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Beyond the Pooled Cohort Equations: Challenges of ASCVD Risk Estimation in Qatar's Primary Care Population

Husameldin Elhimadie[1]*, Dinas Idris[2]

[1]MBBS, MRCGP Department of Family Medicine, Primary Health Care Corporation (PHCC), Doha, Qatar
[2]MBBS, MRCGP Department of Family Medicine, National Health Service (NHS), United Kingdom

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***Corresponding author:** Husameldin Elhimadie
MBBS, MRCGP Department of Family Medicine, Primary Health Care Corporation (PHCC), Doha, Qatar

Abstract **Review Article**

Background: Cardiovascular disease (CVD) remains a leading cause of morbidity and mortality in Qatar [1,2]. The Atherosclerotic Cardiovascular Disease (ASCVD) risk estimator, which implements the Pooled Cohort Equations (PCE), is widely used to guide preventive interventions but has not been formally validated for the Qatari primary-care population [1,2]. ***Objective:*** To evaluate limitations of ASCVD risk estimation in Qatar's primary care population and compare its scope, predictors, and clinical limitations with QRISK3 and AHA PREVENT [1,3,4]. ***Discussion:*** Important limitations include age restrictions, under-representation of high-risk ethnic groups, simplified treatment of diabetes, and omission of several recognised risk-enhancing conditions such as severe mental illness, inflammatory disease, and corticosteroid exposure [1,5–13]. ***Conclusion:*** Cardiovascular risk assessment in Qatar should integrate risk calculators with structured clinical judgement until locally validated prediction tools become available. Prospective validation studies using Qatari and Gulf population data should be prioritised.

Keywords: ASCVD; cardiovascular risk; primary care; Qatar; PREVENT; QRISK3; cardiovascular prevention.

INTRODUCTION

Cardiovascular risk assessment is central to preventive care in primary care practice. The PCE-based ASCVD risk estimator has been widely used to guide cardiovascular risk assessment [1]. However, its applicability to the population served in Qatar is increasingly uncertain [2].

Primary Health Care Corporation (PHCC) clinics manage a heterogeneous population, including Qatari nationals and a large expatriate workforce, particularly from South Asia and North Africa [2]. A secondary analysis of the nationally representative 2012 Qatar STEPwise Survey estimated diabetes mellitus prevalence at 10.4% among Qatari adults aged 18–64 years, correcting an earlier estimate of 16.7% from the original survey [14]; PHCC data similarly point to a substantial burden of non-communicable disease and cardiovascular risk factors in the primary care population [2]. In this setting, reliance on a 10-year risk model derived from Western cohorts may fail to identify patients at high lifetime risk, particularly those developing disease in their 30s and early 40s [1,6].

This narrative review and commentary draws upon contemporary cardiovascular risk prediction literature, major international guidelines, and observations from routine primary care practice in Qatar. The objective is to examine limitations of currently used cardiovascular risk prediction tools and to discuss their implications for preventive care in a diverse Middle Eastern primary care population.

Clinical Limitations of the ASCVD Estimator

Key limitations observed in routine practice include:

- **Age Restriction:** Patients under 40 years are excluded from 10-year PCE risk estimation [1].
- **Diabetes Oversimplification:** Diabetes is treated as a binary variable. Evidence demonstrates that younger age at diabetes diagnosis is associated with increased cardiovascular and mortality risk, while diabetes duration and glycaemic control provide clinically relevant information not captured by the ASCVD estimator [1,6].
- **Ethnicity:** High-risk populations such as South Asian expatriates—who face heightened premature coronary risk and excess mortality

compared to Western derivation cohorts—are under-represented [1,7].

- **Missing Comorbidities:** Chronic inflammatory conditions (e.g., systemic lupus erythematosus, rheumatoid arthritis), long-term corticosteroid exposure, and severe mental illness (SMI) are excluded [8–13]. Severe mental illness is associated with substantially increased cardiovascular morbidity and mortality, while atypical antipsychotic therapy may further contribute to adverse metabolic and cardiovascular risk profiles, yet these factors remain uncaptured by ASCVD [8].

