

$$HH_d = \sum_{i=1}^{N_d} s_{id}^2$$

$i$  denotes a specific drug;

$N_d$  represents the number of drug types involved under disease  $d$ ;

$S_{id}$  denotes the share of sales revenue of drug  $i$  under disease  $d$ , which is calculated as follows:

$$S_{id} = \frac{Revenue_{id}}{\sum_{i=1}^{N_d} Revenue_{id}}$$

$Revenue_{id}$  denotes the sales revenue of drug  $i$  for disease  $d$

### 3 Empirical Results on Medication Combination Concentration

#### 3.1 Overall distribution of medication combination concentration across diseases

The concentration of medication combinations for common diseases in retail pharmacies is not uniformly distributed but instead exhibits pronounced differentiation across disease categories. Differences in pathological mechanisms, therapeutic objectives, and clinical medication guidelines lead to distinct medication-use structure patterns at the retail pharmacy level. Specifically, medications for chronic disease management have gradually formed relatively stable and standardized combination structures in retail settings, with core drugs occupying a dominant position in both sales and utilization, and medication pathways showing a high degree of consistency and predictability. In contrast, symptom-oriented and conditioning-related diseases are characterized by more diverse clinical presentations and greater inter-individual variability, with treatment goals focusing more on symptom relief and overall regulation. As a result, medication combinations for these conditions retain greater flexibility, with more dispersed drug choices and higher levels of diversity and variability in medication regimens (Sikora et al., 2023; Santana et al., 2025).

These findings reflect, on the one hand, the guiding role of clinical medication guidelines and standardized treatment pathways in shaping primary care medication practices, particularly in the field of chronic disease management. On the other hand, they also highlight the functional positioning of retail pharmacies in meeting residents' diverse and individualized health needs. Based on empirical evidence from real-world retail pharmacy sales data from 2023 – 2024, clear and stable differences in medication combination concentration and heterogeneity are observed across major disease categories, providing a solid foundation for further disease-specific analyses of medication-use structures (Table 1).

Table 1 Descriptive statistics of medication combination concentration (hhi) across diseases

Disease Category	Number of Drug Types	Sales Share of Top 3 Drugs	HHI
Hypertension	Few	High	High
Hyperlipidemia	Few	High	High
Sleep Disorders	Moderate	Moderate	Moderate
Gastrointestinal Diseases	Many	Moderately Low	Moderate
Functional Conditioning Conditions	Many	Low	Low

As shown in Table 1, there are significant differences in medication combination concentration across disease categories. Chronic conditions such as hypertension and hyperlipidemia exhibit markedly higher HHI values, indicating that medication use is highly concentrated on a small number of core drugs; in contrast, gastrointestinal diseases and functional conditioning conditions show relatively lower HHI values (Albayrak and Demirbaş, 2023).

#### 3.2 Medication-use structure characteristics of high-concentration diseases

Diseases with high medication combination concentration typically exhibit clear and stable medication-use structures, with the core feature characterized by a “single core drug plus a limited number of adjunctive medications” pattern. In the sales and use of medicines for such diseases, the core drug is usually targeted at the