Conversion (cross-walking) of body-mass index (BMI) metrics

NCD-RisC work on body-mass index (BMI) pools and analyses population-based studies that had measured height and weight in people aged 5 years and older to estimate mean BMI in 200 countries and territories. In ~0.5% of our data points for children and adolescents (aged 5-19 years) and ~2% of our data points for adults (aged 20 years and older), mean BMI is not reported, but data are available for the prevalence of one or more BMI categories. These data are mostly extracted from published reports or from a previous pooling analysis.[1] In order to use these data, we developed conversion (or cross-walking) regressions to estimate mean BMI from the available data.

Estimating mean BMI from prevalence of different BMI categories

The dependent variable in each regression is mean BMI. The independent variable (predictor) is the prevalence of one or more BMI categories that is reported by at least one study that did not report mean BMI. All regressions include terms for age, sex, year of study, and country's income (natural logarithm of per-capita gross domestic product in 2011 international dollars), as well as regional random intercepts and interactions between predictors and age and sex, based on the Bayesian Information Criterion (BIC).[2] For regional random intercepts, there are21 regions used in NCD-RisC, which are based on geography and national income.[3] Mean BMI is inversed when used as a dependent variable because the relationship between inverse mean BMI and the probit of prevalence is closer to linear than relationships between other functions of mean BMI. The coefficients of these regressions are estimated using data sources from 1975 onwards, and national studies from the 3 years prior to 1975 used as 1975 studies. We excluded data points with fewer than 25 participants.

Cut-offs used to define underweight, overweight, and obesity for children and adolescents are different from those for adults and vary by age and sex because of the natural growth in childhood and adolescence. This is taken into account when developing the cross-walking models. The regression coefficients and number of data points we use to estimate the coefficients are shown in Table 1 for children and adolescents and in Table 2 for adults.

When applying the conversion models, all sources of uncertainty, including the sampling uncertainty of the data on the available metrics, the uncertainty of the regression coefficients and random intercepts, and the regression residuals, are carried forward by using repeated draws from their respective distributions. We account for the correlation among the uncertainties of regression coefficients and random intercepts by drawing from their joint posterior distribution.

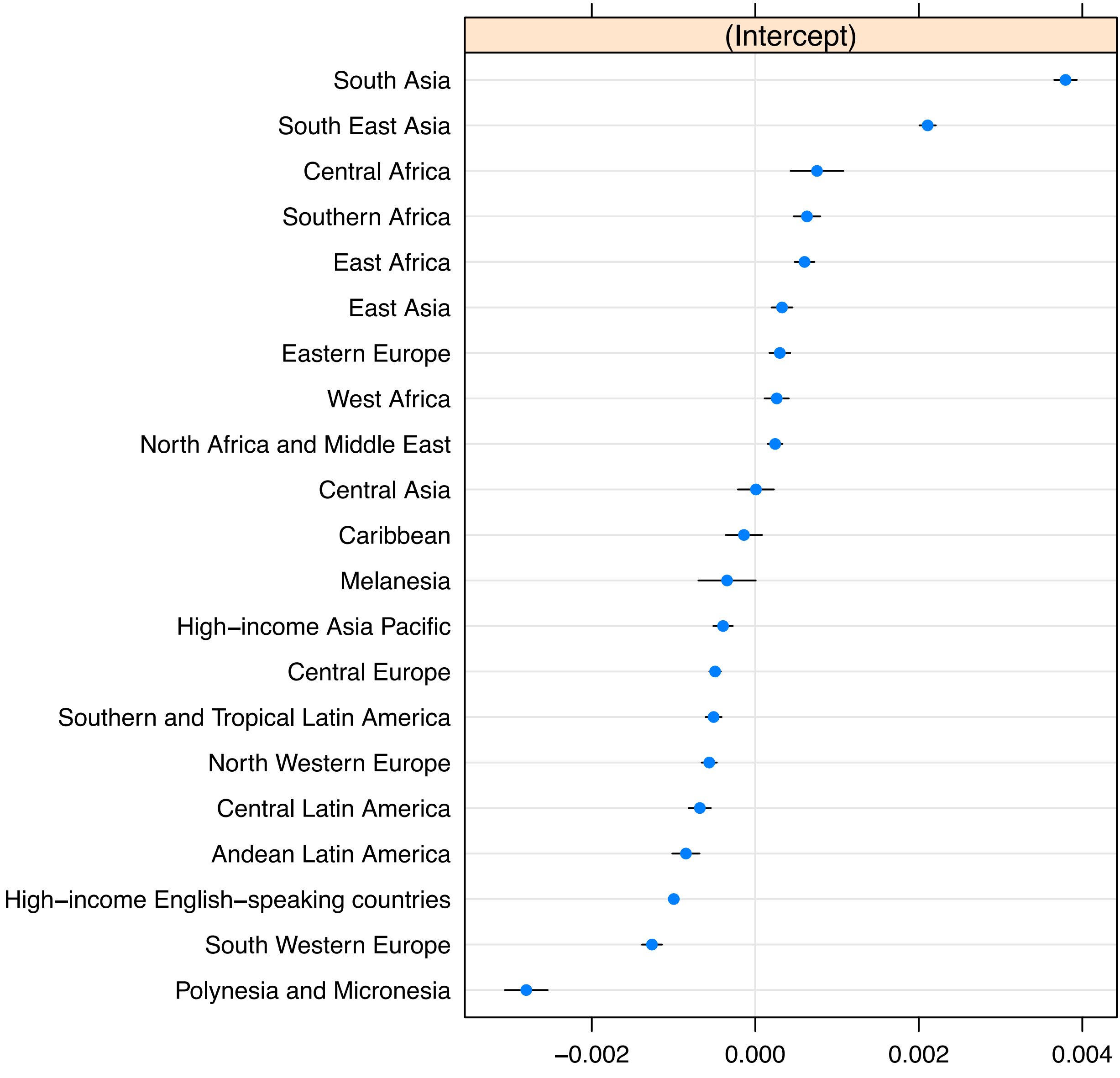
Table 1: Model specifications and regression coefficients to estimate mean BMI from other metrics for children and adolescents (aged 5-19 years).

The dependent variable in all regressions was the inverse of mean BMI, fitted using a linear mixed model. Random intercepts for regions in regression are presented after the table of coefficients.

* denotes statistical interaction. CI: confidence interval.

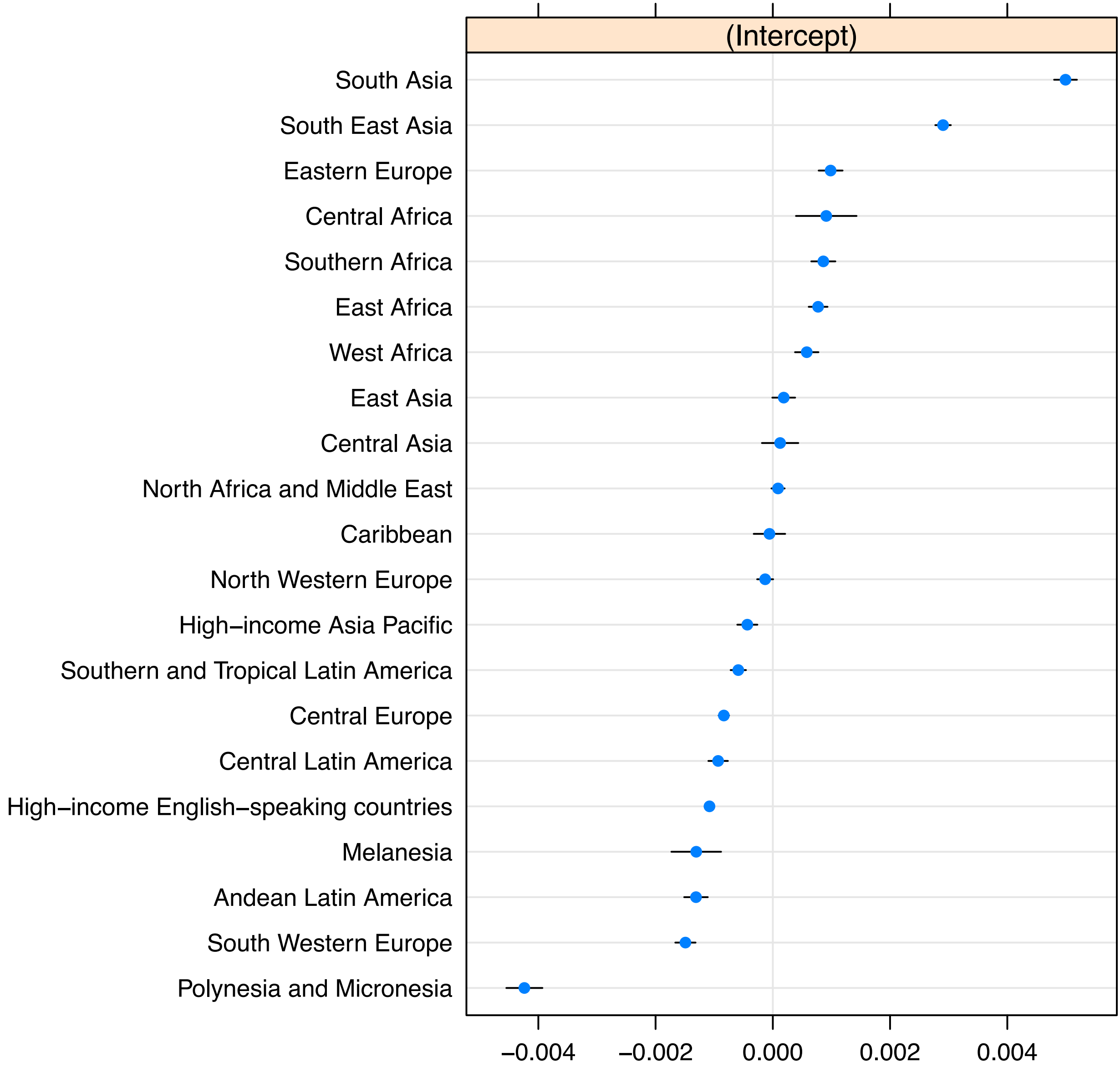
Dependent variable: Inverse mean BMI	
Age range: 5-19 years	
Independent variable: Prevalence (BMI ≥25 kg/m^2)	
Variables	**Coefficients (95% CI)**
Intercept	0.056 (0.056, 0.057)
Probit-transformed prevalence (BMI ≥25 kg/m^2)	-0.0069 (-0.0070, -0.0067)
Mid-age of age group	-0.00070 (-0.00072, -0.00068)
Male sex	0.00050 (0.00036, 0.00063)
Study mid-year (per one more recent year since 1975)	-1.6e-05 (-1.9e-05, -1.3e-05)
Natural logarithm of per-capita gross domestic product	-0.00035 (-0.00040, -0.00030)
Probit-transformed prevalence (BMI ≥25 kg/m^2) * mid-age of age group	0.00015 (0.00014, 0.00016)
Probit-transformed prevalence (BMI ≥25 kg/m^2) * male sex	0.00010 (2.1e-05, 0.00018)
Number of data points used to fit the model = 13,773	

Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.947.


