BP404T · B.PHARM THEORY

BP404T Social Pharmacy and Public Health

Unit II — Health Systems, Policy & Pharmacoepidemiology

Pills & Python Notes

From-zero teaching standard: every technical term is defined before use.

Syllabus coverage: Unit II (6 hours).

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CHAPTER 2 — UNIT II: HEALTH SYSTEMS, POLICY, AND PHARMACOEPIDEMIOLOGY (6 HOURS)

2.1 Learning Objectives

After studying this chapter, you will be able to:

1. Describe the overview of global healthcare delivery systems.
2. Describe the structure of the Indian healthcare system — public and private sectors, primary/secondary/tertiary levels.
3. Explain health policy formulation and the objectives of India's National Health Policy.
4. State the goals, strategies, and impact of the National Health Mission (NRHM and NUHM).
5. Define pharmacoepidemiology and explain its aims, scope, and applications.
6. Define and calculate incidence, prevalence, and explain endemic, epidemic, pandemic.
7. Explain morbidity and mortality rates, odds ratio, and relative risk.
8. Explain the role of biostatistics in public health, types of data, and basic data presentation methods.

2.2 Definitions

- **Healthcare delivery system:** The organized network of people, institutions, and resources that deliver health-care services to a population.
- **Health policy:** A set of decisions, plans, and actions taken by governments to achieve health goals.
- **National Health Mission (NHM):** India's flagship program to strengthen the public health system, combining the National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM).
- **Pharmacoepidemiology:** The study of the use and effects of drugs in large populations. Simple meaning: studying how medicines behave when thousands of people take them.
- **Incidence:** Number of *new* cases of a disease in a population during a time period.
- **Prevalence:** Number of *total* (old + new) cases of a disease at one point (or period) in time.
- **Biostatistics:** The application of statistics to biological, medical, and public-health data.

2.3 Terminology

Term	Simple Meaning
Primary care	First-contact care — village clinic, health centre
Secondary care	Specialist care — district hospital
Tertiary care	Advanced/super-specialty care — medical college hospital
Endemic	Disease constantly present in an area
Epidemic	Sudden increase of cases beyond normal
Pandemic	Epidemic spread across countries/continents
Odds ratio (OR)	Compares odds of disease in exposed vs unexposed groups
Relative risk (RR)	Compares risk of disease in exposed vs unexposed groups
Quantitative data	Numbers (blood pressure, age)
Qualitative data	Categories/words (gender, blood group)

2.4 Explanation

2.4.1 Healthcare delivery systems: overview of global systems

Technical concept: Countries organize health care in different ways: (1) tax-funded national systems (e.g., United Kingdom — government pays for most care), (2) social insurance systems (e.g., Germany — workers and employers contribute), (3) private insurance/market systems (e.g., USA — mixed public and private), and (4) mixed systems (e.g., India — government services plus large private sector).

Simple explanation: Every country must answer three questions: who pays, who provides, and who gets care. Different countries answer differently, but all try to give the most health to the most people with the money available.

2.4.2 Indian healthcare system: structure, public and private sectors, primary/secondary/tertiary levels

Technical concept: India has a mixed system: a public (government) sector providing free or low-cost care, and a large private sector. Care is organized in three levels — primary (first contact), secondary (specialist), tertiary (super-specialty).

> **Simple explanation:** Think of a three-floor building. Floor 1 is your village clinic (first place you go). Floor 2 is the district hospital (specialist doctors). Floor 3 is the big medical college hospital (heart surgery, cancer treatment). Patients move up as the problem gets serious.

Public sector structure:

- **Primary level:** Sub-centres (one per ~5,000 people, ANM/ASHA), Primary Health Centres or PHCs (one per ~30,000, doctor + pharmacist + lab), Community Health Centres or CHCs (specialists, 30 beds)
- **Secondary level:** District hospitals and sub-district hospitals
- **Tertiary level:** Medical college hospitals, AIIMS-like institutions

Private sector: private clinics, nursing homes, corporate hospitals, and the vast majority of pharmacies. Most Indians first visit a private clinic or buy medicines from a pharmacist.

Pharmacist's place: pharmacists are present at every level — PHC pharmacist, hospital pharmacist, and the community pharmacist who is often the *first and most accessible* health worker.

2.4.3 Health policy: formulation and analysis; objectives of India's National Health Policy

> **Technical concept:** Health policy formulation means identifying health problems, setting goals, choosing strategies, implementing them, and evaluating results. Policy analysis checks whether a policy works and why.

