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# Tailoring stewardship to context: Drivers and patterns of antibiotic prescribing and consumption in rural China

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## Antibiotic use and AMR in China - background

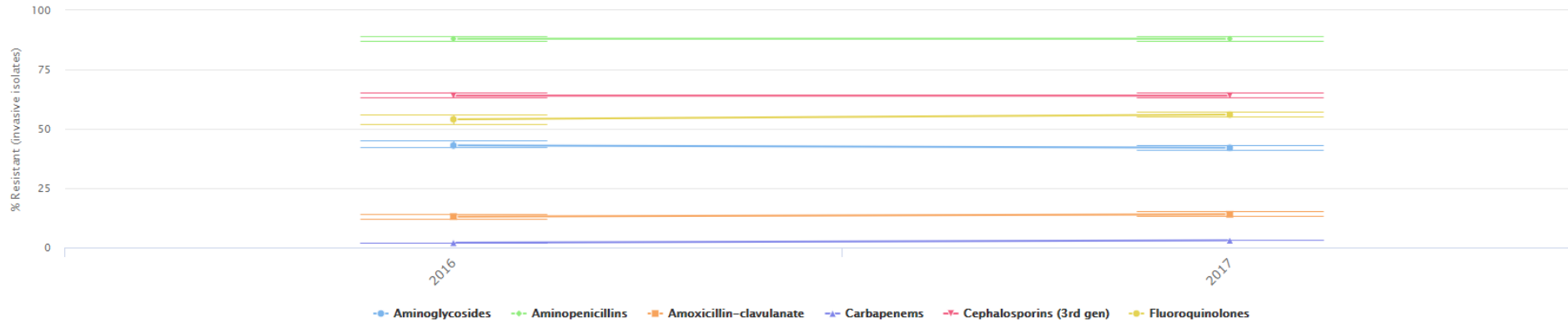
- Globally significant consumer (human/animal)
- Surveillance limited, hospital-based
- AMR prevalence in population unknown
- Antibiotic use, consumption patterns outside hospital settings little documented
- PRC govt actions on antibiotic use
  - National guidelines (2004)
  - Surveillance networks for antibiotic use & AMR (2005)
  - Special National Antimicrobial Stewardship Campaign to control AB in secondary and tertiary hospitals (2011-14)
  - 2016 National Action Plan to restrict antibiotic use (National Health and Family Planning Commission, 2016).

# China

Resistance Data

Use Data

Antibiotic Resistance of *Escherichia coli* in China



Center for Disease Dynamics, Economics & Policy

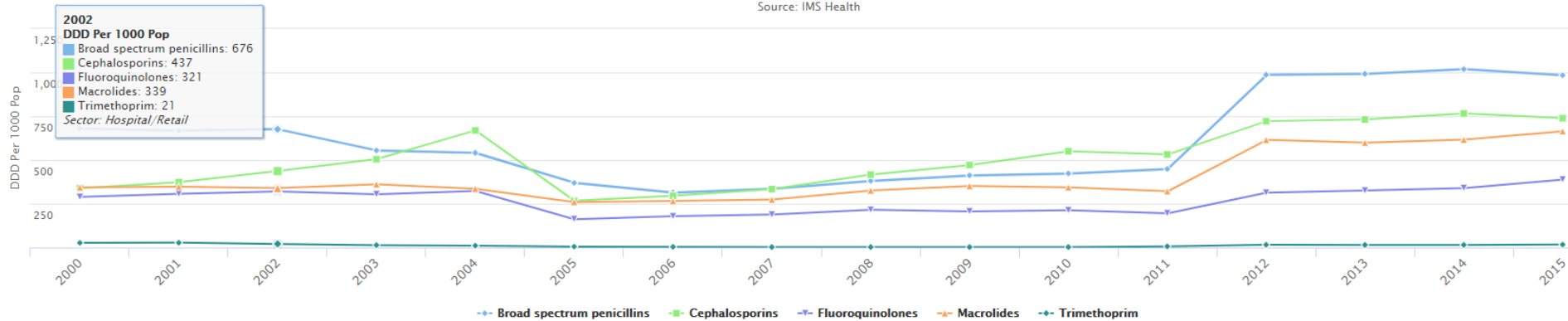
# China

Resistance Data

Use Data

Antibiotic Use in China

Source: IMS Health



Center for Disease Dynamics, Economics & Policy

Data obtained under license IMS Health's MIDAS and Xponent information services. All Rights Reserved

Data includes aggregated resistance rates for isolates (includes intermediate resistance) from blood and cerebrospinal fluid (i.e., invasive) from inpatients of all ages. Because of differences in scope of collections and testing methods, caution should be exercised in comparing across countries. For more details see [methodology](#). Country boundaries/designations do not represent CDDEP opinion concerning the legal status of any country, territory, city, or area of its authorities, or concerning the delimitation of its frontiers or boundaries.

