SUPPLEMENTARY METHODS

Decomposition analysis

The decomposition method can be employed to assess the causes of changes in the incidents of specific diseases. In this study, we first utilized the decomposition methodology developed by Guoqing Hu [1,2] to analyze changes in type 2 diabetes mellitus related chronic kidney disease (CKD-T2DM) incident by considering factors such as population age structure (aging), population growth, and epidemiologic changes. In the decomposition analysis, the decomposition for each country and region was based on each country's own disease data and population data.

Using the difference in the number of incidence cases of CKD-T2DM in 1992 and 2021 as an example, we show how the number of incident attributable to these three factors was calculated. Age was divided using 5-year group, from 15–19 years old to 95 years and older. Let d_{ij}, n_{ij}, m_{ij}, and p_{ij} denote the number of incident, population size, age-specific incidence rate, and proportion of population for the i_{th} age group of the j_{th} year, respectively ($i=1, 2, \ldots, 17$; $j=1, 2$). Let D_1 and D_2, N_1 and N_2, M_1 and M_2 represent the total number of incident, population size and crude incidence rate for years 1992 and 2021, respecitvely (Supplementary Table 1).

$$D_1 = \sum_{i=1}^{17} d_{i1}$$

$$D_2 = \sum_{i=1}^{17} d_{i2}$$

$$N_1 = \sum_{i=1}^{17} n_{i1}$$

$$N_2 = \sum_{i=1}^{17} n_{i2}$$

$$M_1 = D_1/N_1$$

$$M_2 = D_2/N_2$$

$$m_{ij} = d_{ij}/n_{ij}$$

$$p_{ij} = n_{ij}/N_j$$

Using M_p, M_a, and M_m to represent the main effects of the changes in population size, in age structure and in incidence rates, and I_{pa}, I_{pm}, I_{am}, and I_{pam} to represent their two-way and three-way interactions, respectively. These terms are calculated as follows when using year 1992 as the reference:

$$M_p = \sum_{i=1}^{17} (N_2 - N_1) p_{i1} m_{i1}$$

$$M_a = \sum_{i=1}^{17} N_1 (p_{i2} - p_{i1}) m_{i1}$$

$$M_m = \sum_{i=1}^{17} N_1 p_{i1} (m_{i2} - m_{i1})$$

$$I_{pa} = \sum_{i=1}^{17} (N_2 - N_1)(p_{i2} - p_{i1}) m_{i1}$$

$$I_{pm} = \sum_{i=1}^{17} (N_2 - N_1) p_{i1} (m_{i2} - m_{i1})$$

$$I_{am} = \sum_{i=1}^{17} N_1 (p_{i2} - p_{i1})(m_{i2} - m_{i1})$$

$$I_{pam} = \sum_{i=1}^{17} (N_2 - N_1)(p_{i2} - p_{i1})(m_{i2} - m_{i1})$$

The contribution of each factor includes its main effect and partial interactions with other factors.

(1) Suppose a%, b%, and c% of the two-way interaction between population size and age structure, population size and

Supplementary Table 1. Meaning of mathematical symbols in the decomposition formula

Age group, yr	1992 ($j=1$)				2021 ($j=2$)			
	Incident	Population	incidence	Age structure	Incident	Population	incidence	Age structure
15–19	d_{11}	n_{11}	m_{11}	p_{11}	d_{12}	n_{12}	m_{12}	p_{12}
20–24	d_{21}	n_{21}	m_{21}	p_{21}	d_{22}	n_{22}	m_{22}	p_{22}
25–29	d_{31}	n_{31}	m_{31}	p_{31}	d_{32}	n_{32}	m_{32}	p_{32}
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
90–94	D_{161}	n_{161}	m_{161}	p_{161}	d_{162}	n_{162}	m_{162}	p_{162}
≥95	D_{171}	n_{171}	m_{171}	p_{171}	d_{172}	n_{172}	m_{172}	p_{172}
Total	D_1	N_1	M_1	$P_1=1$	D_2	N_2	M_2	$P_2=1$