> **Simple explanation:** A health policy is the government's written promise: "This is what we will do for health, and how." Making it is like planning a wedding — decide the goal (healthy marriage), budget, who does what, then check if guests were happy afterwards.

Objectives of India's National Health Policy (2017): the policy aims to achieve the highest possible level of good health and well-being for all citizens through: (1) increasing access to quality health care, (2) reducing out-of-pocket expenditure on health, (3) strengthening primary health care, (4) addressing the growing burden of NCDs, (5) promoting preventive and promotive health, and (6) achieving universal health coverage. (Use cautious wording: refer to the policy document for exact targets.)

2.4.4 National Health Mission (NHM): NRHM and NUHM — goals, strategies, impact

> **Technical concept:** The National Health Mission (launched 2005 as NRHM for rural areas; NUHM added 2013 for urban areas) aims to strengthen the public health system, reduce maternal and child deaths, control communicable diseases, and make health care accessible, affordable, and accountable.

> **Simple explanation:** Before NHM, many villages had a clinic building but no doctor, no medicines. NHM put health workers (ASHAs), medicines, ambulances (108/102), and money into the system — especially for mothers and children.

Key strategies: ASHA workers (one per village), Janani Suraksha Yojana (incentives for institutional delivery), free drugs and diagnostics initiatives, immunization strengthening, and Rogi Kalyan Samitis for hospital management.

Impact on public health indicators: IMR and MMR declined significantly after NHM; institutional deliveries increased; immunization coverage improved. (Avoid exact figures in the exam unless from current official data; describe trends.)

2.4.5 Pharmacoepidemiology: definition, aims, scope, applications

> **Technical concept:** Pharmacoepidemiology studies drug use and drug effects in populations — how drugs are used, whether they work in real life, and what harms they cause.

Aims: (1) describe drug use patterns, (2) assess drug safety in large populations, (3) evaluate real-world effectiveness, (4) support rational drug use and policy.

Scope: drug utilization studies, pharmacovigilance (ADR monitoring), post-marketing surveillance, comparative effectiveness.

Applications: detecting rare side effects that clinical trials missed, comparing two drugs for the same disease, studying drug use in pregnancy or elderly, guiding national drug policies.

> **Simple explanation:** A clinical trial tests a drug on 3,000 people. But after launch, 30 lakh people take it. Pharmacoepidemiology watches those 30 lakh — "In real life, does the drug still work? Does it harm anyone?" It is the *CCTV camera* of the drug world after the drug reaches the market.

2.4.6 Measures of disease frequency and distribution

> **Technical concept:**

- **Incidence** = new cases ÷ population at risk, over a time period. Tells how *fast* disease is spreading.
- **Prevalence** = total cases ÷ total population, at a point in time. Tells how *big* the problem is.
- **Endemic:** disease always present in a region (e.g., malaria in some districts).
- **Epidemic:** sudden rise above normal (e.g., dengue outbreak in a city).
- **Pandemic:** epidemic across countries (e.g., COVID-19).

> **Worked examples (hypothetical):**

- Incidence: A town of 10,000 people had 200 NEW TB cases in 2025. Incidence = 200/10,000 = 20 per 1,000 per year.
- Prevalence: In the same town, 500 people had diabetes in January 2025 (old + new). Prevalence = 500/10,000 = 50 per 1,000.

> **Analogy:** Incidence is like the *speed* of water filling a bucket; prevalence is the *total water* in the bucket.

Morbidity and mortality rates: Morbidity rate = number of illness cases per population (how many are sick). Mortality rate = number of deaths per population (how many died). Case fatality rate = deaths among those who got the disease (how deadly the disease is for its victims).

Odds ratio and relative risk:

- **Relative risk (RR):** risk of disease in exposed group ÷ risk in unexposed group. RR = 2 means the exposed group has twice the risk.
- **Odds ratio (OR):** odds of exposure in diseased ÷ odds of exposure in non-diseased (used in case–control studies). OR ≈ RR for rare diseases.
- Simple: both answer "How much more likely is disease if you are exposed?" RR > 1 means exposure increases risk.

2.4.7 Introduction to biostatistics: role in public health; types of data; basic data presentation methods

> **Technical concept:** Biostatistics turns health data into decisions — which disease to fight first, whether a program works, which drug is safer.

Types of data:

- **Quantitative (numerical):** discrete (number of children — whole numbers) and continuous (blood pressure — can be any decimal).
- **Qualitative (categorical):** nominal (blood group A/B/AB/O — no order) and ordinal (mild/moderate/severe — ordered).

Basic data presentation methods: tables (frequency tables), bar diagrams (compare categories), pie charts (show parts of a whole), histograms (distribution of numbers), line graphs (trends over time).