Antibiotic use data are shown in defined daily doses (DDD) per 1,000 individuals. View data as [Standard Units](#)

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# Pathways to Optimising Antibiotic Use in Anhui Province, China: Identifying key determinants of antibiotic consumption & prescribing in community & clinical settings

PIs: Helen Lambert, UoB (UK), Debin Wang, AMU (China)

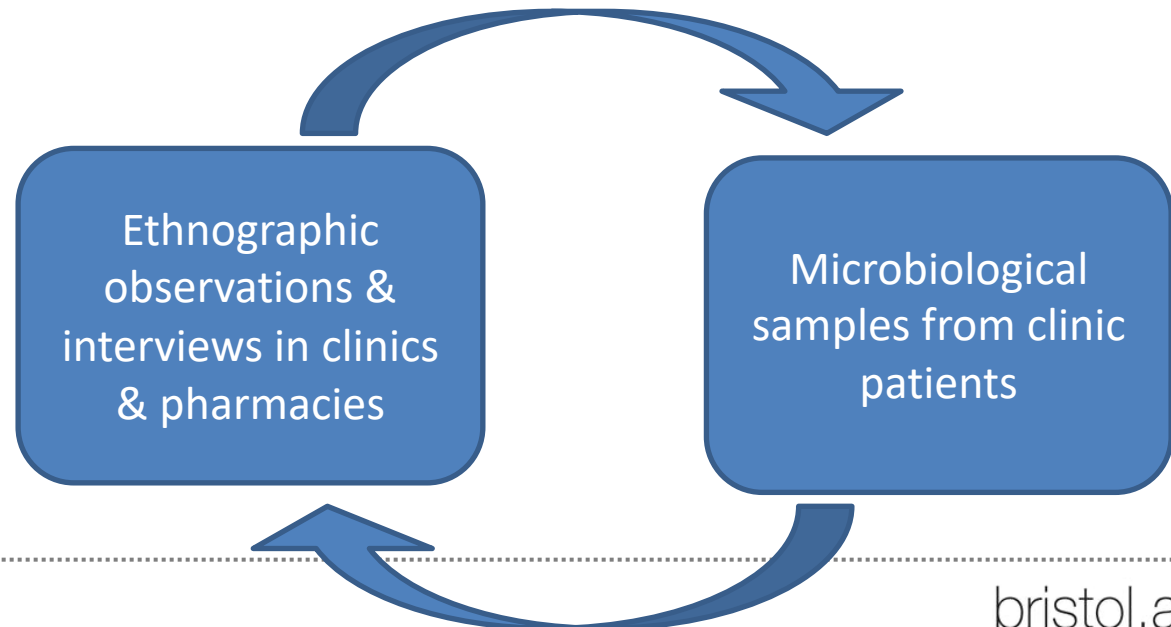


University of Bristol & Anhui Medical University with Public Health England, North Bristol Trust, UCL & Xi'an Jiaotong Liverpool University

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# Aims

1. To investigate key social, cultural, economic, health system and behavioural determinants of antibiotic use, including treatment seeking & clinical practice.
2. To conduct a microbiological feasibility study to characterise bacteria in relation to presenting symptoms and diagnoses for common infections & ascertain antibiotic resistance rates in a rural population.
3. To assess the potential for using patient records to monitor antibiotic use.



