

DEVELOPMENT OF PREDICTIVE HEART RISK SCORE: A PREDICTIVE MOBILE APPS

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Product Background

- Predictive Model of Heart Risk Score
- Non-Laboratory-Based Heart Risk Score (NLHRS) Apps has been developed based on risk prediction models produced from novel machine learning (ML) methodology.
- The NLHRS Apps recommended formal risk assessment tool to assess cardiovascular diseases (CVDs) risk for the primary prevention of CVDs in people.
- This apps contains 14 variables/features which are used to determine whether a person has CVDs.

Novelty/ Originality

- Non-Laboratory Based Features to detect the CVD risk.
- Modern Computing Methods
- Developing New Scoring Methodology (Shifting from Logistic Regression Scores to ML-based Scores).

Inventiveness

Predictive Apps – able to predict the heart risk score and able to give early warning of the heart risk.

Benefits/Usefulness/ Applicability

- User-friendly smartphone application to non medical background.
- Can be used to give a warning/early of detection of heart risk.
- Estimate the level of heart risk.
- Improve and adaptation of healthy lifestyles.

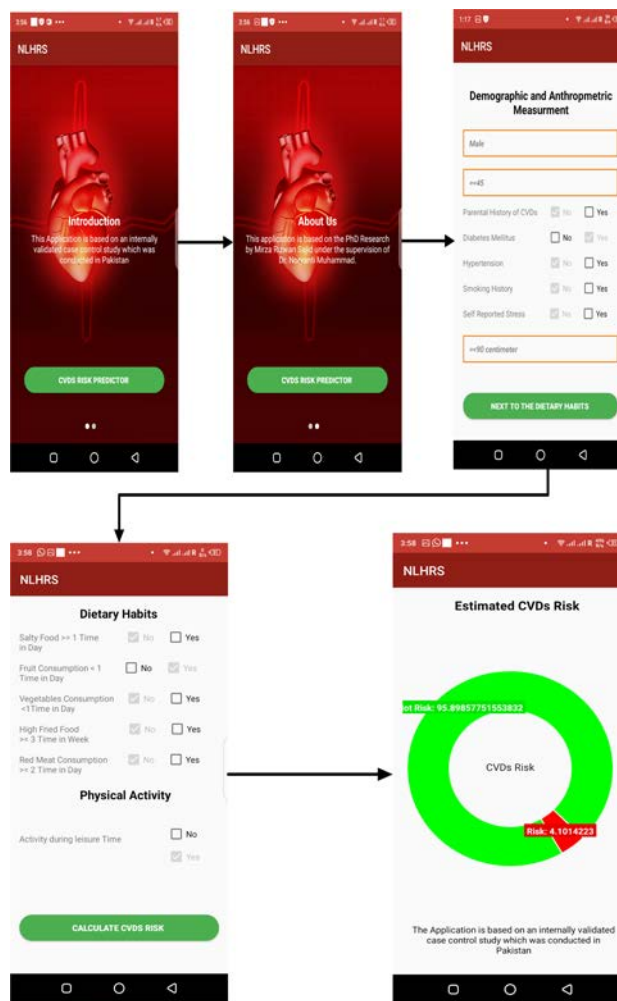
Status of Innovation

- **TRL Level - TRL4** (Technology Development)
- **Status of Product** – Ready to be used (appropriate to Pakistan community)
- *Confirmed on basic formulation of model*
- *Development of Graphical User Interface (GUI).*

Publication

- *Modifiable risk factors and overall cardiovascular mortality: Moderation of urbanization. Journal of Public Health Research, 9(4): 410-416. (2020). (Q2)*
- *Non-clinical Features in Predictive Modeling of Cardiovascular Diseases:A Machine Learning Approach. (2021). (Accepted in Interdisciplinary Sciences- Computational Life Sciences: IF: 1.52).*
- *Development of Non-Laboratory Based Risk Prediction Models for Cardiovascular Diseases Using Conventional and Machine Learning Methods (in progress).*

Product Image and Product Characteristics/Results



Environmental Impact

- No Environmental Impact

State of the Art/ Methods

- Transformation of Complex Machine Learning Methods into Simple Statistical Model

$$NLHRS = w_1(f_1) + w_2(f_2) + \dots + w_{13}(f_{13})$$

$$P(CVDs = 1) = 1 / (1 + e^{-Z_i})$$

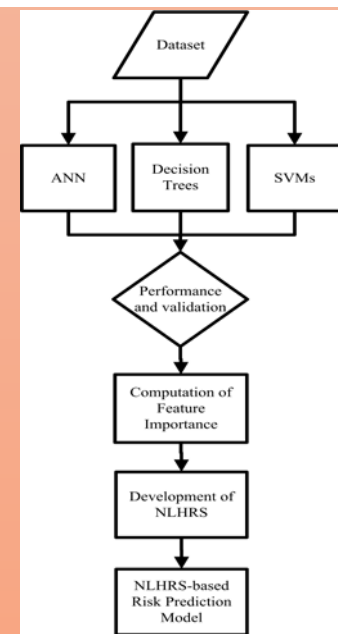
$$Z_i = -6.131 + 0.415(\text{Male}) + 0.174(NLHRS)$$

$$Z_i = -6.131 + 0(\text{Female}) + 0.174(NLHRS)$$

$$P(CVDs = 1) = 1 / (1 + e^{-(-3.152)})$$

$$P(CVDs = 1) = 0.041$$

$$\% \text{ of Risk of CVDs} = 0.041 * 100 = 4.10\%$$



Marketability & Commercialisation

Market Study-

- Estimated 22 Million Android-users in Pakistan.
- Estimated 76% market share Malaysian Android users.
- National Heart Institute (IJN).
- Ministry of Health (KKM) and Policy Maker.
- **Technology Transfer Potential** – National Heart Institute (IJN), Ministry of Health (KKM) and Policy Maker.

Cost Analysis (Planning)

- One-Time Download
- Free for very basic information
- One off payments apps (Upgrade Charged)

Market Competitive

At Malaysia, we do not have any yet. However, at UK we have QRISK®3-2018 risk calculator.

Collaboration/Industrial Partner

- KKM/IMR/CRC/IJN and PIC

