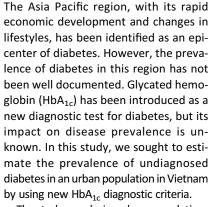
HbA_{1c}-Based Classification Reveals Epidemic of Diabetes and Prediabetes in Vietnam

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The study was designed as a populationbased investigation that involved 1,339 individuals (973 women) randomly sampled from Ho Chi Minh City, Vietnam. All individuals were aged 30 years and above (average age \sim 53 years, no significant difference between women and men). Blood samples were collected after overnight fasting and analyzed within 24 h after collection. HbA_{1c} was measured with highperformance liquid chromatography (ARKRAY, Japan). Fasting plasma glucose (FPG) was measured by the hexokinase method (Advia Autoanalyzer; Siemens Healthcare Diagnostics, Tarrytown, NY). Diabetes was defined as HbA_{1c} \geq 6.5% (\geq 47.5 mmol/mol) or FPG \geq 7.0 mmol/L. Prediabetes was classified as HbA_{1c} between 5.7 and 6.4% (38.8 and 46.4 mmol/mol).

On the basis of the HbA_{1c} test, the overall prevalence of diabetes and prediabetes was 12.3% (95% Cl 10.5–14.0%; n = 164) and 40.1% (95% Cl 37.5–42.7; n = 537), respectively. There was no significant difference in prevalence between women and men (P = 0.22). The prevalence of HbA_{1c}-diagnosed diabetes significantly increased with advancing age (Fig. 1) such that among those aged 70 years and older, 27% had HbA_{1c}-diagnosed diabetes, which is almost tenfold higher than for those aged between 30 and 39 years.

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There was a significant discordance between HbA_{1c} and FPG in the diagnosis of diabetes. On the basis of the FPG test, the prevalence of diabetes and prediabetes was 7.4% (95% CI 6.0–8.8%; n = 99) and 11.7% (95% CI 10.0–13.4; n = 156), respectively. Among 164 individuals classified by HbA_{1c} as having diabetes, 88 were

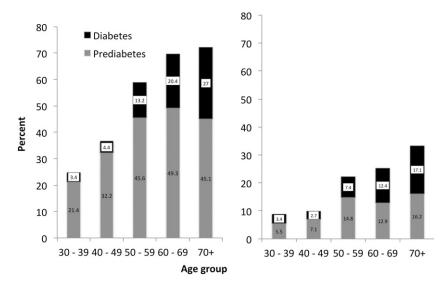


Figure 1—Prevalence of diabetes and prediabetes by age-group on the basis of HbA_{1c} (left panel) and FPG (right panel).

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classified as having the same diagnosis by FPG (sensitivity 54%, specificity 99%). Among 535 individuals classified as having prediabetes by HbA_{1c}, the FPG test provided a similar diagnosis for only 76 (sensitivity 14.2%, specificity 95%). Overall, the weighed κ statistic was 0.5 (95% CI 0.45–0.54).

Our findings demonstrate a rapid increase in the prevalence of diabetes in Vietnam. In 2004, a population-based study using FPG testing found that 3.8% of the population of Ho Chi Minh City had diabetes (1). This prevalence was increased to 11% in 2010 (2). In this study, we observed that within approximately 10 years, the prevalence of diabetes in this city has increased by more than threefold. The study also raises a disturbing aspect: prediabetes. We note that 40% of the adult individuals had prediabetes (on the basis of HbA_{1c} definition), which means that more than half (52%) of the population had either diabetes or prediabetes, and this will be a significant burden to society. Our data also suggest that FPG testing can miss a substantial proportion of diabetes and prediabetes detected by the HbA_{1c} test, increasing the eventual cost and burden to society of missed diabetes and its multisystem complications.

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Duality of Interest. No potential conflicts of interest relevant to this article were reported. **Author Contributions.** L.T.H.-P., T.T.D., and T.V.N. performed the experiments and data collection. L.T.H.-P. and T.V.N. conceived of and designed the experiments and analyzed the data. L.T.H.-P., L.V.C., and T.V.N. wrote the paper and interpreted the data.

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