# Anhui Province



## Anhui province

- Population 68.6 m
- 57% living rurally

## Study sites

Township health centres & pharmacies, village clinics

- Respiratory tract infections
- Urinary tract infections

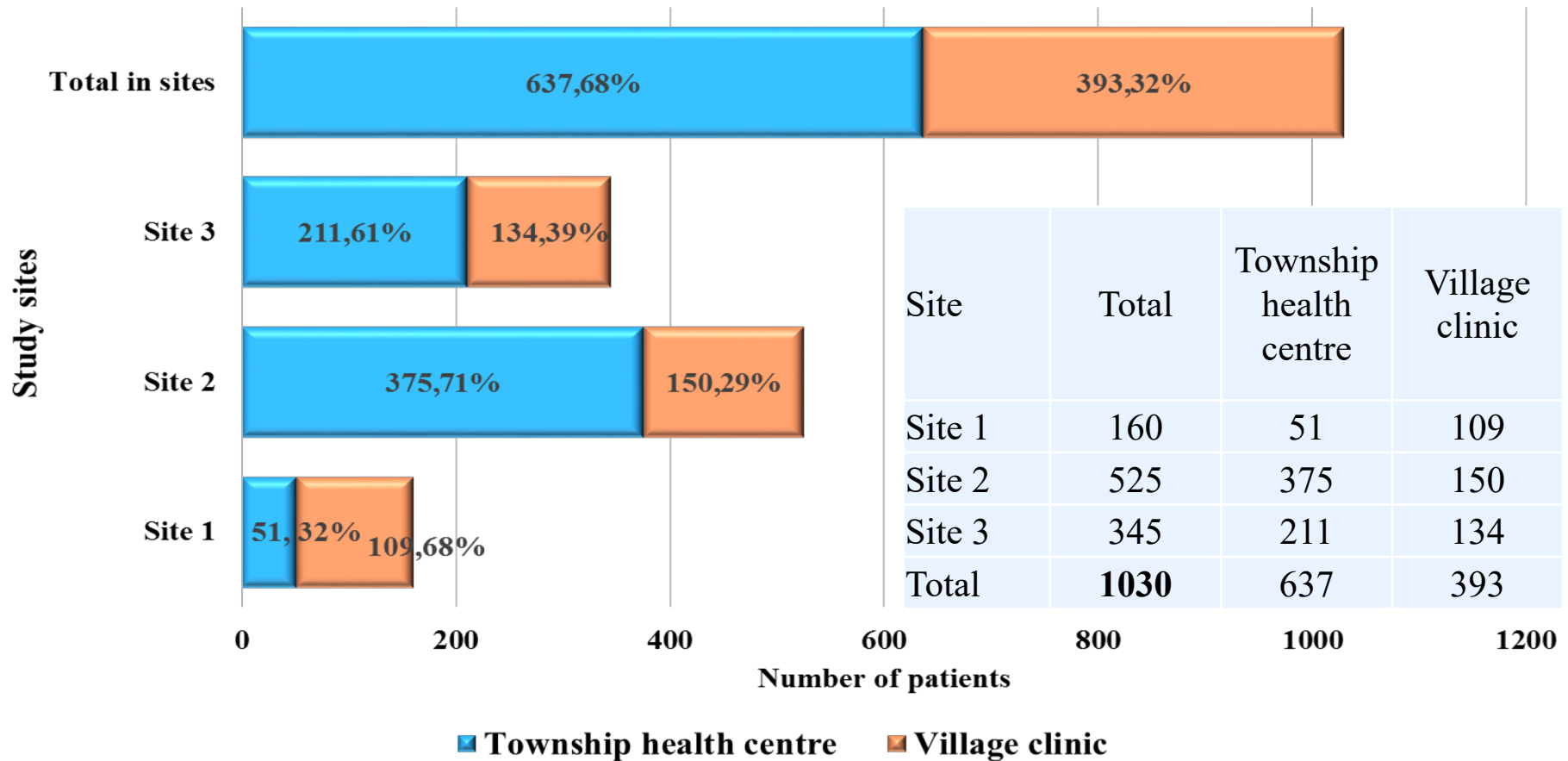


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## Research activities

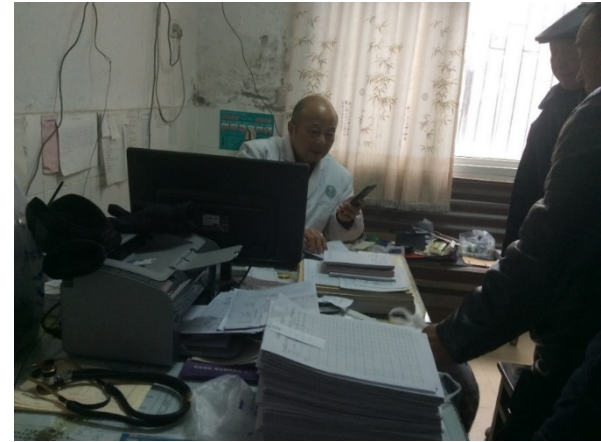
- Observations of routine outpatient care: **3** village clinics and **3** township health centers, for over 4 months each
- Observations of drug purchases at medicine shops at site townships: **15** shops for over 8 days each