(Intercept)
South Asia
South East Asia
Central Africa
Southern Africa
East Africa
East Asia
Eastern Europe
West Africa
North Africa and Middle East
Central Asia
Caribbean
Melanesia
High–income Asia Pacific
Central Europe
Southern and Tropical Latin America
North Western Europe
Central Latin America
Andean Latin America
High–income English–speaking countries
South Western Europe
Polynesia and Micronesia
–0.002
0.000
0.002
0.004

Dependent variable: Inverse mean BMI	
Age range: 5-19 years	
Independent variable: Prevalence (BMI ≥30 kg/m^2)	
Variables	**Coefficients (95% CI)**
Intercept	0.058 (0.057, 0.060)
Probit-transformed prevalence (BMI ≥30 kg/m^2)	-0.0062 (-0.0065, -0.0060)
Mid-age of age group	-0.00071 (-0.00074, -0.00067)
Male sex	0.00069 (0.00043, 0.00095)
Study mid-year (per one more recent year since 1975)	-3.0e-05 (-3.4e-05, -2.6e-05)
Natural logarithm of per-capita gross domestic product	-0.00062 (-0.00069, -0.00055)
Probit-transformed prevalence (BMI ≥30 kg/m^2) * mid-age of age group	0.00019 (0.00017, 0.00020)
Probit-transformed prevalence (BMI ≥30 kg/m^2) * male sex	7.7e-05 (-4.2e-05, 0.00020)
Number of data points used to fit the model = 10,321	

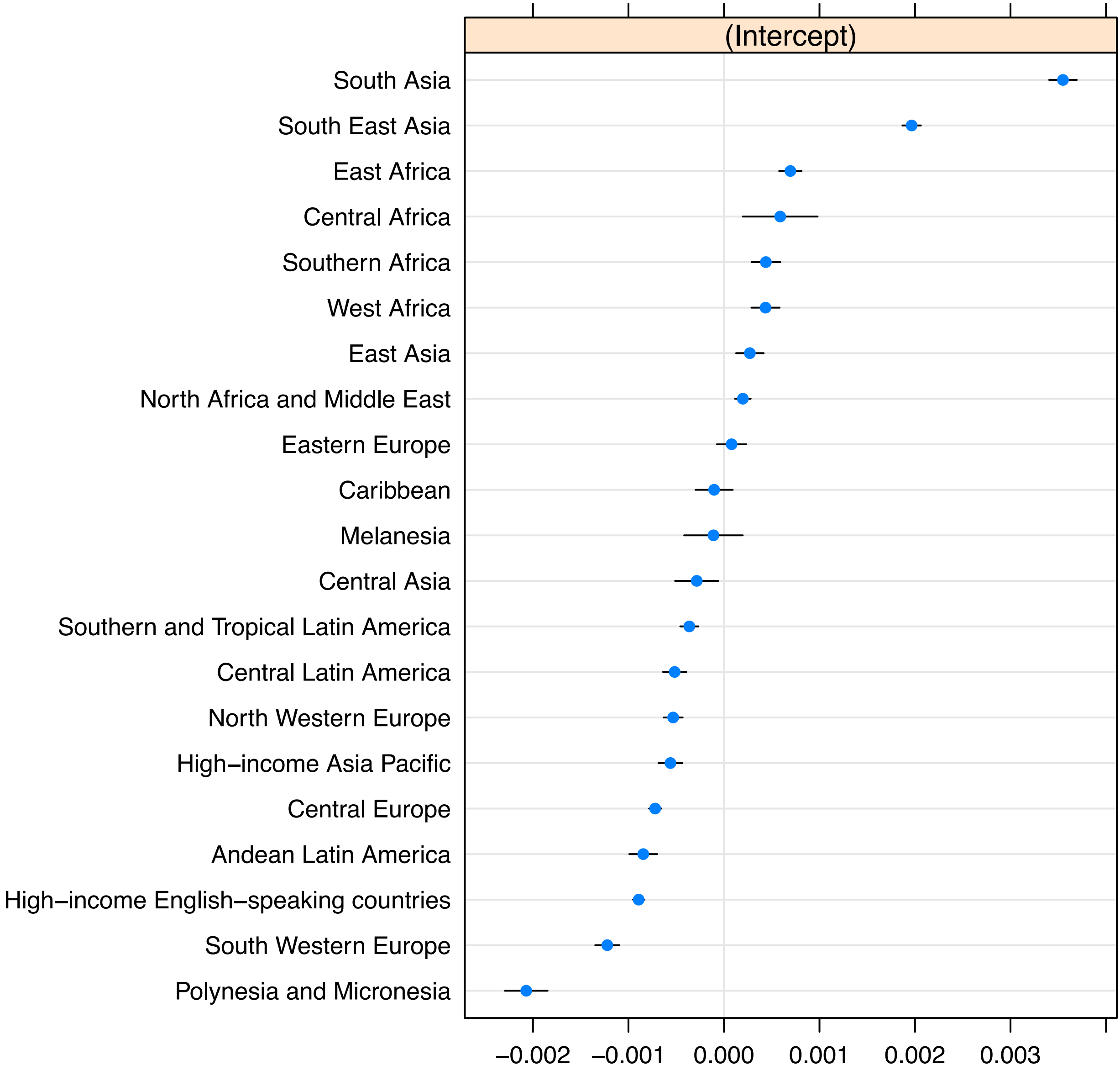
Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.919.



(Intercept)
South Asia
South East Asia
Eastern Europe
Central Africa
Southern Africa
East Africa
West Africa
East Asia
Central Asia
North Africa and Middle East
Caribbean
North Western Europe
High–income Asia Pacific
Southern and Tropical Latin America
Central Europe
Central Latin America
High–income English–speaking countries
Melanesia
Andean Latin America
South Western Europe
Polynesia and Micronesia
–0.004
–0.002
0.000
0.002
0.004

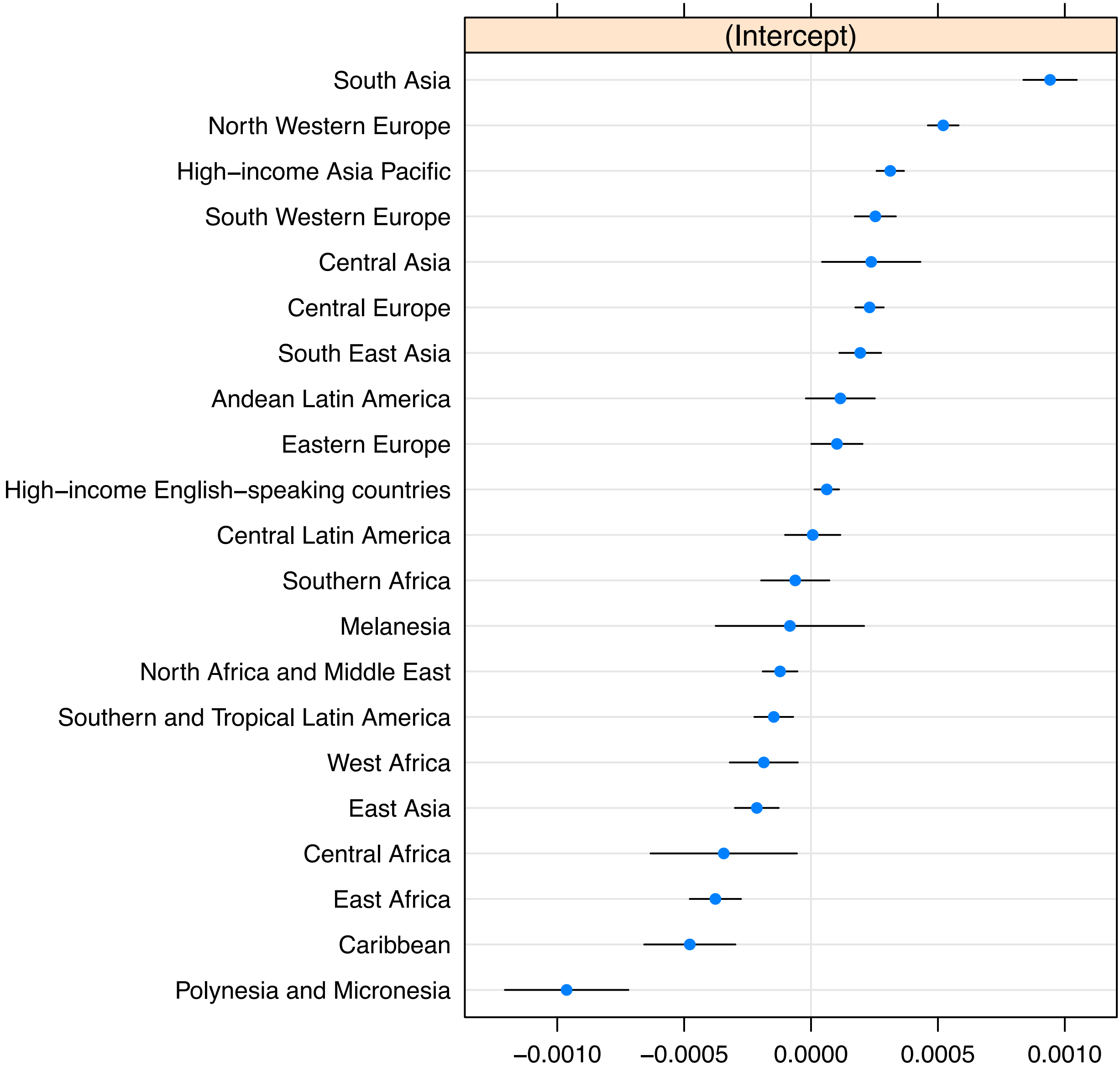
Dependent variable: Inverse mean BMI	
Age range: 5-19 years	
Independent variable: Prevalence (BMI ≥25 kg/m^2) and prevalence (BMI ≥30 kg/m^2)	
Variables	**Coefficients (95% CI)**
Intercept	0.052 (0.051, 0.053)
Probit-transformed prevalence (BMI ≥25 kg/m^2)	-0.011 (-0.012, -0.011)
Probit-transformed prevalence (BMI ≥30 kg/m^2)	0.0028 (0.0025, 0.0032)
Mid-age of age group	-0.00070 (-0.00074, -0.00067)
Male sex	0.00012 (-9.9e-05, 0.00033)
Study mid-year (per one more recent year since 1975)	-3.7e-06 (-6.9e-06, -5.5e-07)
Natural logarithm of per-capita gross domestic product	-7.3e-05 (-0.00012, -2.0e-05)
Probit-transformed prevalence (BMI ≥25 kg/m^2) * mid-age of age group	0.00041 (0.00038, 0.00044)
Probit-transformed prevalence (BMI ≥30 kg/m^2) * mid-age of age group	-0.00023 (-0.00025, -0.00020)
Probit-transformed prevalence (BMI ≥25 kg/m^2) * male sex	0.00027 (6.5e-05, 0.00047)
Probit-transformed prevalence (BMI ≥30 kg/m^2) * male sex	-0.00029 (-0.00049, -8.9e-05)
Number of data points used to fit the model = 10,139	

Traditional R2 is not clearly defined for mixed-effect models. The conditional R2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.955.


(Intercept)
South Asia
South East Asia
East Africa
Central Africa
Southern Africa
West Africa
East Asia
North Africa and Middle East
Eastern Europe
Caribbean
Melanesia
Central Asia
Southern and Tropical Latin America
Central Latin America
North Western Europe
High−income Asia Pacific
Central Europe
Andean Latin America
High−income English−speaking countries
South Western Europe
Polynesia and Micronesia
−0.002
−0.001
0.000
0.001
0.002
0.003

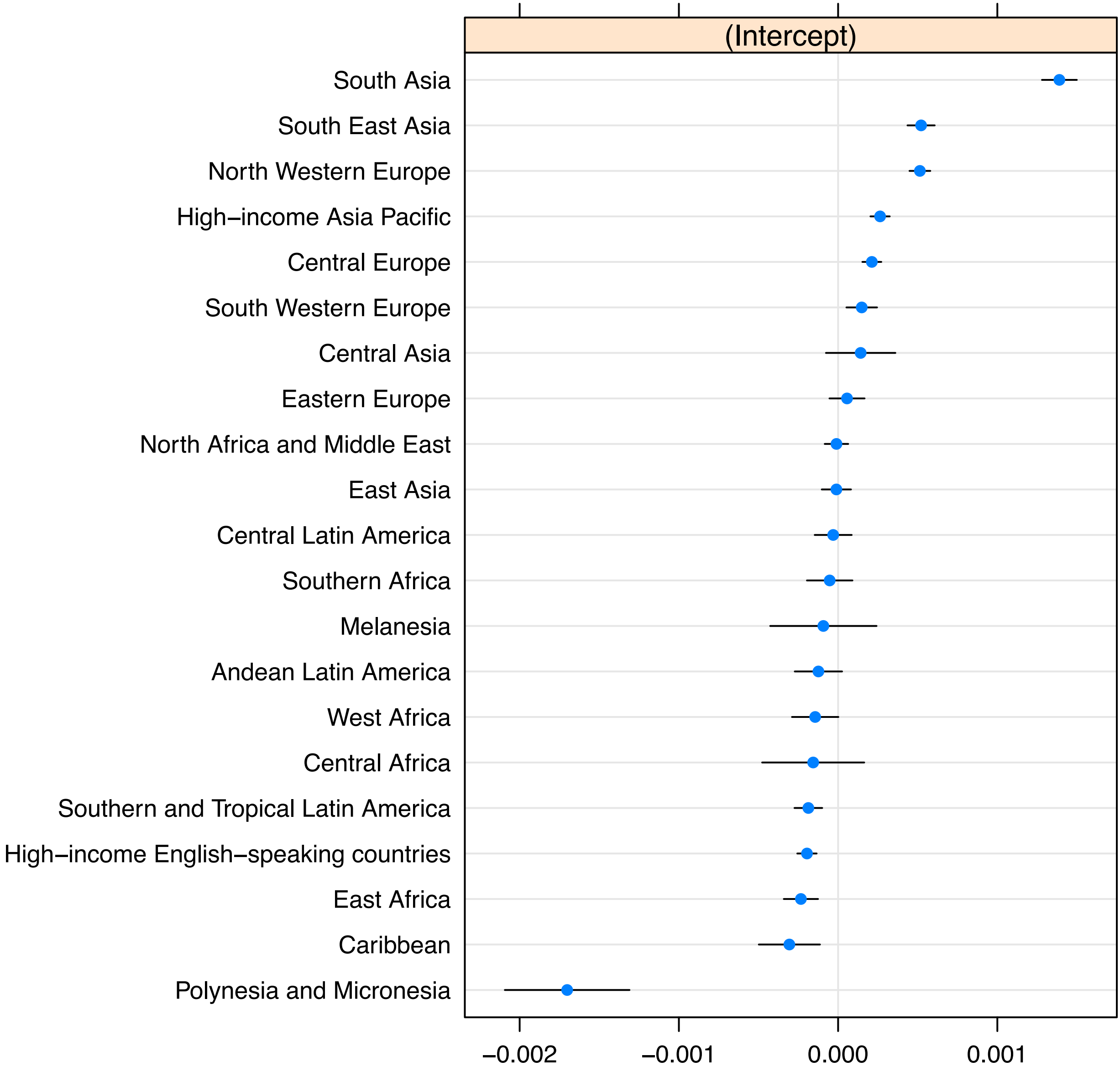
Dependent variable: Inverse mean BMI	
Age range: 5-19 years	
Independent variable: Prevalence (BMI > +1SD), prevalence (BMI > +2SD) and prevalence (BMI < -1SD)	
Variables	**Coefficients (95% CI)**
Intercept	0.074 (0.074, 0.075)
Probit-transformed prevalence (BMI > +1SD)	-0.0042 (-0.0045, -0.0038)
Probit-transformed prevalence (BMI > +2SD)	-0.0012 (-0.0015, -0.00085)
Probit-transformed prevalence (BMI < -1SD)	0.0031 (0.0029, 0.0033)
Mid-age of age group	-0.0017 (-0.0018, -0.0017)
Male sex	0.00041 (0.00020, 0.00063)
Study mid-year (per one more recent year since 1975)	2.2e-06 (-1.6e-08, 4.3e-06)
Natural logarithm of per-capita gross domestic product	-0.00034 (-0.00038, -0.00030)
Probit-transformed prevalence (BMI > +1SD) * mid-age of age group	-2.4e-05 (-5.0e-05, 2.0e-06)
Probit-transformed prevalence (BMI > +2SD) * mid-age of age group	3.2e-05 (1.1e-05, 5.3e-05)
Probit-transformed prevalence (BMI < -1SD) * mid-age of age group	-8.8e-05 (-0.00010, -7.3e-05)
Probit-transformed prevalence (BMI > +1SD) * male sex	0.0010 (0.00080, 0.0012)
Probit-transformed prevalence (BMI > +2SD) * male sex	-0.00080 (-0.00097, -0.00063)
Probit-transformed prevalence (BMI < -1SD) * male sex	0.00031 (0.00019, 0.00043)
Number of data points used to fit the model = 17,142	

Traditional R2 is not clearly defined for mixed-effect models. The conditional R2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.968.


(Intercept)
South Asia
North Western Europe
High–income Asia Pacific
South Western Europe
Central Asia
Central Europe
South East Asia
Andean Latin America
Eastern Europe
High–income English–speaking countries
Central Latin America
Southern Africa
Melanesia
North Africa and Middle East
Southern and Tropical Latin America
West Africa
East Asia
Central Africa
East Africa
Caribbean
Polynesia and Micronesia
−0.0010
−0.0005
0.0000
0.0005
0.0010

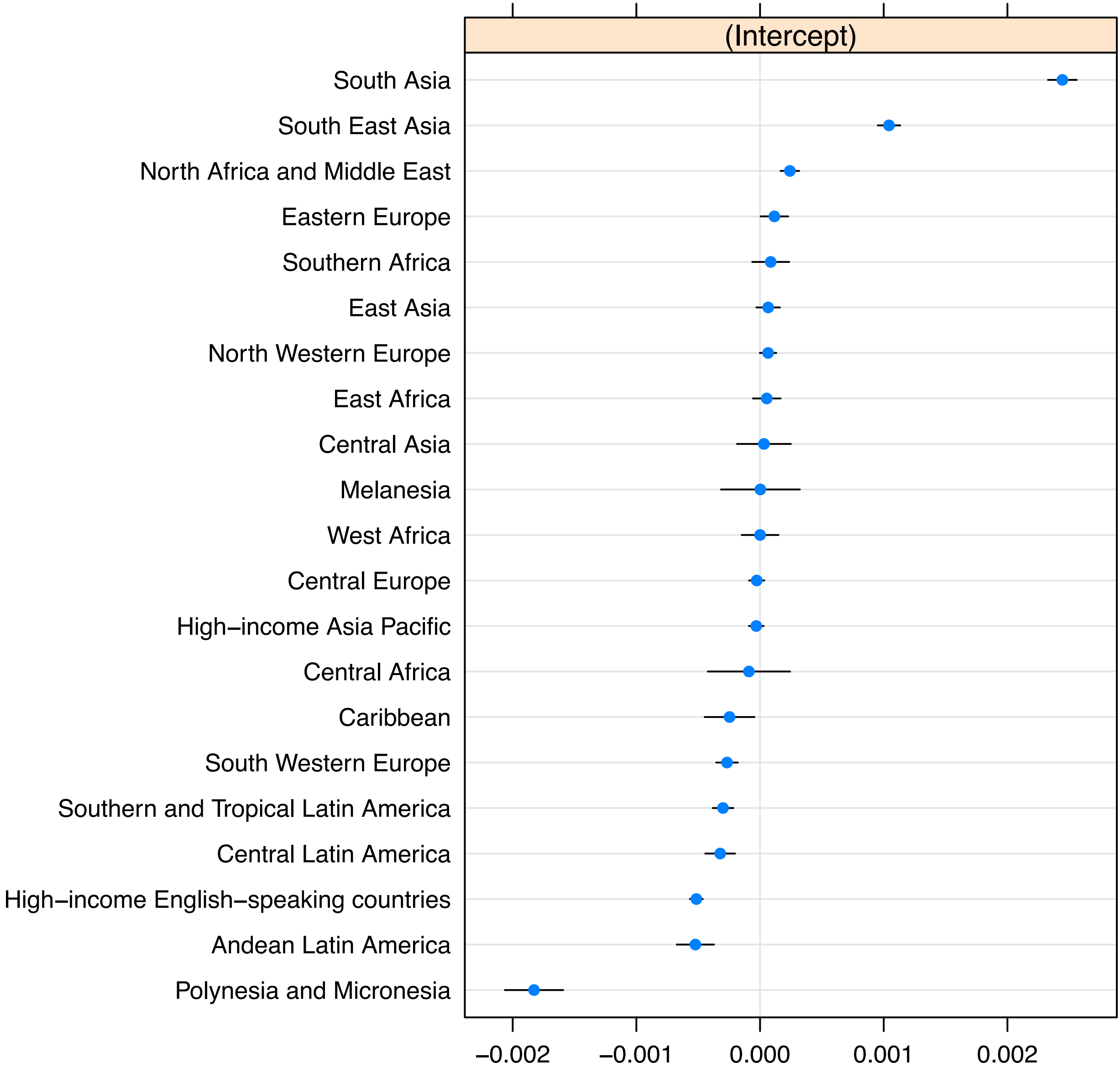
Dependent variable: Inverse mean BMI	
Age range: 5-19 years	
Independent variable: Prevalence (BMI > +1SD), prevalence (BMI > +2SD) and prevalence (BMI < -2SD)	
Variables	**Coefficients (95% CI)**
Intercept	0.074 (0.073, 0.074)
Probit-transformed prevalence (BMI > +1SD)	-0.0054 (-0.0058, -0.0050)
Probit-transformed prevalence (BMI > +2SD)	-0.00085 (-0.0012, -0.00049)
Probit-transformed prevalence (BMI < -2SD)	0.0020 (0.0018, 0.0022)
Mid-age of age group	-0.0018 (-0.0018, -0.0018)
Male sex	0.00092 (0.00065, 0.0012)
Study mid-year (per one more recent year since 1975)	3.4e-06 (9.8e-07, 5.8e-06)
Natural logarithm of per-capita gross domestic product	-0.00028 (-0.00032, -0.00023)
Probit-transformed prevalence (BMI > +1SD) * mid-age of age group	-1.2e-05 (-4.0e-05, 1.7e-05)
Probit-transformed prevalence (BMI > +2SD) * mid-age of age group	4.2e-05 (1.7e-05, 6.7e-05)
Probit-transformed prevalence (BMI < -2SD) * mid-age of age group	-8.3e-05 (-9.6e-05, -7.0e-05)
Probit-transformed prevalence (BMI > +1SD * male sex	0.0013 (0.0011, 0.0016)
Probit-transformed prevalence (BMI > +2SD) * male sex	-0.0011 (-0.0013, -0.00090)
Probit-transformed prevalence (BMI < -2SD) * male sex	0.00053 (0.00043, 0.00064)
Number of data points used to fit the model = 14,847	

Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.966.


(Intercept)
South Asia
South East Asia
North Western Europe
High−income Asia Pacific
Central Europe
South Western Europe
Central Asia
Eastern Europe
North Africa and Middle East
East Asia
Central Latin America
Southern Africa
Melanesia
Andean Latin America
West Africa
Central Africa
Southern and Tropical Latin America
High−income English−speaking countries
East Africa
Caribbean
Polynesia and Micronesia
−0.002
−0.001
0.000
0.001

Dependent variable: Inverse mean BMI	
Age range: 5-19 years	
Independent variable: Prevalence (BMI > +1SD) and prevalence (BMI > +2SD)	
Variables	**Coefficients (95% CI)**
Intercept	0.069 (0.068, 0.069)
Probit-transformed prevalence (BMI > +1SD)	-0.0064 (-0.0067, -0.0060)
Probit-transformed prevalence (BMI > +2SD)	-0.0010 (-0.0013, -0.00068)
Mid-age of age group	-0.0016 (-0.0016, -0.0015)
Male sex	0.00011 (-5.6e-05, 0.00028)
Study mid-year (per one more recent year since 1975)	4.3e-06 (1.9e-06, 6.7e-06)
Natural logarithm of per-capita gross domestic product	-0.00029 (-0.00033, -0.00024)
Probit-transformed prevalence (BMI > +1SD) * mid-age of age group	6.5e-05 (4.2e-05, 8.8e-05)
Probit-transformed prevalence (BMI > +2SD) * mid-age of age group	3.9e-05 (1.8e-05, 6.1e-05)
Probit-transformed prevalence (BMI > +1SD) * male sex	0.00059 (0.00040, 0.00078)
Probit-transformed prevalence (BMI > +2SD) * male sex	-0.00071 (-0.00089, -0.00053)
Number of data points used to fit the model = 17,335	

Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.962.


(Intercept)
South Asia
South East Asia
North Africa and Middle East
Eastern Europe
Southern Africa
East Asia
North Western Europe
East Africa
Central Asia
Melanesia
West Africa
Central Europe
High−income Asia Pacific
Central Africa
Caribbean
South Western Europe
Southern and Tropical Latin America
Central Latin America
High−income English−speaking countries
Andean Latin America
Polynesia and Micronesia
−0.002
−0.001
0.000
0.001
0.002

Dependent variable: Inverse mean BMI	
Age range: 5-19 years	
Independent variable: Prevalence (BMI > +1SD) and prevalence (BMI < -2SD)	
Variables	**Coefficients (95% CI)**
Intercept	0.075 (0.074, 0.075)
Probit-transformed prevalence (BMI > +1SD)	-0.0063 (-0.0064, -0.0061)
Probit-transformed prevalence (BMI < -2SD)	0.0021 (0.0019, 0.0022)
Mid-age of age group	-0.0018 (-0.0018, -0.0017)
Male sex	0.0015 (0.0012, 0.0017)
Study mid-year (per one more recent year since 1975)	-2.4e-06 (-4.8e-06, 4.0e-09)
Natural logarithm of per-capita gross domestic product	-0.00032 (-0.00036, -0.00028)
Probit-transformed prevalence (BMI > +1SD) * mid-age of age group	5.7e-05 (4.4e-05, 7.0e-05)
Probit-transformed prevalence (BMI < -2SD) * mid-age of age group	-7.1e-05 (-8.4e-05, -5.9e-05)
Probit-transformed prevalence (BMI > +1SD) * male sex	0.00029 (0.00019, 0.00039)
Probit-transformed prevalence (BMI < -2SD) * male sex	0.00044 (0.00034, 0.00055)
Number of data points used to fit the model = 15,923	

Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.962.

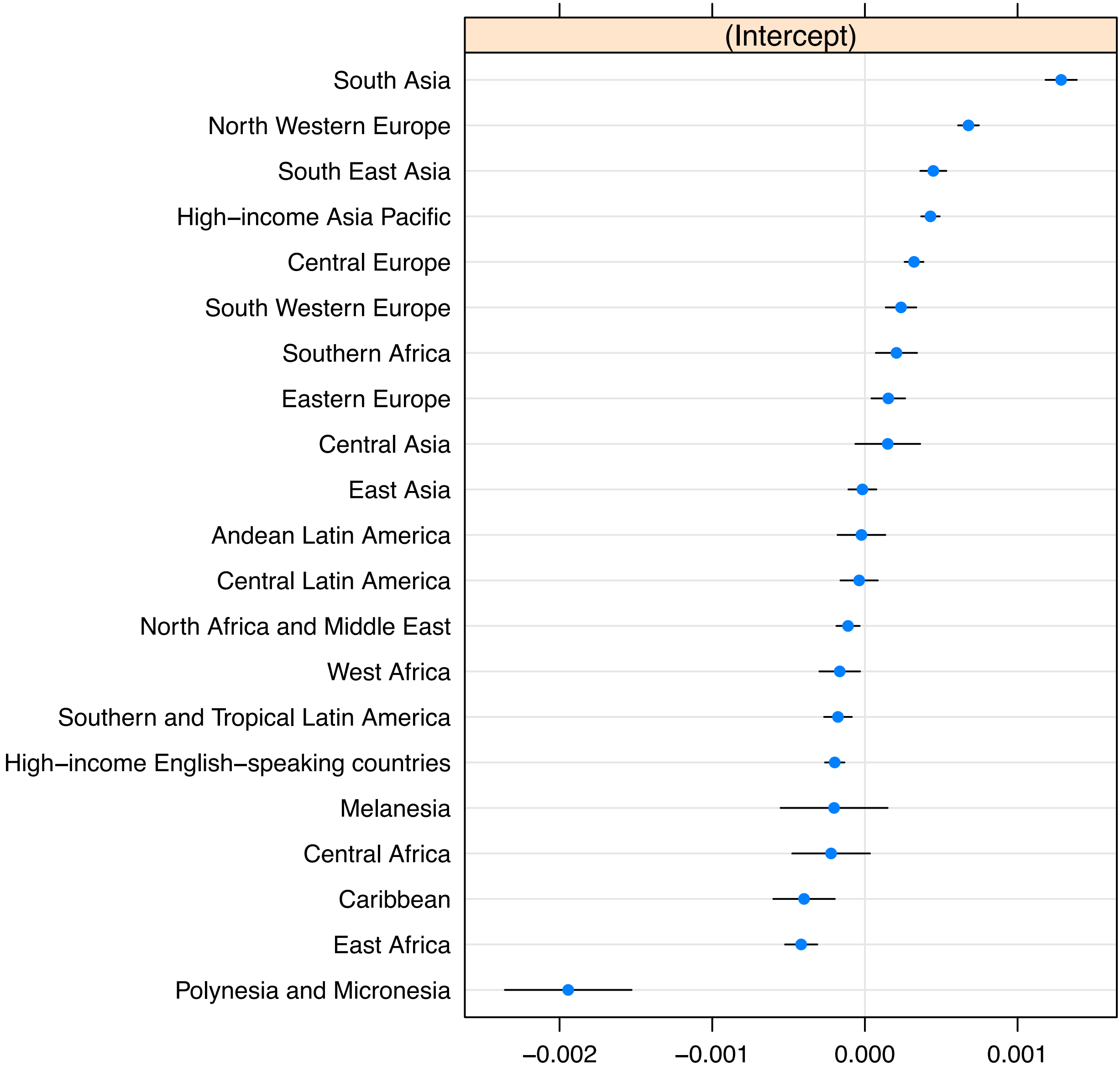

(Intercept)
South Asia
North Western Europe
South East Asia
High−income Asia Pacific
Central Europe
South Western Europe
Southern Africa
Eastern Europe
Central Asia
East Asia
Andean Latin America
Central Latin America
North Africa and Middle East
West Africa
Southern and Tropical Latin America
High−income English−speaking countries
Melanesia
Central Africa
Caribbean
East Africa
Polynesia and Micronesia
−0.002
−0.001
0.000
0.001

