

Introduction

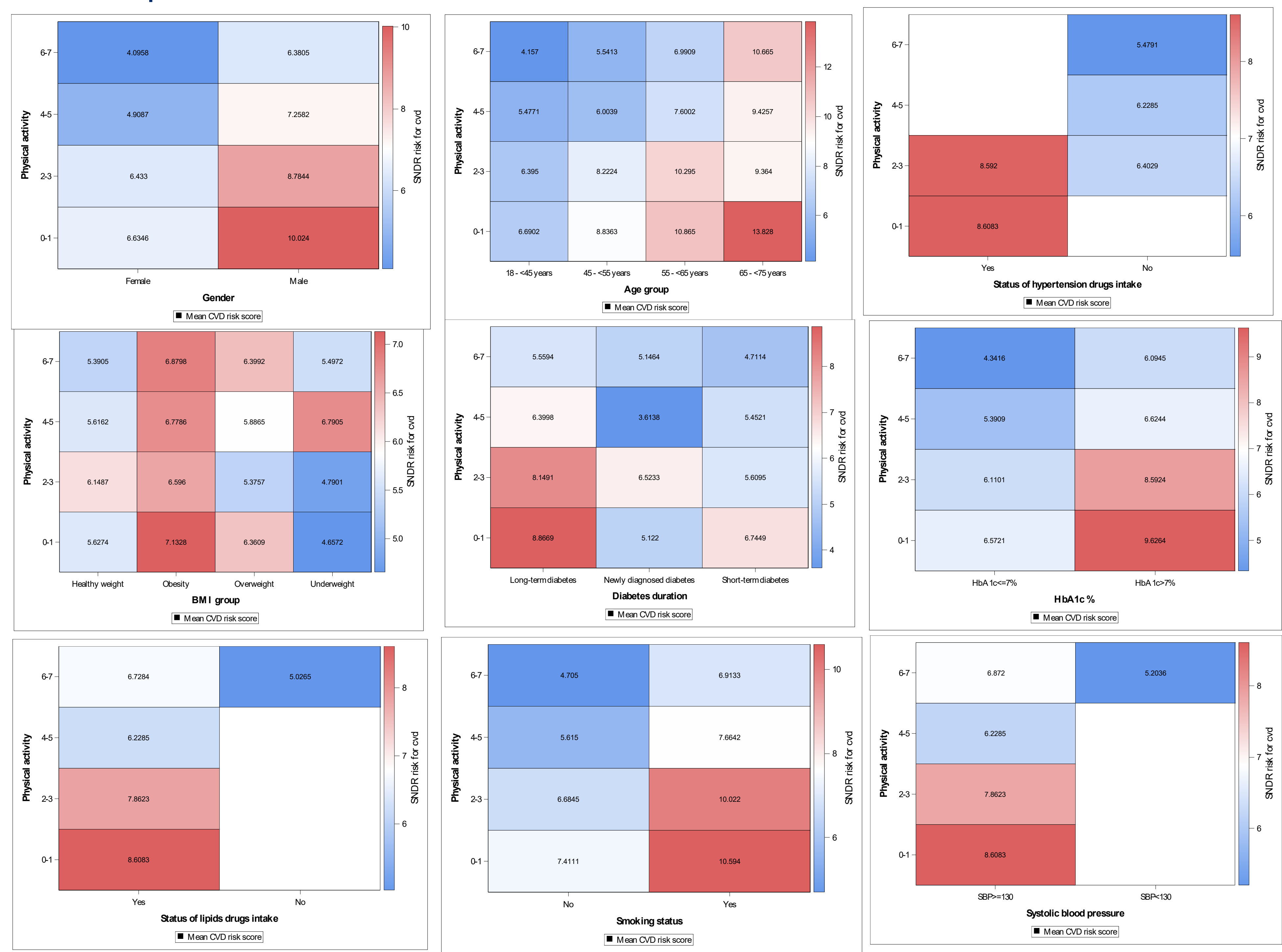
- Cardiovascular disease (CVD) is among the leading causes of death and disability worldwide. An early diagnosis of CVD can potentially cure patients and save innumerable lives. The CVD risk prediction is a cost-effective way to identify susceptible population.
- CVD is caused by multiple factors. Some of the CVD risk factors are sex (yes, no), age group ( 18<= years < 45, 45 <= years < 55, 55 <= years < 65, 65 <= years < 75), SBP ≥ 130 mmHg (yes, no), smoking status (yes, no), hypertension drug status (yes, no), lipid drug intake status (yes, no), BMI groups (kg/m<sup>2</sup>) (underweight <= 18.5, 18.5 < healthy weight <= 24.9, 24.9 < overweight <= 29.9, obesity > 29.9), diabetes duration group ( newly diagnosed diabetes <=1 year, 1 year < short-term diabetes <=5 years, long-term diabetes >5 years). The role of physical activity (number of days (0-7days) in the last week with at least 30 minutes of activity) will also be explored.
- At Novo Nordisk, we experimented using heat maps, a data visualization tool to understand relationship between CVD risk predictors, role of physical activity, and CVD risk scores. This is an important area of research as it can help to identify the strategies for preventing and managing CVD.