- Exit surveys: **1030** patients at site clinics and **731** customers at site medicine shops
- In-depth qualitative interviews: **46** patients, **19** health professionals, 15 customers, 8 pharmacy staff
- Specimen collection at site clinics and microbiological tests:
  - **1030 sputum specimens/throat swabs, 33 urine specimens**
- Comparison of routine medical records at clinics w/ observations

# Study Sites and Population





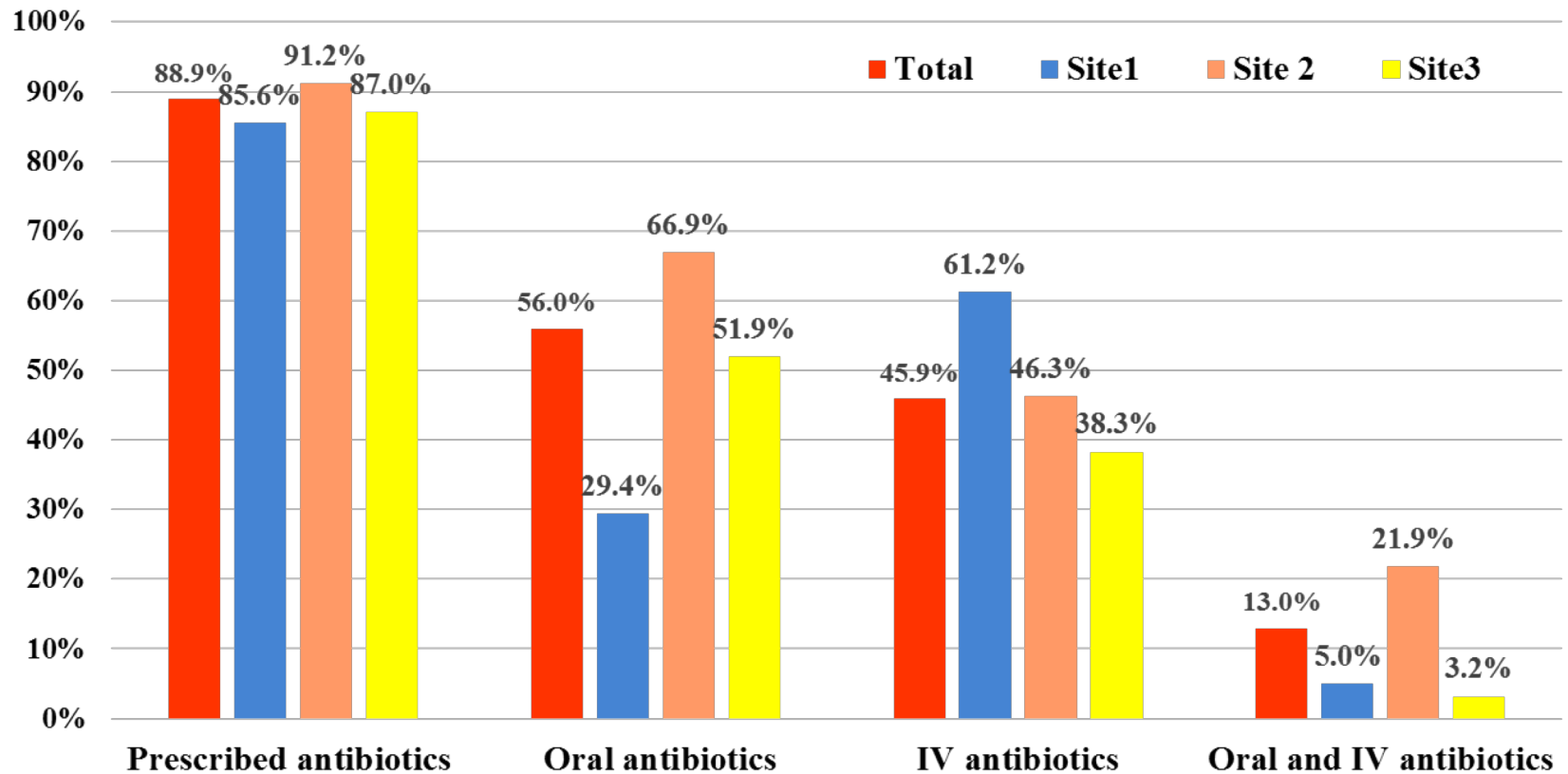
# Clinical consultation observation & patient exit interviews



