

## Supplementary Materials

# Multimorbidity Analysis of 13 systemic diseases in Northeast China

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### 1. Choosing 13 systemic diseases

According to the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD), the diseases and related health problem were divided into 21 categories (See details in Table S1). Besides, NO.I, NO.XV~XXI were excluded because these diseases were infectious disease, congenital diseases, injury, poisoning, pregnancy, childbirth and the puerperium and others. Thus, we finally choose the 13 systemic diseases (NO. II~ XIV) in this study.

**Table S1.** International Statistical Classification of Diseases and Related Health Problems 10th Revision.

NO.	International Statistical Classification of Diseases and Related Health Problems 10th Revision
I	Certain infectious and parasitic diseases
II	Neoplasms
III	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism
IV	Endocrine, nutritional and metabolic diseases
V	Mental and behavioural disorders
VI	Diseases of the nervous system
VII	Diseases of the eye and adnexa
VIII	Diseases of the ear and mastoid process
IX	Diseases of the circulatory system
X	Diseases of the respiratory system
XI	Diseases of the digestive system
XII	Diseases of the skin and subcutaneous tissue
XIII	Diseases of the musculoskeletal system and connective tissue
XIV	Diseases of the genitourinary system
XV	Pregnancy, childbirth and the puerperium
XVI	Certain conditions originating in the perinatal period
XVII	Congenital malformations, deformations and chromosomal abnormalities
XVIII	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified

XIX	Injury, poisoning and certain other consequences of external causes
XX	External causes of morbidity and mortality
XXI	Factors influencing health status and contact with health services
XXII	Codes for special purposes

## 2. Ten most common two-disease combinations

**Table S2.** The proportions of ten most common two-disease combinations by age in males

	0~	18~	45~	65~	85~
1	CirS-ResS(27.61%)	CirS-ENM(12.85%)	CirS-ENM(22.22%)	CirS-ENM(18.99%)	ResS-CirS(33.51%)
2	ResS-DigS(8.42%)	DigS-ENM(12.44%)	NerS-ENM(7.52%)	ResS-CirS(15.24%)	CirS-ENM(12.01%)
3	BBI-ResS(8.39%)	NerS-ENM(6.03%)	CirS-NerS(7.22%)	ResS-ENM(8.04%)	ResS-ENM(10.02%)
4	CirS-DigS(6.48%)	GenS-ENM(5.74%)	DigS-ENM(6.85%)	NerS-CirS(4.90%)	DigS-ResS(6.30%)
5	ResS-EM(4.26%)	DigS-CirS(5.67%)	DigS-CirS(5.64%)	CirS-GenS(4.83%)	GenS-CirS(6.21%)
6	CirS-ENM(3.66%)	GenS-CirS(4.74%)	CirS-ResS(5.30%)	DigS-CirS(3.98%)	DigS-CirS(5.94%)
7	ResS-ENM(3.64%)	DigS-ResS(3.74%)	GenS-ENM(4.04%)	ENM-GenS(3.70%)	GenS-ENM(3.74%)
8	CirS-BBI(3.22%)	GenS-BBI(3.60%)	Neo-DigS(3.76%)	NerS-ENM(3.54%)	GenS-ResS(3.50%)
9	DigS-ENM(2.93%)	ResS-ENM(3.60%)	ResS-ENM(3.24%)	DigS-Neo(3.44%)	CirS-NerS(2.15%)
10	ResS-NerS(2.91%)	CirS-NerS(3.12%)	GenS-CirS(3.22%)	Neo-CirS(3.39%)	CirS-BBI(1.86%)