Methods

- Data was simulated on CVD risk predictors and physical activity. CVD risk scores were calculated using the established risk assessment tool, the Swedish National Diabetes (SNDR) Register Risk Score<sup>1</sup>
- CVD risk prediction models estimate whether individuals are at risk of experiencing a CVD event. A risk score above 20% indicates a CVD risk in 5 years <sup>2,3</sup>.
- A logistic regression analysis was also done to estimate predicted probabilities and the odds ratios of each level of CVD predictor variable with each level of physical activity while keeping other variables fixed.
- Heatmaps were created using two approaches, first method based on mean risk scores and the second based on odds ratio of CVD risk in 5 years

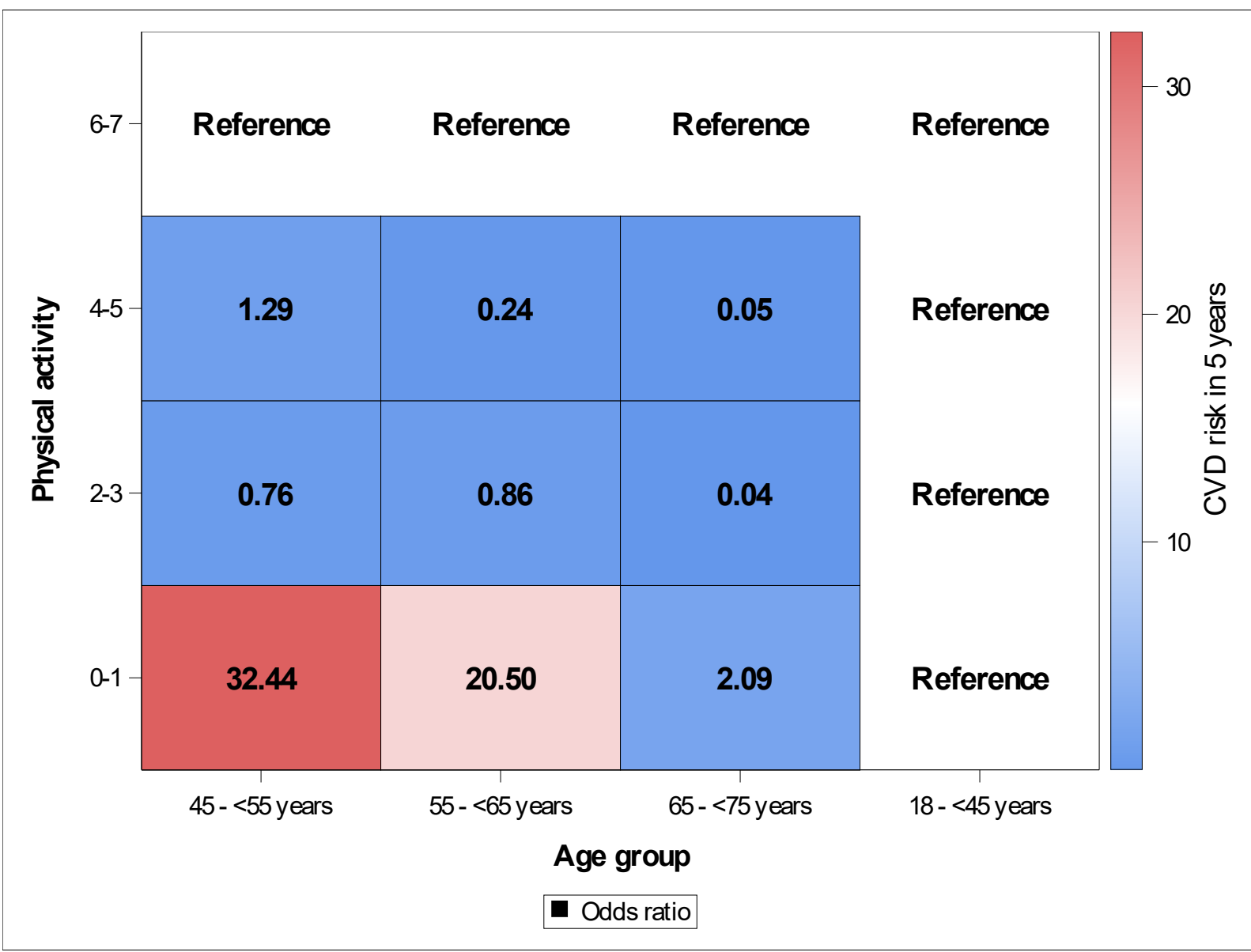
Results

Heat map on mean risk scores



High risk for CVD could be identified in populations for each predictor by largest value in the cells indicated by darkest red.

Heat maps on odds ratio of CVD risk in 5 years



The interaction between predictor age group and physical activity was significant (pvalue <0.05). Odds ratio with highest risk for CVD risk in 5 years could be identified in populations for predictor by values in the cells with darkest red as compared with reference levels

Conclusions

- CVD risk factors can be useful for developing targeted interventions to reduce CVD risk in high-risk populations.
- The proposed methodology can also be employed in detecting other diseases.
- The performance of the proposed model using simulated data can be assessed by comparison with real world data/clinical trial data.

References: 1. Cederholm et al. Diabetes Care. 2008;31(10):2038-2043.  
2. Williams, B., et al., British Hypertension Society guidelines for hypertension management 2004 (BHS-IV): summary. Bmj. 2004; 328(7440): p. 634-40. 3. Wallis, Erica J., et al., "Cardiovascular and coronary risk estimation in hypertension management." Heart 88.3 (2002): 306-312.

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