## Treatment of recruited patients (observed consultations)

Treatment methods (RTI/UTI)	N	%
IV antibiotics	484	47.0
Oral antibiotics	692	67.2
Chinese Traditional Medicine	10	1.0
Others	59	5.6
IV & Oral antibiotics	134	13.0
IV or Oral antibiotics	<b>916</b>	<b>88.9</b>

## Use of prescribed antibiotics (*observed*)



- Rate of antibiotics use in IV prescriptions - 97.7%.
- Rate of antibiotics use in oral prescriptions - 83.4%.

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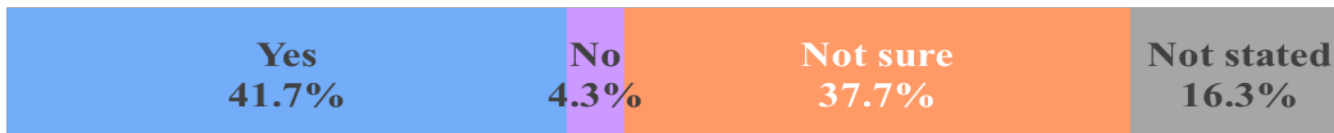
## Exit interviews with patients

*Does patient know the doctor's prescription ?*

**Q1 If medicines were prescribed, do you know what they are for?**



**Q2 Does this prescription contain antibiotics or anti-inflammation medicine?**



## Treatment for RTI before seeing the doctor

	Township health centre (N=623)		Village clinic (N=374)	
	N	%	N	%
<b>Q1: Have you used any self-treatment at home for this problem before coming here?</b>				
No	441	71.0	256	68.4
Yes	180	29.0	118	31.6
<b>Q2: Did the pills contain antibiotics or anti-inflammation medicine?(n=180)</b>				
No	52	28.9	14	11.9
Yes	67	37.2	48	40.7
Not sure	61	33.9	56	47.5
<b>Q3: Did you get any treatment outside your home for this problem before coming here?</b>				
No	343	55.1	333	89.0
Yes	280	44.9	41	11.0
<b>Q4: Did it contain antibiotics or anti-inflammation medicine?(n=280)</b>				
No	46	16.4	4	9.8
Yes	158	56.4	25	61.0
Not sure	76	27.1	12	29.3

## Patients' reported use of antibiotics in past year

	N	%
<b>Q1:Have you taken medicines in the past year? (n=997)</b>		
No	32	3.2
I can't remember	5	0.5
Yes, Western medicine	706	70.8
Yes, Chinese medicine	72	7.2
other	25	2.5
<b>Q2:Did you use any anti-bacterial or antibiotic medicines in the past year?</b>		
I don't know what antibiotics/anti-bacterial medicine is	92	9.2
I don't remember what my medicines were	67	6.7
No, these medicines weren't antibiotics.	83	8.3
Yes, they were antibiotics.	508	51.0
Others	16	1.9
Not stated	331	33.2
<b>Q3:Where did you obtain these 'antibiotics' or 'antibacterial'?(n=508)</b>		
Hospital or Clinic Pharmacy	398	78.3
Retail Pharmacy	188	37.0
From Family Member	5	1.0
From Neighbor or Friend	2	0.4
I already have them at home	16	3.1

## Language & public understanding of antibiotics

- 'antibiotics' 抗生素(*kangshengsu*)
- 'antibacterial medicine' 抗菌药 (*kangjun yao* )
- 'anti-inflammation medicine' 消炎药 (*xiaoyan yao*)
- “I would say ‘anti-inflammation medicine’ to refer to ‘antibiotics’ so that the patients can understand” (doctor at township Health Center)

