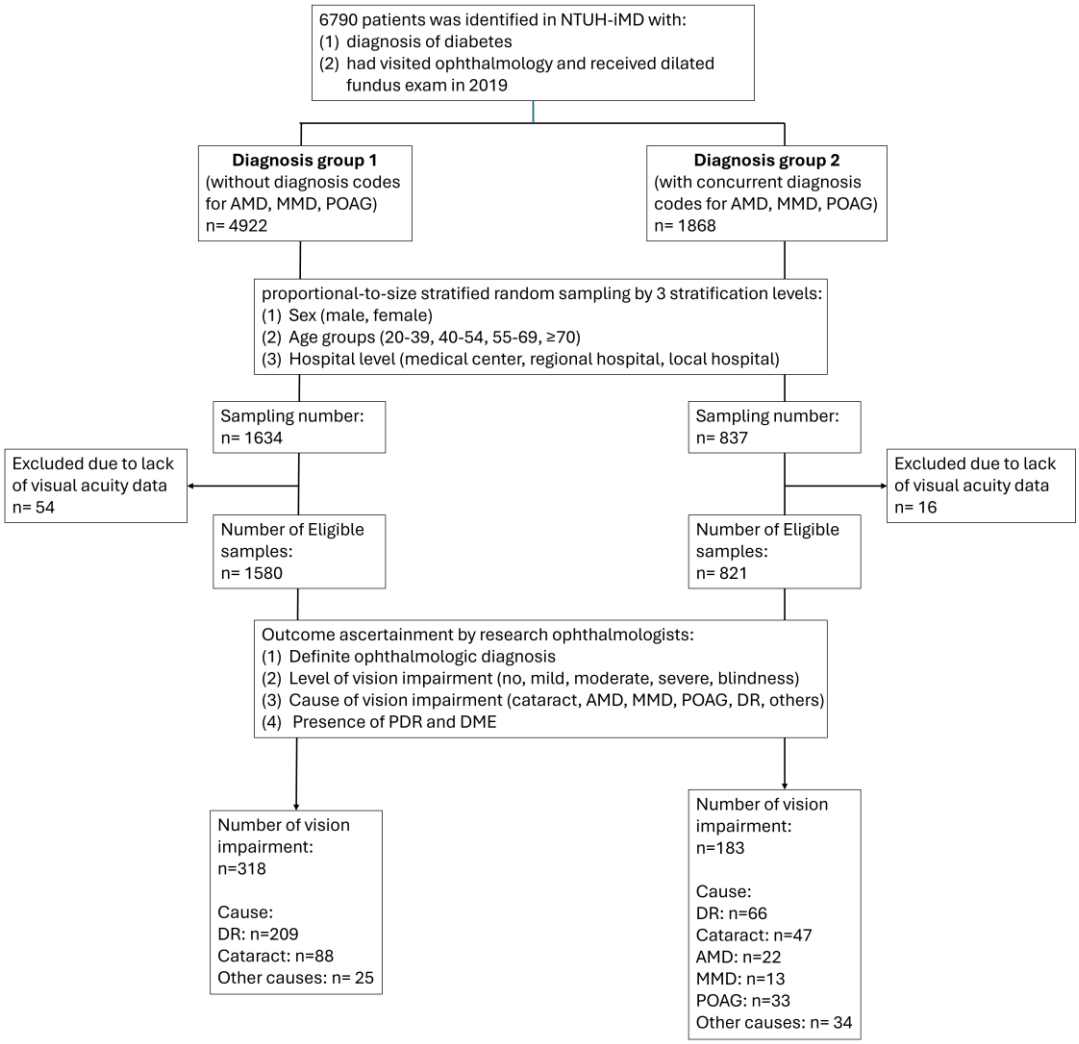
Supplement 1. The procedure of patient sampling and outcome ascertainment from the electronic medical records of National Taiwan University Hospital (NTUH) medical system.



NTUH-iMD: National Taiwan University Hospital- integrated medical database
AMD: age-related macular degeneration
MMD: myopic macular degeneration
POAG: primary open angle glaucoma

The NTUH medical system, which consists of one medical center (the Taipei main hospital), two regional hospitals (NTUH Hsin-Chu branch and Yun-Lin branch), and three local hospitals (NTUH Bei-Hu branch, NTUH Jin-Shan Branch, NTUH Chu-Tong branch) in 2019. Starting from 2006, the electronic health records from all the affiliated hospitals were integrated as NTUH-integrated Medical Database (NTUH-iMD).

Patients aged 20 and above who met the criteria for specific diagnosis codes were extracted from NTUH-iMD. In 2019, 6,790 patients with diabetes visited

ophthalmologic clinics and received dilated fundus exams within the NTUH medical system. In the diabetic population, the distribution of vision impairment is assumed to differ between individuals diagnosed with other major eye diseases (diagnosis group 2) and those who are not (diagnosis group 1). These include age-related macular degeneration (AMD), myopic macular degeneration (MMD), and primary open-angle glaucoma (POAG), previously identified as major causes of vision impairment in the literature. Therefore, the sampling procedure was performed separately from group 1 and group 2. Among the patients, 1,868 had concurrent diagnosis for major eye diseases (diagnosis group 2), while the remaining 4,922 did not (diagnosis group 1).

We then established three stratification levels: sex, age groups (20-39 years, 40-54 years, 55-69 years, and ≥70 years), and hospital levels (medical center, regional hospital, local hospital). Based on these stratifications, we performed proportional-to-size stratified random sampling of 1,634 patients from group 1 and 837 patients from group 2, respectively.

The ophthalmologic medical records of the sampled patients were reviewed. Data on corrected visual acuity or best-corrected visual acuity and automated visual field tests of both eyes conducted in 2019 were extracted. Patients lacking these key data necessary to determine the extent of vision impairment were excluded (70 patients in group 1 and 14 patients in group 2). Then, the ophthalmologic medical records and imaging of the eligible patients were scrutinized by three ophthalmologists (YL Liu, TC Ho, and YA Lee). Based on these records, each patient's 2019 ophthalmologic diagnosis, presence of proliferative diabetic retinopathy (PDR) or diabetic macular edema (DME), level of vision impairment, and the main cause of vision impairment were assessed and determined by the ophthalmologists. The level of vision impairment was categorized into no impairment, mild, moderate, severe, and blindness according to the WHO's standard definition. If the two eyes had vision impairment due to different causes, the cause of the better-seeing eye was considered the main cause of vision impairment.

In diagnosis group 1, 1580 eligible patients were reviewed, of which 318 had vision impairment (209 caused by DR, 88 by cataract, and 25 by other causes). In diagnosis group 2, 821 eligible patients were reviewed, of which 183 had vision impairment (66 caused by DR, 47 by cataract,13 by MMD, 22 by AMD, 33 by

glaucoma, and 34 by other causes). Among all sampled diabetic patients, 23 had blindness caused by DR. These sampling primary data from NTUH-iMD was used to develop hierarchical models to estimate the distribution of cause-specific vision impairment across different sex, age groups, and hospital levels.