Comparison with Alternative Models

Alternative tools address several gaps in traditional 10-year ASCVD estimation. QRISK3 incorporates a broader set of clinical and demographic variables, while the AHA PREVENT equations offer updated cardiometabolic risk modelling and long-term estimates [3,4]. PREVENT provides 10-year risk estimates for adults aged 30–79 years, with additional 30-year estimates available for those aged 30–59 years [4]. Its core equations include kidney function (eGFR), with HbA1c and albuminuria available as optional predictors [4]. PREVENT offers several conceptual advantages and broader cardiovascular outcome prediction, although evidence regarding performance across diverse international populations remains limited and local validation is required [4]. A recent PHCC-based study applied QRISK3 to a Qatari primary care cohort of over 1,600 adults, but this analysis was cross-sectional and did not assess calibration or discrimination against observed cardiovascular outcomes [15]. Neither QRISK3 nor PREVENT has therefore undergone formal validation in the Qatari population, and their calibration and discrimination in this setting remain uncertain [2,4,5,15].

The 2026 ACC/AHA Guideline on the Management of Dyslipidaemia further supports movement beyond legacy Pooled Cohort Equations. For adults aged 30–79 years without clinical ASCVD or subclinical atherosclerosis and with LDL-C 70–189 mg/dL, the guideline recommends PREVENT-ASCVD to estimate 10-year risk, with 30-year risk additionally used for adults aged 30–59 years. PREVENT incorporates eGFR in its base equation and offers optional equations incorporating HbA1c and UACR; the guideline also recommends consideration of CKM syndrome and other risk enhancers in individualised risk discussions. These concepts are particularly relevant in Qatar, where diabetes and metabolic disease are common [2,14,15]. However, local validation remains essential before implementation in Qatari populations [4,16].

A summary of key features comparing these major cardiovascular risk prediction models is shown in Table 1.

Table 1: Comparison of major cardiovascular risk prediction models relevant to primary care

Feature	ASCVD (PCE) [1]	QRISK3 [3]	AHA PREVENT [4]
Age Range	40–79 years	25–84 years	30–79 years (10-yr); 30–59 years (30-yr)
Ethnicity Adjustment	Limited (White/African American)	Specific risk-weightings (e.g., South Asian)	Race/ethnicity not included as a predictor
Diabetes Variable	Binary	Type-specific	Binary diabetes; HbA1c optional
SMI / Antipsychotics	No	Yes	No
Inflammatory Disease	No	Yes (SLE, RA)	No
Renal Markers	No	CKD Stage 3–5	eGFR (core); albuminuria optional

Note: QRISK3 incorporates additional clinical variables including SMI, atypical antipsychotic use, and systemic lupus erythematosus (SLE) [3].

Clinical Perspective: Situations Where ASCVD Risk May Be Underestimated

The following clinical scenarios illustrate situations commonly encountered in primary care where conventional ASCVD risk estimation may underestimate true cardiovascular risk. These scenarios are hypothetical and are provided for illustration; they do not describe identifiable patients.

Early-Onset Diabetes in a Young South Asian Patient

A 38-year-old South Asian male is diagnosed with early-onset type 2 diabetes (HbA1c 7.8%), elevated triglycerides (3.5 mmol/L), and a smoking history. His 10-year PCE ASCVD risk cannot be calculated because he is younger than 40 years, leaving short-term risk unquantified despite multiple adverse risk factors. His young-onset diabetes, smoking, and South Asian ancestry warrant consideration of longer-term cardiovascular risk [1,6,7].

Inflammatory Disease and Chronic Corticosteroid Exposure

A 52-year-old Qatari female presents with active systemic lupus erythematosus (SLE), intermittent systemic corticosteroid use, chronic kidney disease stage 3, and a strong family history of premature myocardial infarction. Her calculated ASCVD score may appear reassuringly low, yet this estimate may not adequately

reflect the accelerated atherogenesis associated with chronic inflammation, corticosteroid exposure, and renal impairment [9–13].

Severe Mental Illness and Antipsychotic-Associated Metabolic Risk

A 43-year-old woman with schizophrenia is treated with olanzapine and presents with rapid weight gain, dyslipidaemia, and newly diagnosed hypertension. Despite substantial metabolic risk associated with severe mental illness and long-term atypical antipsychotic therapy, her calculated ASCVD score may remain comparatively low despite clinically important risk factors not directly captured by the PCE [1,8].