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## Observation notes of clinical encounters: qualitative analysis

A 65-year old male came in to the Site 1 THC to ask for a cold remedy (*ganmao yao* 感冒药)

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- P: Prescribe something to ‘reduce inflammation’ (开点什么消炎的)
- D; You look, Cephalosporin (*toubao* 头孢)
- P: Prescribe more *huangqi* [a TCM 黄芪]. How many are you prescribing?
- D; Two packs of cold remedy; two packs of “*xiaoyan yao*” (medicines that eradicate inflammation) (感冒药开2盒消炎药开2盒)

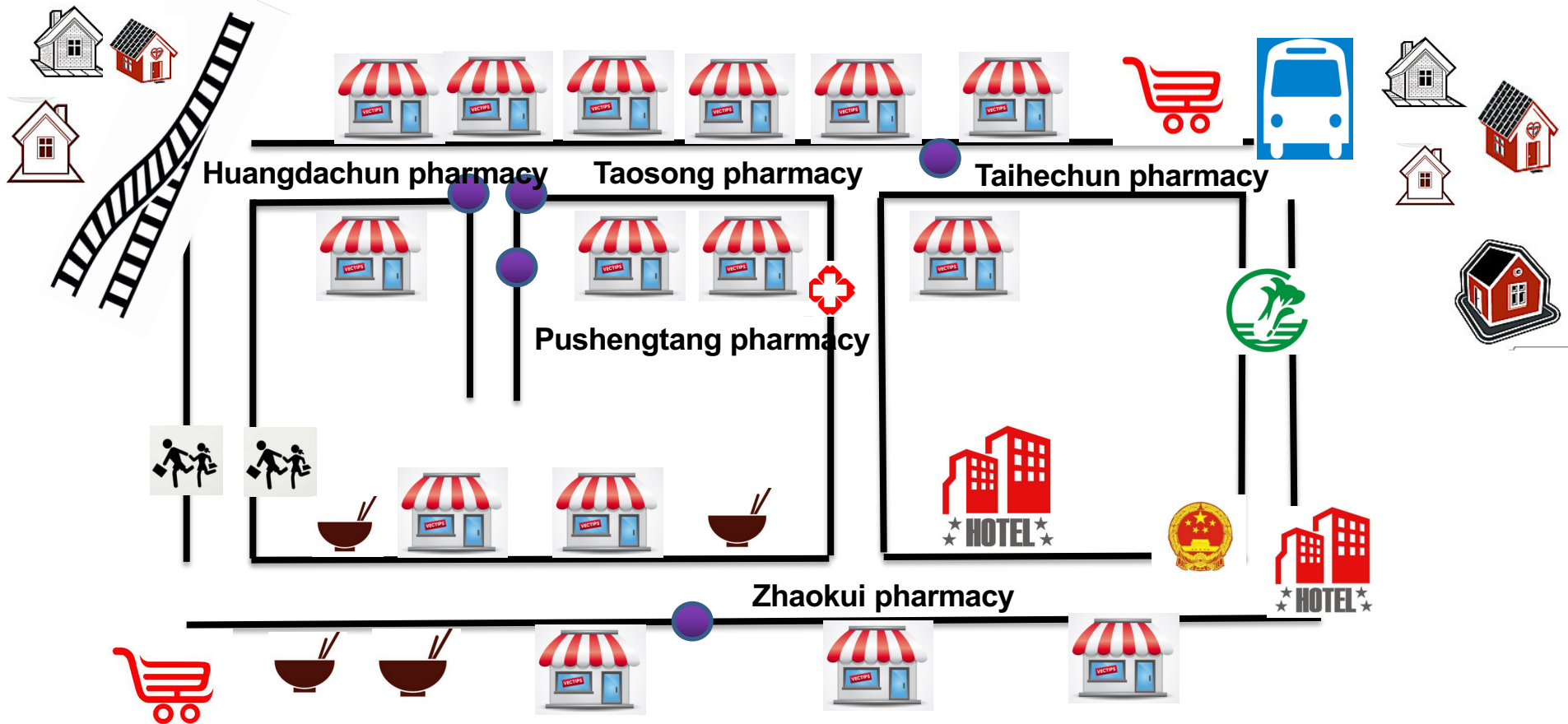
Here, both physician and patient recognise Cephalosporin as a type of “*xiaoyan yao*”, ‘anti-inflammation medicine’; that “*xiaoyan yao*” is useful for treating “cold” (*ganmao*); and that *xiaoyan yao* differs from (non-antibiotic) ‘cold remedy’ (*ganmao yao*).