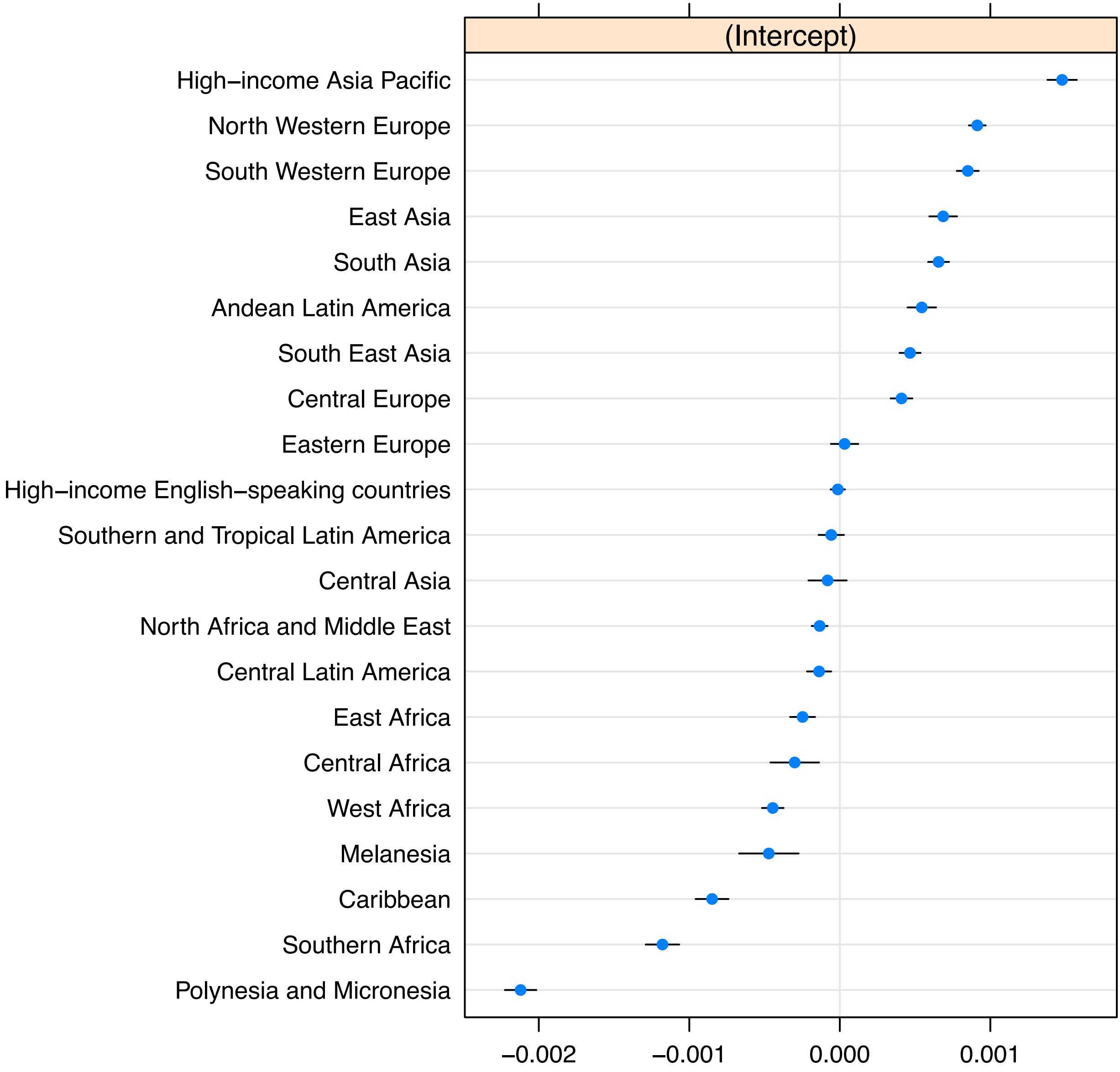
Table 2: Model specifications and regression coefficients to estimate mean BMI for adults (aged 18 years and older).

The dependent variable in all regressions was the inverse of mean BMI, fitted using a linear (mixed) model. Random intercepts for regions in regression are presented after the table of coefficients.

* denotes statistical interaction. CI: confidence interval.

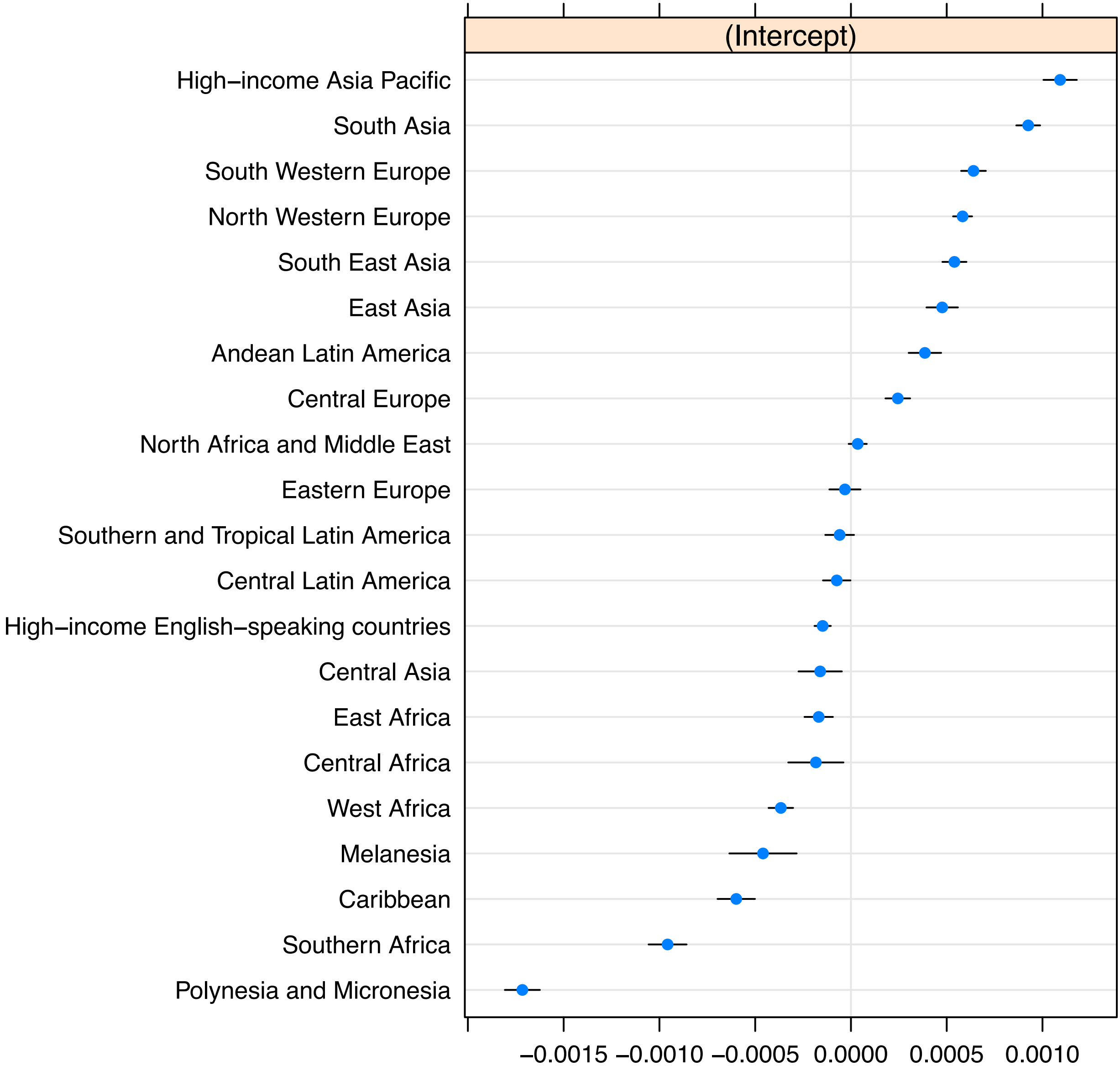
Dependent variable: Inverse mean BMI	
Age range: 18 years and older	
Independent variable: Prevalence (BMI ≥22 kg/m^2)	
Variables	**Coefficients (95% CI)**
Intercept	0.048 (0.047, 0.048)
Probit-transformed prevalence (BMI ≥22 kg/m^2)	-0.0062 (-0.0063, -0.0061)
Mid-age of age group	1.5e-06 (2.6e-0.7, 2.7e-06)
Male sex	0.00051 (0.00047, 0.00056)
Study mid-year (per one more recent year since 1975)	-2.3e-0.5 (-2.5e-0.5, -2.1e-05)
Natural logarithm of per-capita gross domestic product	-0.00038 (-0.00041, -0.00035)
Probit-transformed prevalence (BMI ≥22 kg/m^2) * mid-age of age group	1.8e-06 (5.7e-07, 3.1e-06)
Probit-transformed prevalence (BMI ≥22 kg/m^2) * male sex	0.00091 (0.00086, 0.00095)
Number of data points used to fit the model = 15,027	

Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.948.


(Intercept)
High−income Asia Pacific
North Western Europe
South Western Europe
East Asia
South Asia
Andean Latin America
South East Asia
Central Europe
Eastern Europe
High−income English−speaking countries
Southern and Tropical Latin America
Central Asia
North Africa and Middle East
Central Latin America
East Africa
Central Africa
West Africa
Melanesia
Caribbean
Southern Africa
Polynesia and Micronesia
−0.002
−0.001
0.000
0.001

Dependent variable: Inverse mean BMI	
Age range: 18 years and older	
Independent variable: Prevalence (BMI ≥23 kg/m^2)	
Variables	**Coefficients (95% CI)**
Intercept	0.045 (0.044, 0.045)
Probit-transformed prevalence (BMI ≥23 kg/m^2)	-0.0061 (-0.0062, -0.0061)
Mid-age of age group	8.5e-06 (7.5e-06, 9.5e-06)
Male sex	0.00062 (0.00058, 0.00065)
Study mid-year (per one more recent year since 1975)	-1.8e-05 (-1.9e-05, -1.6e-05)
Natural logarithm of per-capita gross domestic product	-0.00027 (-0.00030, -0.00025)
Probit-transformed prevalence (BMI ≥23 kg/m^2) * mid-age of age group	-6.2e-07 (-1.7e-06, 5.0e-07)
Probit-transformed prevalence (BMI ≥23 kg/m^2) * male sex	0.00087 (0.00083, 0.00091)
Number of data points used to fit the model = 15,076	

