# Achievement of treatment goals and mortality in individuals with type 2 diabetes: the ELSA-Brasil Study

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**Objectives:** To characterize the risk of death according to the achievement of blood glucose, hypertension, and lipid goals in middle-aged and elderly Brazilian adults with type 2 diabetes.

**Methods:** The Estudo Longitudinal de Saúde do Adulto (ELSA-Brasil) is an occupational cohort initiated in 2008 and followed through 2019. We ascertained known diabetes by self-reported diagnosis or anti-diabetic medication use. We measured glycated hemoglobin (HbA1c) and LDL-c centrally. We used 2022 American Diabetes Association treatment targets: HbA1c <7% (53 mmol/mol); blood pressure <140/90 mmHg (or <130/80 mmHg in high cardiovascular risk), and LDL-c <100 mg/dL or <70 mg/dl in high risk (2.58 mmol/L and 1.81 mmol/L, respectively). We ascertained deaths through annual telephone surveillance and confirmed them with death certificates. We built proportional hazards models to relate mortality with HbA1c, systolic blood pressure, and LDL-c control, adjusting for age, sex, school achievement, race/skin color, private health insurance, income, smoking, physical activity, HDL-cholesterol, body mass index, history of cardiovascular disease and diabetes duration.

**Results:** After 11 (1.8) years of follow-up, 272 of the 2492 participants with known diabetes had died. Within target HbA1c was associated with the greatest protection (HR=0.62; 95% IC 0.47-0.81) against all-cause mortality, followed by systolic blood pressure (HR=0.77; 95% IC 0.59-0.99). Achieving these two goals conferred substantial protection (HR=0.39; 95% IC 0.25-0.60). Within-target LDL-c, however, was associated with increased mortality (HR=1.38; 95% IC 1.03-1.84).

**Conclusions:** Glucose and blood pressure control, especially when concomitant, reduced mortality. The increased mortality associated with achieving the LDL-c target merits further investigation.

**Figure 1:** Risk of death (the greyed area is the zone of 95% confidence) according to the z-score of treatable prognostic factors: (A) Hba1c, (B) systolic blood pressure, (C) LDL-cholesterol, and (D) the overall ABC z-score. Associations were obtained through restricted cubic spline analyses using Cox proportional hazards models adjusted for relevant covariables