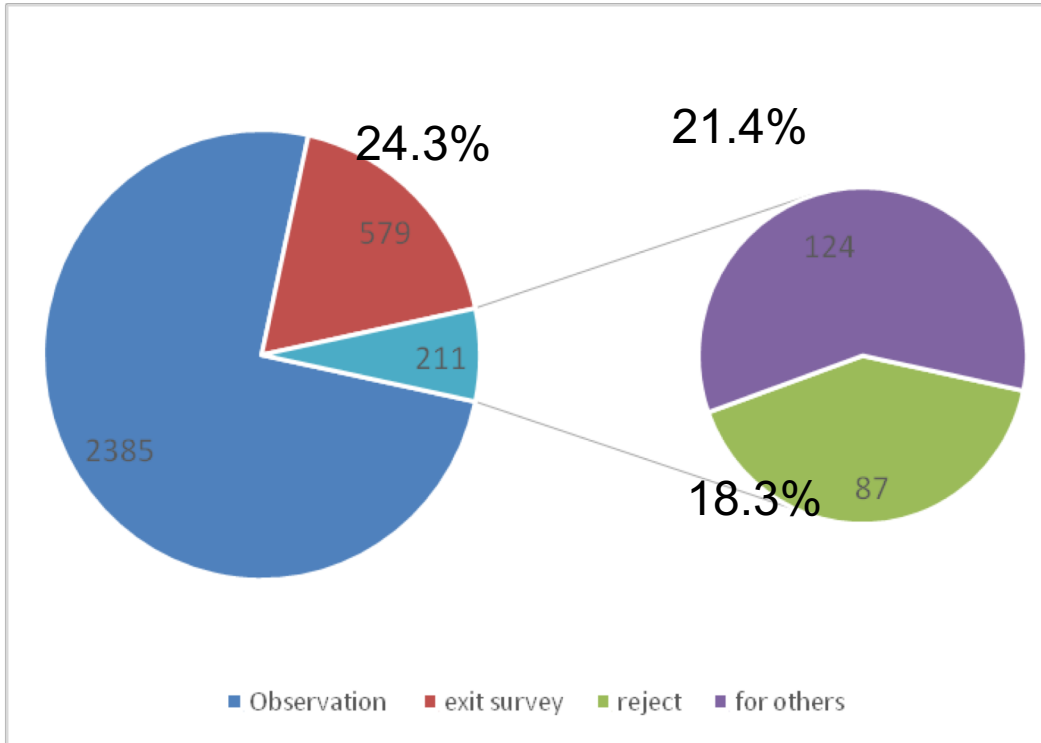
# Observations at Retail Pharmacies



## The location of the five pharmacies in XXXX

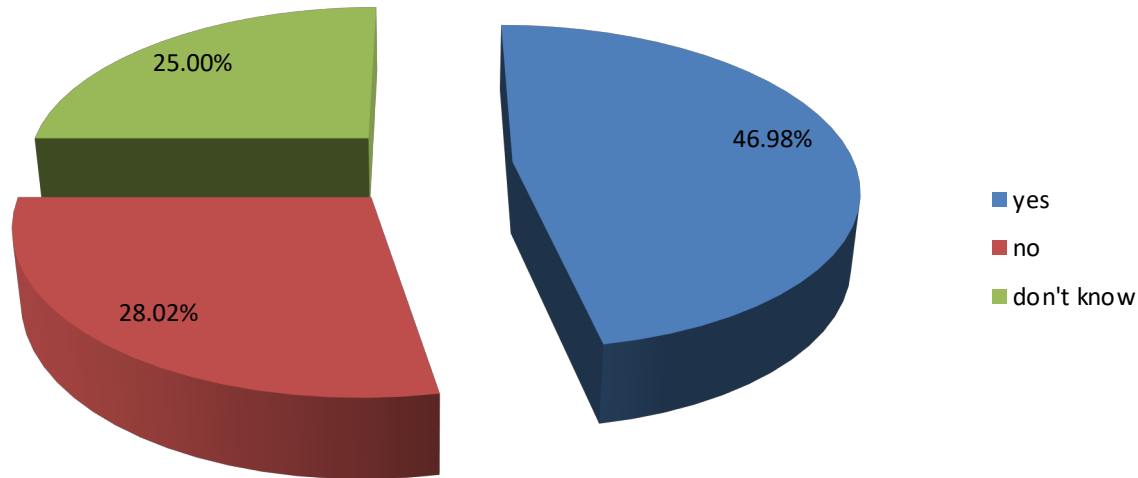


## Cases studied at sites 1 and 2



medicine for whom	cases	percentage
for themselves	1240	54.01%
for baby	520	22.65%
don't refer to	241	10.50%
for others	295	12.85%

Q5. 'Do you know whether what you have bought contain(s) antibiotics or anti-inflammation medicine?'



# Interviews with Clinicians



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# Health system incentives

## Multiple diagnoses:

- **D3:** “Prescription set is certainly useful, it limits the price of single disease by clinical path. But if doctor want to prescribe more drugs, they can give patient more diagnoses.”

## Remuneration issues:

- **D1:** “in the field of New Rural Cooperative Medical, if we treat a patient, 5 Yuan will be return to the health clinic.”
- **D2:** “If you give the patient infusion, the effect is faster, it will attract more patients, the income will be better.”; “If don’t give patient infusion, how can doctor get income to support life”;; “If we give the patient oral medication, we will have no profits”
- **D3:** ” In the past, medical representative gave doctor rebate, but now pharmacy gives rebate to doctor”

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## Summary of findings

### 1) High rates of antibiotic prescribing in clinic patients, both oral and IV

- Western medicine, especially antibiotics, seen as potent, fast-acting (esp IV), cheap
- Doctors want to meet patients' desire for speedy and effective treatment
- Insurance reimbursement incentivises use of tests and IVs

### 2) Under-reporting by clinic patients of prescribed antibiotics

### 3) Use of antibiotics before attending health facilities (esp THC)

- Short doctor-patient consultations with little communication
- Electronic records used for reimbursement purposes, have low level of accuracy compared with observed consultations

### 5) Frequent OTC purchasing of antibiotics from retail pharmacies

- Extended exposure to antibiotics -> development of resistance

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## Summary of findings (contd.)

**5) Antibiotics 抗生素(kangshengsu) and 'antibacterial medicine' 抗菌药 (kangjun yao) are 'anti-inflammation medicine' 消炎药(xiaoyan yao)**

- Doctors say patients won't understand medical language
- (but) Doctors proactively prescribe 'anti-inflammation medicine'
- Antibiotics can't be distinguished verbally from other (non-antibiotic) anti-inflammatory medicine

**6) Frequent antibiotic prescribing reinforces patient perceptions of appropriateness for common RTI symptoms, perpetuating self-medication**



## Conclusions

- Stewardship initiatives in community settings need to consider
  - provincial and local health systems context
  - current perceptions, language and practices
- Decision support tools and clinical guidelines may help establish stewardship in rural facilities

## With thanks to:

### *At AMU:*

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- Melissa Cole
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- Isabel Oliver
- Alasdair Macgowan
- Karen Bowker
- Matt Hickman

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- UKRI
- NSFC



and the rest of the research team

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## Observations of clinical encounters: quantitative analysis

“*Xiaoyan yao* 消炎药” anti-inflammation medicine) vs “*kangsheng su* 抗生素” (antibiotic) in patient consultations (4-month period)

**Site 1 Township Health center Consultation Room One (7 physicians rotate)**

- “*xiaoyan*”消炎 (anti-inflammation): 27
- “*yan*”炎 (inflammation): 113
- “*kangsheng su*”抗生素: 0

**Site 1 Township Health center Consultation Room Two (2 physicians rotate)**

- “*xiaoyan*” : 16
- “*kangsheng su*”抗生素: 0

**Site 1 Village Clinic**

- “*kangsheng su*” 抗生素 (antibiotics) : once by a patient & twice by a physician