**S1 Supporting Information. Code for the software package SAS for a logistic regression analysis and Firth’s bias correction**

\*Load raw dataset and implement filter criteria;

\*The following commands will analyze only variant CFH\_Arg1210Cys;

libname 'name';

data geographic;

set lees.'name';

if include=1;

run;

proc print data=geographic;

run;

\*Create variables to summarize data per geographical region;

data Add;

length samplename $27;

samplename = 'fake';

continent=1;

output;

samplename = 'fake';

continent=3;

output;

samplename = 'fake';

continent=4;

output;

samplename = 'fake';

continent=5;

output;

samplename = 'fake';

continent=6;

output;

run;

proc print data=Add;

run;

data geographic2;

set geographic Add;

run;

\*Logistic regression with Firth correction for each of the regions as reference;

\*Using Proc logistic to suppresses the display of results;

\*For more information check http://support.sas.com/en/support-home.html ;

proc logistic descending data =geographic2;

class continent (param=ref ref='1') CFH\_Arg1210Cys ;

model CFH\_Arg1210Cys = continent/cl firth;

output out=geographic\_out predicted=pred lower=pred\_low upper=pred\_up;

run;

proc logistic descending data =geographic2;

class continent (param=ref ref='3') CFH\_Arg1210Cys ;

model CFH\_Arg1210Cys = continent/cl firth;

run;

proc logistic descending data =geographic2;

class continent (param=ref ref='4') CFH\_Arg1210Cys ;

model CFH\_Arg1210Cys = continent/cl firth;

run;

proc logistic descending data =geographic2;

class continent (param=ref ref='5') CFH\_Arg1210Cys ;

model CFH\_Arg1210Cys = continent/cl firth;

run;

proc logistic descending data =geographic2;

class continent (param=ref ref='6') CFH\_Arg1210Cys ;

model CFH\_Arg1210Cys = continent/cl firth;

run;

\* Calculate estimated allele frequency per geographical region;

data geographic\_out2;

set geographic\_out;

if samplename='fake';

pred\_low=pred\_low\*100;

pred\_up=pred\_up\*100;

pred=pred\*100;

keep continent pred pred\_up pred\_low;

run;

proc print data=geographic\_out2;

var continent pred\_low pred pred\_up;

run;