

medication choices in retail pharmacies are highly centered on a small number of core therapeutic drugs. These diseases are typically supported by well-established clinical guidelines and mature pharmacological treatment regimens, and the core drugs involved tend to have low substitutability, resulting in stable medication-use structures at the retail pharmacy level. Although adjunctive medications are present, their types and frequency of use are relatively fixed and exert a limited influence on the overall combination structure. The presence of highly concentrated medication combinations reflects, on the one hand, a trend toward standardized medication use in primary care, and on the other hand, the relatively limited decision-making space available in retail pharmacies for these disease categories (Macvicar and Paterson, 2023).

#### 2.2.2 Diseases with moderate concentration

Compared with chronic diseases, the concentration of medication combinations is relatively lower for certain gastrointestinal disorders, sleep disorders, and metabolic dysfunctions. These conditions are characterized by greater heterogeneity in symptom presentation and marked inter-individual differences among patients, leading to more diverse medication choices. In such diseases, one or two core drugs are usually present, but there is a wider range of options for concomitant medications. The concurrent use of traditional Chinese medicines and chemical drugs is relatively common. Pharmacists' recommendations, patients' prior medication experiences, and price considerations all play important roles in shaping the final medication combinations (Wang et al., 2023).

### 2.3 Conceptual framework for measuring medication combination concentration

In studies of medication use for common diseases in retail pharmacies, medication combination concentration is used to reflect whether drug sales under a specific disease context are primarily concentrated in a small number of core drugs, thereby revealing the structural characteristics of medication purchasing and decision-making by patients and pharmacists. A higher level of concentration generally indicates a narrower range of medication choices, a more pronounced dominance of core drugs, and stronger stability and path dependence in medication-use pathways. Conversely, a lower level of concentration suggests more dispersed drug use, greater diversity of medication combinations, and more pronounced differences in medication choices among patients.

Drawing on classical methods for measuring market structure and competitive patterns in industrial organization theory, this study treats medication combinations corresponding to different diseases in retail pharmacies as a form of "quasi-market structure." From the perspective of sales revenue—which jointly reflects frequency of use, price levels, and patient preferences—a medication combination concentration index is constructed. This index allows for an intuitive depiction of medication-use structures for different diseases at the retail pharmacy level and provides a quantitative basis for comparing differences in medication-use patterns across disease categories (Saha and Xu, 2025; Sapkota et al., 2025).

### 2.4 Construction of the herfindahl–hirschman index (HHI)

The Herfindahl-Hirschman Index (HHI) is employed in this study as the primary measure of medication combination concentration. The HHI captures overall concentration by summing the squares of the sales shares of individual drugs, thereby accounting for both the number of core drugs and their relative dominance, and demonstrating high sensitivity to changes in sales structure. In the field of industrial economics, this index is widely used to assess market concentration, competitive intensity, and monopoly power, owing to its intuitive calculation and clear interpretability.

In the context of this study, the introduction of the HHI facilitates the standardized quantification of medication sales structures in retail pharmacies, enabling a systematic evaluation of the degree of concentration or dispersion of medication combinations across different diseases. Compared with simple counts of drug varieties, the HHI more accurately reflects changes in the weight of core drugs within overall medication combinations, providing a more robust quantitative foundation for analyzing medication-use structures and their potential risks (Kvålseth, 2022).

#### 2.4.1 Definition of the index

For a given disease  $d$ , the medication combination concentration index is defined as: