without CAC)

**Usage**

mesa\_coef

**Format**

A data frame with 1 obs. and 14 variables:

**age** Coefficient for age

**gender\_male** Coefficient for male gender

**race\_chinese** Coefficient for Chinese race

**race\_aa** Coefficient for African American race

**race\_hispanic** Coefficient for Hispanic race

**diabetes** Coefficient for diabetes status

**smoker** Coefficient for current smoker

**totchol** Coefficient for total cholesterol level

**hdl** Coefficient for HDL level

**hdl\_med** Coefficient for antihyperlipidemic medication

**sbp** Coefficient for systolic blood pressure

**bp\_med** Coefficient for antihypertensive medication

**fh\_heartattack** Coefficient for family history of heart attacks

**baseline\_survival** Baseline survival

**References**

McClelland RL, Jorgensen NW, Budoff M, et al. 10-Year Coronary Heart Disease Risk Prediction Using Coronary Artery Calcium and Traditional Risk Factors: Derivation in the MESA (Multi-Ethnic Study of Atherosclerosis) With Validation in the HNR (Heinz Nixdorf Recall) Study and the DHS (Dallas Heart Study). *J Am Coll Cardiol.* 2015;66(15):1643-1653. doi:10.1016/j.jacc.2015.08.035

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sample\_data

*Sample patient data*

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**Description**

A data set containing sample patient data

**Usage**

sample\_data

**Format**

A data frame with 3 obs. and 10 variables:

**age** age in years

**gender** Patient gender

**race** race

**BMI** Body mass index (kg/m<sup>2</sup>)

**sbp** systolic blood pressure

**hdl** HDL

**totchol** Total cholesterol

**bp\_med** Patient is on blood pressure medication

**smoker** Smoking status

**diabetes** Diabetes status

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