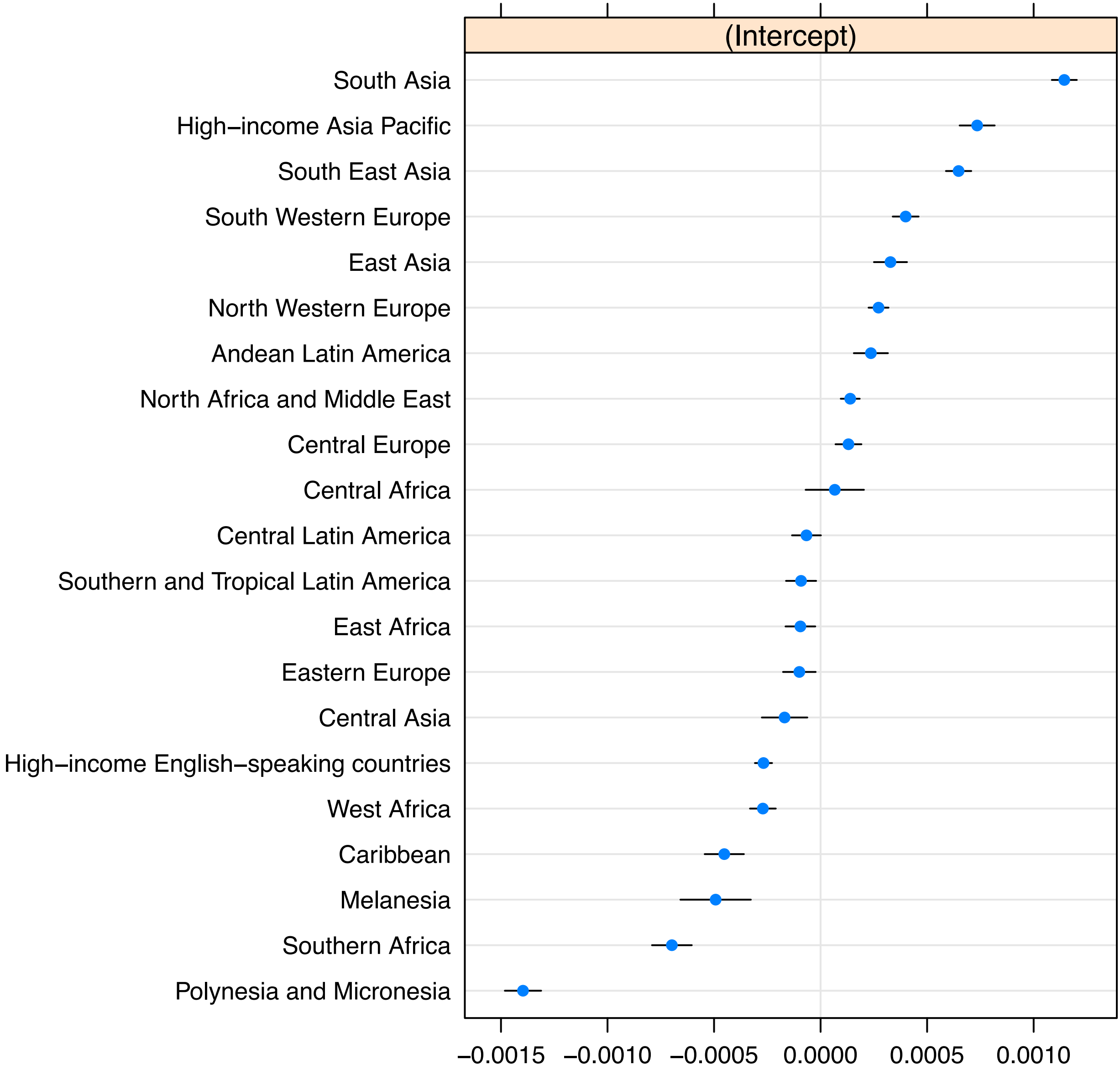
Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.958.



(Intercept)
High−income Asia Pacific
South Asia
South Western Europe
North Western Europe
South East Asia
East Asia
Andean Latin America
Central Europe
North Africa and Middle East
Eastern Europe
Southern and Tropical Latin America
Central Latin America
High−income English−speaking countries
Central Asia
East Africa
Central Africa
West Africa
Melanesia
Caribbean
Southern Africa
Polynesia and Micronesia
−0.0015
−0.0010
−0.0005
0.0000
0.0005
0.0010

Dependent variable: Inverse mean BMI	
Age range: 18 years and older	
Independent variable: Prevalence (BMI ≥24 kg/m^2)	
Variables	**Coefficients (95% CI)**
Intercept	0.042 (0.042, 0.042)
Probit-transformed prevalence (BMI ≥24 kg/m^2)	-0.0059 (-0.0060, -0.0059)
Mid-age of age group	1.1e-05 (1.0e-05, 1.2e-05)
Male sex	0.00064 (0.00061, 0.00067)
Study mid-year (per one more recent year since 1975)	-1.3e-05 (-1.5e-05, -1.2e-05)
Natural logarithm of per-capita gross domestic product	-0.00019 (-0.00022, -0.00016)
Probit-transformed prevalence (BMI ≥24 kg/m^2) * mid-age of age group	-4.8e-06 (-5.8e-06, -3.7e-06)
Probit-transformed prevalence (BMI ≥24 kg/m^2) * male sex	0.00080 (0.00076, 0.00084)
Number of data points used to fit the model = 15,085	

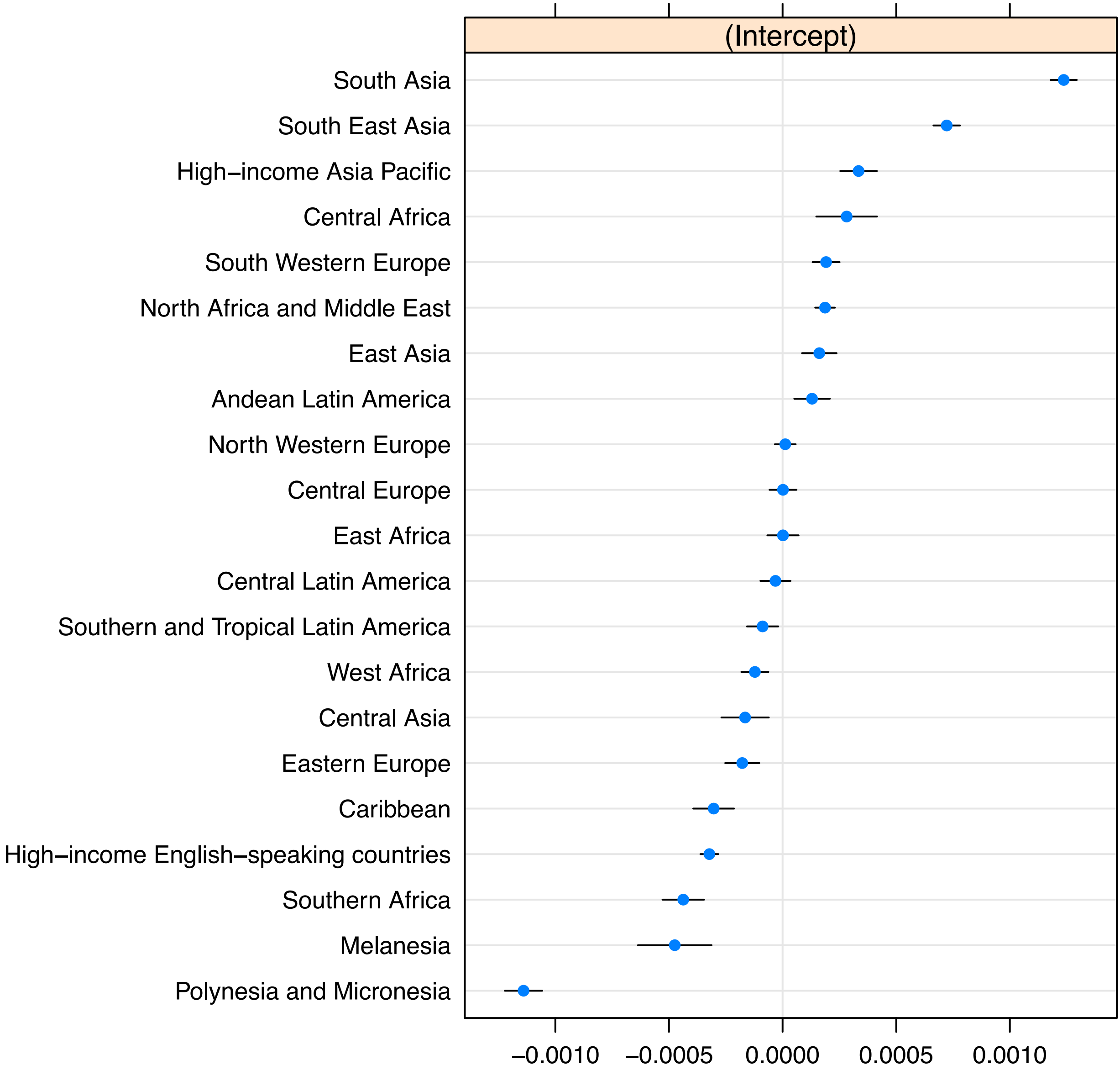
Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.962.



(Intercept)
South Asia
High−income Asia Pacific
South East Asia
South Western Europe
East Asia
North Western Europe
Andean Latin America
North Africa and Middle East
Central Europe
Central Africa
Central Latin America
Southern and Tropical Latin America
East Africa
Eastern Europe
Central Asia
High−income English−speaking countries
West Africa
Caribbean
Melanesia
Southern Africa
Polynesia and Micronesia
−0.0015
−0.0010
−0.0005
0.0000
0.0005
0.0010