**Table S3.** The proportions of ten most common two-disease combinations by age in females

	0~	18~	45~	65~	85~
1	CirS-ResS(26.16%)	DigS-ENM(8.08%)	CirS-ENM(16.58%)	CirS-ENM(19.00%)	ResS-CirS(21.39%)
2	ResS-DigS(8.27%)	GenS-Neo(7.97%)	CirS-NerS(5.63%)	ResS-CirS(10.19%)	CirS-ENM(15.36%)
3	ResS-BBI(7.70%)	GenS-BBI(7.63%)	NerS-ENM(5.55%)	GenS-CirS(7.29%)	ResS-ENM(11.66%)
4	DigS-CirS(6.96%)	ENM-Neo(6.30%)	DigS-ENM(5.15%)	DigS-CirS(5.65%)	DigS-CirS(9.96%)
5	CirS-ENM(4.17%)	ResS-ENM(5.35%)	GenS-ENM(4.68%)	ResS-ENM(5.11%)	GenS-CirS(4.81%)
6	ResS-EM(3.64%)	GenS-ENM(4.95%)	GenS-CirS(4.67%)	GenS-BBI(4.73%)	DigS-Neo(3.62%)
7	ResS-ENM(3.50%)	CirS-ENM(4.57%)	ResS-CirS(4.60%)	CirS-NerS(4.59%)	GenS-ResS(3.09%)
8	DigS-ENM(3.08%)	BBI-Neo(4.30%)	DigS-CirS(4.14%)	GenS-ENM(4.43%)	DigS-ResS(2.68%)
9	GenS-ResS(2.94%)	DigS-Neo(4.11%)	DigS-Neo(3.78%)	DigS-ENM(3.95%)	CirS-BBI(2.45%)
10	ResS-NerS(2.76%)	GenS-DigS(3.64%)	ResS-ENM(3.63%)	CirS-BBI(3.71%)	CirS-NerS(2.14%)

**Table S4.** The proportions of ten most common two-disease combinations by health insurance scheme

	UEBMI	URBMI	NRCMS	USP	Others*
1	CirS-ENM(19.44%)	CirS-ENM(18.83%)	CirS-ENM(14.24%)	ResS-CirS(16.08%)	ResS-CirS(33.52%)
2	ResS-CirS(8.56%)	ResS-CirS(11.27%)	ResS-CirS(11.62%)	CirS-ENM(13.40%)	CirS-ENM(13.07%)
3	CirS-NerS(6.13%)	ResS-ENM(6.02%)	ResS-ENM(6.32%)	ResS-ENM(5.91%)	ResS-ENM(9.76%)
4	NerS-ENM(6.06%)	GenS-CirS(5.85%)	GenS-CirS(5.11%)	DigS-CirS(5.19%)	DigS-CirS(9.47%)

5	DigS-CirS(4.91%)	DigS-ENM(5.20%)	DigS-CirS(4.57%)	DigS-ENM(4.37%)	DigS-ResS(8.56%)
6	GenS-CirS(4.88%)	DigS-CirS(5.13%)	GenS-BBI(4.32%)	GenS-CirS(3.72%)	GenS-CirS(4.01%)
7	ResS-ENM(4.78%)	CirS-NerS(4.55%)	DigS-Neo(4.14%)	DigS-Neo(3.50%)	GenS-ENM(3.51%)
8	DigS-ENM(4.76%)	GenS-ENM(4.33%)	GenS-ENM(4.13%)	CirS-NerS(3.42%)	GenS-ResS(2.56%)
9	GenS-ENM(4.05%)	NerS-ENM(4.07%)	DigS-ENM(3.70%)	GenS-ENM(3.28%)	ResS-Neo(2.42%)
10	DigS-Neo(2.95%)	GenS-BBI(3.93%)	CirS-BBI(3.63%)	DigS-ResS(3.03%)	DigS-ENM(2.12%)

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UEBMI : Urban Employee Basic Medical Insurance; URBMI: Urban Resident Basic Medical Insurance; NRCMS: New Rural Cooperative Medical Scheme; USP: uninsured patients; \*‘‘others’’ included commercial health insurance, work-related injury insurance, maternity, medical assistance.