

## Appendix 1: Model building and validation strategy

A predictive model for PTB was developed using three consecutive model development steps as outlined by Merlo et al 2016 for multilevel data. These steps included development of a logistic regression model, followed by development of a multilevel logistic regression model with a random intercept, with and without including neighborhood SES. These three steps allow us to systematically develop a predictive model containing individual and neighborhood level variables.

Predictive models were developed in the bootstrapped sample (of equal size of the study sample) with 1000 replications (training dataset). A conventional multivariable logistic regression model, which included individual level variables associated with PTB ( $p < 0.25$ ), was developed using a backward variable elimination approach. Neighborhood level information was not included in this model. The individual level variable with the largest p-value was first eliminated from the full model, then, the variable with the second largest p-value was eliminated, and so on. Variables were retained in the model if the associated p-value was  $< 0.1$  or if the variable was clinically relevant. We used a p-value  $< 0.1$ , instead of the conventional p-value  $< 0.05$  to increase the chance of retention of individual level variables in the final model.

A two-level multilevel logistic regression model with a random intercept for neighborhood (DA) was developed, with 5,297 women nested into 1,501 DAs; thus, on average each DA included three women. This model contained all of the individual level predictors identified in the conventional logistic regression model. Then, the neighborhood SES variable (Pampalon material deprivation index or median personal income) was added in the multilevel logistic regression model. Different SES measures have been used across studies to measure neighborhood SES; thus, two multilevel models (one for material deprivation index and another for median personal income) were developed to explore whether the predictive ability of neighborhood SES on the risk of PTB differs by the different measures of neighborhood SES used. Multilevel models provided estimates involving the association between neighborhood SES and PTB (odds ratio (OR)) and the neighborhood variation in PTB (including intra-class correlation coefficient (ICC) and

median odds ratio (MOR)). Additionally, the proportional change in variance between multilevel models with neighborhood SES and without neighborhood SES was calculated to assess the proportion of the neighborhood variance explained by neighborhood SES. The discriminative ability of three predictive models (conventional logistic regression model, multilevel logistic regression model with deprivation index, and multilevel regression model with median household income) was assessed in the bootstrapped sample and the study sample using the AUC of the receiver operating characteristic curve.