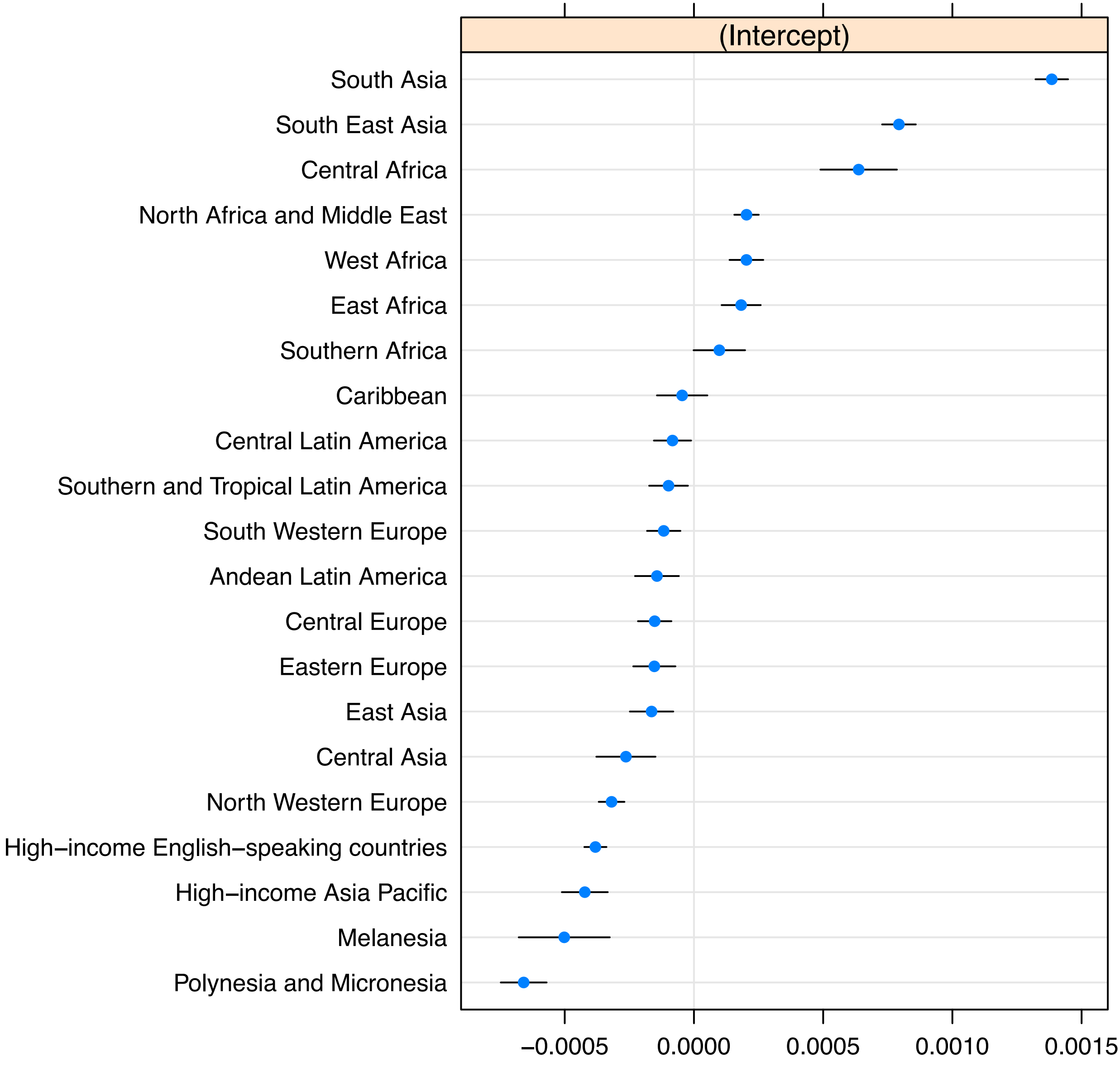
Dependent variable: Inverse mean BMI	
Age range: 18 years and older	
Independent variable: Prevalence (BMI ≥25 kg/m^2)	
Variables	**Coefficients (95% CI)**
Intercept	0.040 (0.040, 0.040)
Probit-transformed prevalence (BMI ≥25 kg/m^2)	-0.0058 (-0.0059, -0.0058)
Mid-age of age group	9.8e-06 (8.9e-06, 1.1e-05)
Male sex	0.00059 (0.00056, 0.00062)
Study mid-year (per one more recent year since 1975)	-8.5e-06 (-1.0e-05, -6.8e-06)
Natural logarithm of per-capita gross domestic product	-0.00012 (-0.00014, -0.000091)
Probit-transformed prevalence (BMI ≥25 kg/m^2) * mid-age of age group	-7.5e-06 (-8.5e-06, -6.4e-06)
Probit-transformed prevalence (BMI ≥25 kg/m^2) * male sex	0.00076 (0.00072, 0.00079)
Number of data points used to fit the model = 15,061	

Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.963.


(Intercept)
South Asia
South East Asia
High−income Asia Pacific
Central Africa
South Western Europe
North Africa and Middle East
East Asia
Andean Latin America
North Western Europe
Central Europe
East Africa
Central Latin America
Southern and Tropical Latin America
West Africa
Central Asia
Eastern Europe
Caribbean
High−income English−speaking countries
Southern Africa
Melanesia
Polynesia and Micronesia
−0.0010
−0.0005
0.0000
0.0005
0.0010

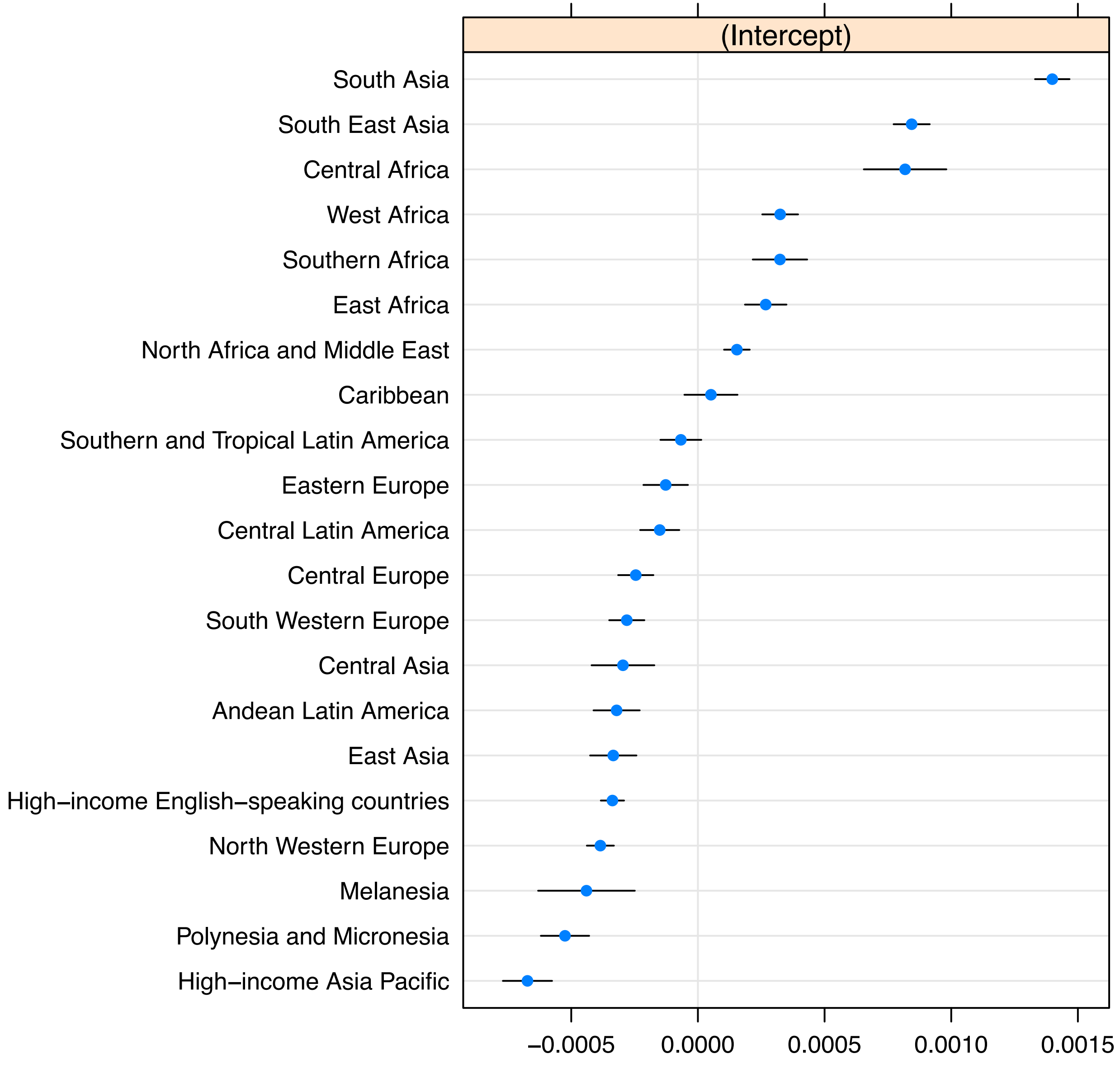
Dependent variable: Inverse mean BMI	
Age range: 18 years and older	
Independent variable: Prevalence (BMI ≥27 kg/m^2)	
Variables	**Coefficients (95% CI)**
Intercept	0.037 (0.037, 0.037)
Probit-transformed prevalence (BMI ≥27 kg/m^2)	-0.0058 (-0.0058, -0.0057)
Mid-age of age group	1.2e-07 (-1.1e-06, 1.4e-06)
Male sex	0.00033 (0.00029, 0.00037)
Study mid-year (per one more recent year since 1975)	2.5e-06 (7.1e-07, 4.4e-06)
Natural logarithm of per-capita gross domestic product	-4.9e-05 (-7.8e-05, -2.0e-05)
Probit-transformed prevalence (BMI ≥27 kg/m^2) * mid-age of age group	-9.2e-06 (-1.0e-05, -8.0e-06)
Probit-transformed prevalence (BMI ≥27 kg/m^2) * male sex	0.00059 (0.00055, 0.00063)
Number of data points used to fit the model = 14,901	

Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.955.


(Intercept)
South Asia
South East Asia
Central Africa
North Africa and Middle East
West Africa
East Africa
Southern Africa
Caribbean
Central Latin America
Southern and Tropical Latin America
South Western Europe
Andean Latin America
Central Europe
Eastern Europe
East Asia
Central Asia
North Western Europe
High−income English−speaking countries
High−income Asia Pacific
Melanesia
Polynesia and Micronesia
−0.0005
0.0000
0.0005
0.0010
0.0015

Dependent variable: Inverse mean BMI	
Age range: 18 years and older	
Independent variable: Prevalence (BMI ≥28 kg/m^2)	
Variables	**Coefficients (95% CI)**
Intercept	0.036 (0.035, 0.036)
Probit-transformed prevalence (BMI ≥28 kg/m^2)	-0.0057 (-0.0058, -0.0057)
Mid-age of age group	-6.6e-06 (-8.1e-06, -5.0e-06)
Male sex	0.00012 (0.00007, 0.00017)
Study mid-year (per one more recent year since 1975)	6.9e-06 (4.9e-06, 8.9e-06)
Natural logarithm of per-capita gross domestic product	-3.2e-05 (-6.3e-05, -2.3e-07)
Probit-transformed prevalence (BMI ≥28 kg/m^2) * mid-age of age group	-9.7e-06 (-1.1e-05, -8.4e-06)
Probit-transformed prevalence (BMI ≥28 kg/m^2) * male sex	0.00048 (0.00043, 0.00053)
Number of data points used to fit the model = 14,769	