DISCUSSION

The ASCVD estimator remains a useful baseline tool but should not be used in isolation in populations differing from its derivation cohorts [1]. Over-reliance on 10-year risk estimates may contribute to under-recognition of clinically relevant cardiovascular risk in younger patients and other vulnerable groups [2,6].

Contemporary ACC/AHA guidance has reinforced concerns regarding sole reliance on legacy risk equations. The 2026 dyslipidaemia guideline recommends use of PREVENT-ASCVD equations rather than older Pooled Cohort Equations for primary-prevention risk assessment in appropriate adults and advocates assessment beginning at age 30 years. It further recognises the importance of long-term risk horizons, kidney-metabolic risk factors, and risk-enhancing conditions that may not be adequately captured by traditional calculators. These recommendations align closely with the challenges discussed here, particularly the limitations of conventional 10-year risk models in younger adults [1,4,16].

PREVENT has recently undergone external validation in a retrospective Emirati cohort, showing good discrimination in women but only moderate discrimination in men, with calibration limitations at higher predicted-risk levels [17]. A subsequent multinational analysis of over 6.4 million individuals across 44 observational cohorts and 18 randomised trials reported generally good discrimination and calibration for PREVENT across multiple geographic regions [18]. This regional and international evidence improves confidence in the broader transportability of PREVENT but does not establish calibration, discrimination, or clinical utility specifically in Qatar's multinational primary-care population.

Qatar-based studies have applied risk calculators in selected populations. A 2021 psychiatric-outpatient study compared AHA/ACC PCE estimates with WHO/ISH charts in patients with severe mental illness but was limited by retrospective data completeness, with sufficient data for both tools in only 97 of 346 eligible records, and did not assess predicted risk against subsequent cardiovascular outcomes [19]. A 2021 systematic assessment of ASCVD prediction models concluded that no existing calculator was particularly well suited to Qatar's ethnically diverse population, though QRISK3 and PREDICT appeared most appropriate because of their inclusion of ethnicity [20]. These studies, together with the cross-sectional PHCC QRISK3 study described above, demonstrate local feasibility and clinically important risk burden, but as of September 2026 we identified no Qatar-specific study reporting outcome-based calibration and discrimination of PCE, QRISK3, or PREVENT [15,19,20].

Clinicians should exercise clinical discretion beyond low or borderline ASCVD estimates when important risk-enhancing factors are not adequately captured by conventional prediction models. Cardiovascular risk assessment should be interpreted with caution in patients with:

- Early-onset metabolic disease or prolonged diabetes duration [5,6].
- High-risk ethnic backgrounds, particularly South Asian populations, which are recognised in contemporary ACC/AHA guidance as cardiovascular risk-enhancing groups and are highly represented within Qatar's primary care population [7,16].
- Autoimmune/inflammatory conditions (SLE, RA) or chronic steroid therapy [9–13].
- Severe mental illness treated with metabolic-disrupting antipsychotics [8].

At the institutional level, there is a clear imperative to utilise Qatar Biobank and PHCC electronic registry data to formally validate and recalibrate CVD prediction models for the regional population [2].

Limitations

This article is a narrative review and clinical commentary rather than a systematic review or empirical validation study. Although the concerns discussed are supported by published evidence and routine clinical observations, formal outcome-based validation of ASCVD, QRISK3, and PREVENT in the Qatari population remains lacking [15]. In addition, several recommendations discussed in contemporary international guidelines are derived predominantly from Western populations and may not be directly generalisable to Middle Eastern populations. The three clinical scenarios are illustrative rather than empirical. Future research should evaluate the calibration, discrimination, and clinical utility of these models using local data from PHCC, Qatar Biobank, and other national health datasets [2].

CONCLUSION

Cardiovascular risk assessment in Qatar should extend beyond automated ASCVD scoring alone. An integrated approach combining risk calculators with structured clinical judgement may improve identification of high-risk individuals whose risk is not adequately captured by existing models [1,2,5]. Prospective validation and recalibration studies using Qatari and wider Gulf population data should be prioritised to support locally relevant cardiovascular prevention strategies. Emerging CKM-based prevention frameworks may provide useful direction for future regional risk assessment models; however, their performance requires formal validation within Qatari and wider Gulf populations before implementation [4,16].

DECLARATIONS

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Data Availability: Data sharing is not applicable because no new datasets were generated or analysed during this study.

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