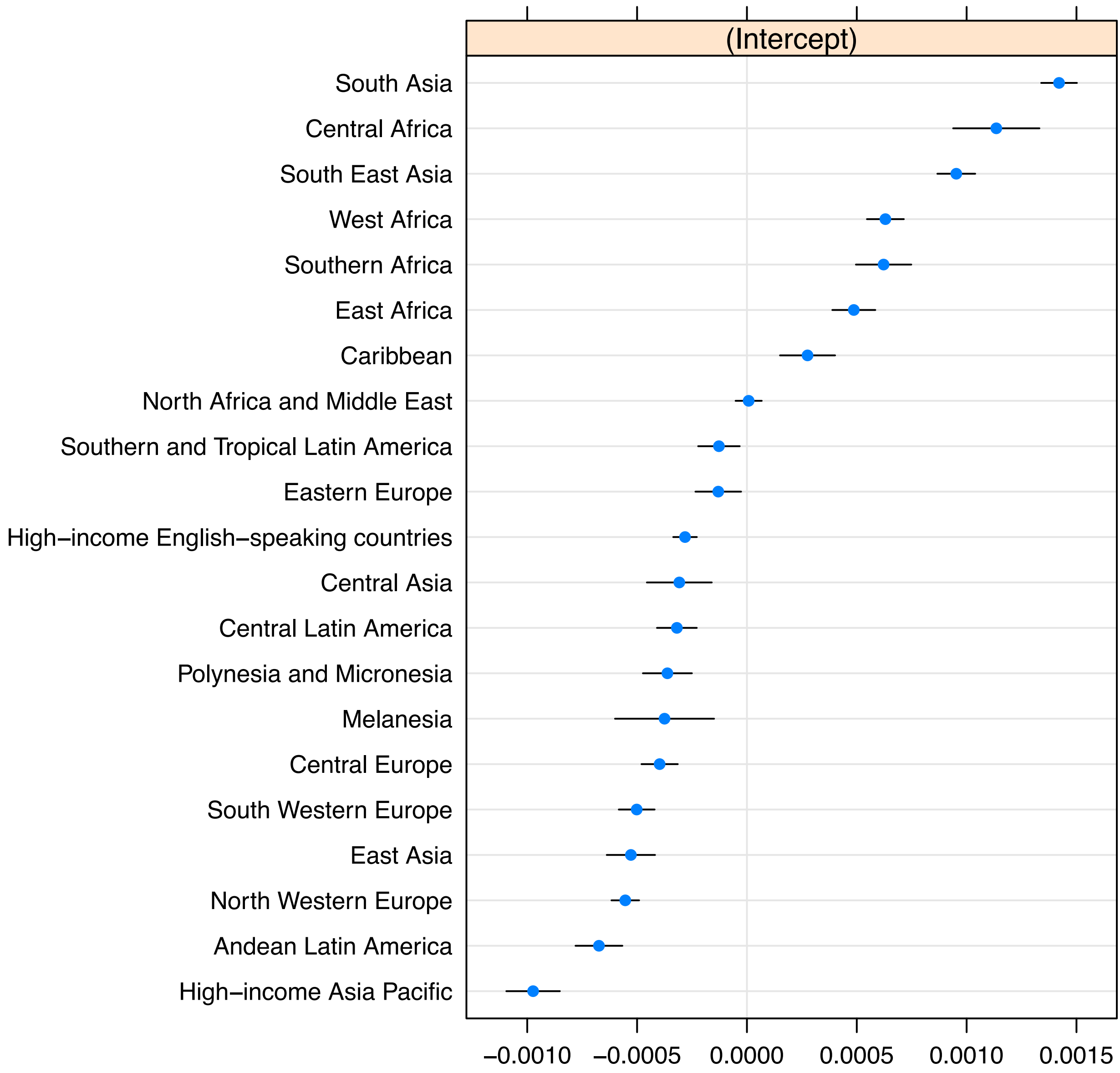
Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.947.



(Intercept)
South Asia
South East Asia
Central Africa
West Africa
Southern Africa
East Africa
North Africa and Middle East
Caribbean
Southern and Tropical Latin America
Eastern Europe
Central Latin America
Central Europe
South Western Europe
Central Asia
Andean Latin America
East Asia
High−income English−speaking countries
North Western Europe
Melanesia
Polynesia and Micronesia
High−income Asia Pacific
−0.0005
0.0000
0.0005
0.0010
0.0015

Dependent variable: Inverse mean BMI	
Age range: 18 years and older	
Independent variable: Prevalence (BMI ≥30 kg/m^2)	
Variables	**Coefficients (95% CI)**
Intercept	0.034 (0.034, 0.035)
Probit-transformed prevalence (BMI ≥30 kg/m^2)	-0.0058 (-0.0059, -0.0057)
Mid-age of age group	-2.2e-05 (-2.4e-05, -1.9e-05)
Male sex	-0.00022 (-0.00030, -0.00014)
Study mid-year (per one more recent year since 1975)	1.1e-05 (8.5e-06, 1.3e-05)
Natural logarithm of per-capita gross domestic product	-2.2e-05 (-6.0e-05, 1.5e-05)
Probit-transformed prevalence (BMI ≥30 kg/m^2) * mid-age of age group	-9.3e-06 (-1.1e-05, -7.6e-06)
Probit-transformed prevalence (BMI ≥30 kg/m^2) * male sex	0.00041 (0.00035, 0.00047)
Number of data points used to fit the model = 14,400	

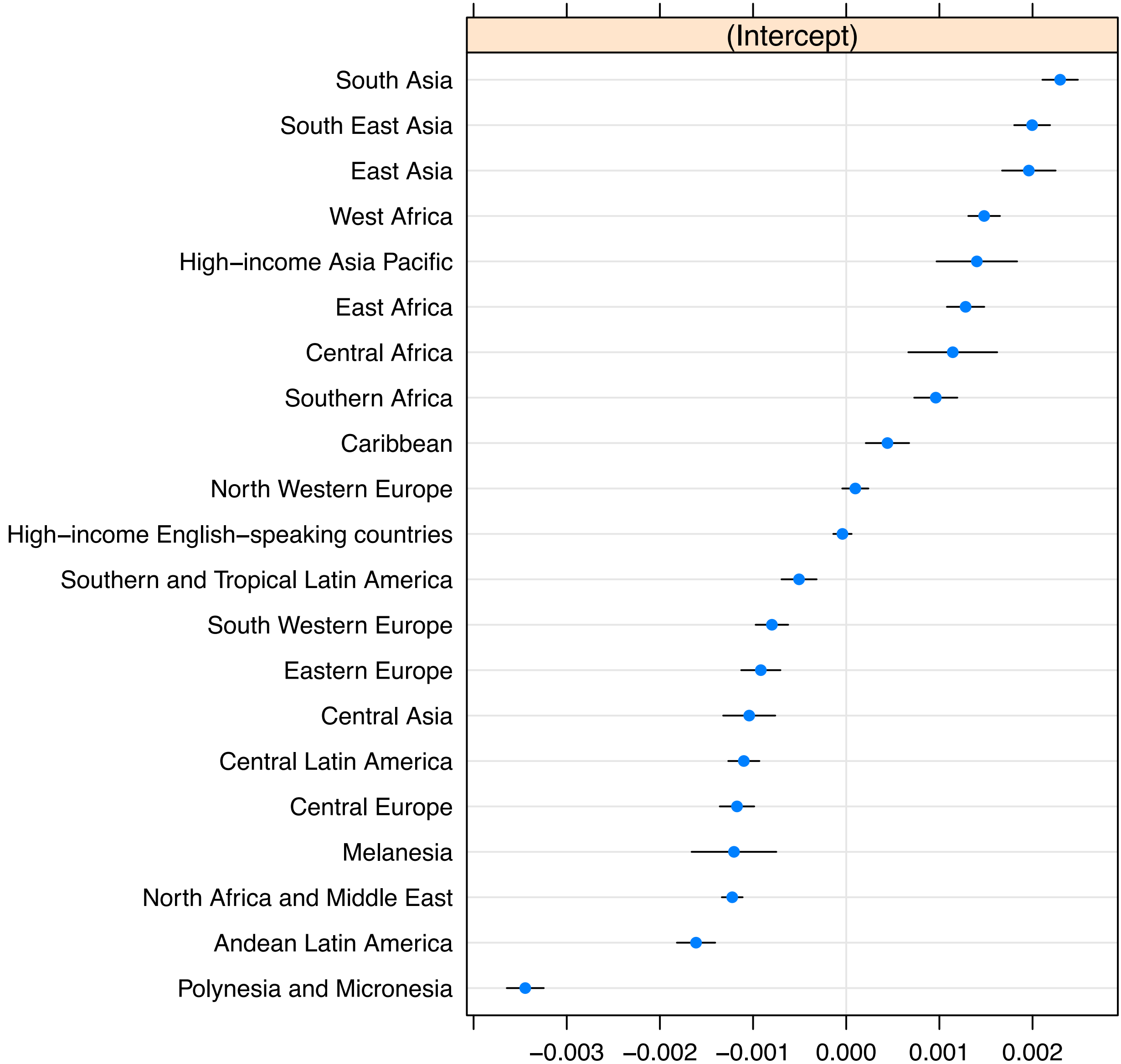
Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.925.



(Intercept)
South Asia
Central Africa
South East Asia
West Africa
Southern Africa
East Africa
Caribbean
North Africa and Middle East
Southern and Tropical Latin America
Eastern Europe
High–income English–speaking countries
Central Asia
Central Latin America
Polynesia and Micronesia
Melanesia
Central Europe
South Western Europe
East Asia
North Western Europe
Andean Latin America
High–income Asia Pacific
–0.0010
–0.0005
0.0000
0.0005
0.0010
0.0015

Dependent variable: Inverse mean BMI	
Age range: 18 years and older	
Independent variable: Prevalence (BMI ≥40 kg/m^2)	
Variables	**Coefficients (95% CI)**
Intercept	0.036 (0.034, 0.037)
Probit-transformed prevalence (BMI ≥40 kg/m^2)	-0.0051 (-0.0053, -0.0049)
Mid-age of age group	-5.2e-05 (6.2e-05, -4.1e-05)
Male sex	0.0020 (0.0017, 0.0024)
Study mid-year (per one more recent year since 1975)	-5.1e-06 (-1.0e-05, -1.6e-07)
Natural logarithm of per-capita gross domestic product	-0.00051 (-0.00059, -0.00044)
Probit-transformed prevalence (BMI ≥40 kg/m^2) * mid-age of age group	5.4e-06 (8.0e-07, 9.9e-06)
Probit-transformed prevalence (BMI ≥40 kg/m^2) * male sex	0.0011 (0.0008, 0.0012)
Number of data points used to fit the model = 9,376	

Traditional R^2 is not clearly defined for mixed-effect models. The conditional R^2 for the model, which describes the proportion of variance explained by both fixed and random factors,[4] was 0.730.


(Intercept)
South Asia
South East Asia
East Asia
West Africa
High–income Asia Pacific
East Africa
Central Africa
Southern Africa
Caribbean
North Western Europe
High–income English–speaking countries
Southern and Tropical Latin America
South Western Europe
Eastern Europe
Central Asia
Central Latin America
Central Europe
Melanesia
North Africa and Middle East
Andean Latin America
Polynesia and Micronesia
–0.003
–0.002
–0.001
0.000
0.001
0.002

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4 Nakagawa S, Schielzeth H. A general and simple method for obtaining R2 from generalized linear mixed-effects models. Methods Ecol Evol 2013; 4(2): 133-42.