> **Key takeaway:** India's mixed health system has three levels of care; NHM strengthened rural and urban public health; pharmacoepidemiology watches drugs in real populations; incidence, prevalence, RR, and OR describe disease; biostatistics converts data into public-health decisions.

2.5 Infographic Concept Box — Chapter 2

> Title: "From Village to Policy" — Left: three-level pyramid (PHC → district hospital → medical college). Middle: NHM box with ASHA, 108 ambulance, free drugs flowing down to villages. Right: a magnifying glass over a crowd labelled "pharmacoepidemiology — watching drugs in real life." Bottom strip: incidence (speed) vs prevalence (water in bucket) analogy icons, and RR/OR formulas. Bottom: bar chart + pie chart labelled "biostatistics — data into decisions."

2.6 Analogies

- Incidence vs prevalence: speed of water filling a bucket vs total water in the bucket.
- Pharmacoepidemiology is the CCTV camera of drugs after market launch.
- The three levels of care are like a three-floor building — go up only when needed.

2.7 Pharmacy Relevance

Pharmacists report ADRs (pharmacovigilance), conduct drug-utilization studies, support NHM programs at PHCs, and counsel under national programs.

2.8 India Context

India's National Health Policy (2017) and NHM (NRHM + NUHM) shape the system pharmacists work in; ASHA workers are the pharmacist's partners in villages.

2.9 Key Points

1. Global systems: tax-funded, insurance-based, mixed (India = mixed).
2. Indian system: public + private; primary (PHC/CHC) → secondary (district) → tertiary (medical college).
3. NHP (2017): access, affordability, primary care, NCDs, universal health coverage.
4. NHM = NRHM + NUHM: goals — stronger public system, lower MMR/IMR, accessible affordable care.
5. Pharmacoepidemiology: aims — describe use, assess safety, evaluate effectiveness, support policy.
6. Incidence = new cases; prevalence = total cases; endemic/epidemic/pandemic = scale of spread.
7. RR and OR compare disease risk/odds between exposed and unexposed.
8. Biostatistics: quantitative vs qualitative data; tables, bar, pie, histogram, line graphs.

2.10 Common Confusions

- **Incidence vs prevalence:** incidence counts only NEW cases over time; prevalence counts ALL existing cases at a point.
- **RR vs OR:** RR is used in follow-up (cohort) studies; OR in case–control studies.
- **NRHM vs NUHM:** NRHM = rural, NUHM = urban; together they form NHM.

2.11 Common Mistakes

1. Writing incidence formula for prevalence — remember "incidence = incoming (new)."
2. Calling every outbreak a pandemic — pandemic means across countries.
3. Saying pharmacists have no role in public health — list pharmacovigilance, NHM support, drug-utilization studies.

2.12 Mnemonics

- Endemic/Epidemic/Pandemic scale: "**E**very **E**lephant **P**lays" — Endemic (area), Epidemic (region), Pandemic (planet).
- Data types: "**Q**uality **Q**uantifies?" no — "**QUAN** = numbers, **QUAL** = qualities."
- NHM strategies: "**A**SHA-**J**SY-**F**ree drugs-**I**mmunization" — "AJFI."

2.13 Exam Summary

India has a mixed health system with three levels (primary PHC/CHC, secondary district, tertiary medical college) plus a large private sector. NHP (2017) aims at access, affordability, primary care, NCD control, universal health coverage. NHM (NRHM + NUHM) strengthened public health via ASHA, JSY, free drugs/diagnostics; MMR/IMR fell. Pharmacoepidemiology studies drug use and effects in populations (drug utilization, pharmacovigilance, post-marketing surveillance). Incidence = new cases/time; prevalence = total cases/point; endemic/epidemic/pandemic; morbidity/mortality/case fatality rates; RR and OR compare exposed vs unexposed. Biostatistics: role in decisions; quantitative vs qualitative data; tables, bar, pie, histogram, line graphs.

2.14 One-Minute Revision

3 levels: PHC → district → medical college. NHP 2017: access, affordability, primary care, NCDs, UHC. NHM = NRHM + NUHM. Pharmacoepidemiology = drugs in real populations. Incidence = new; prevalence = total. E-E-P = area, region, planet. RR/OR: exposed vs unexposed. Biostatistics: numbers → decisions.

2.15 Exam Questions

Long answer:

1. Describe the structure of the Indian healthcare system with its three levels of care.
2. Discuss the goals, strategies, and impact of the National Health Mission.
3. Define pharmacoepidemiology. Explain its aims, scope, and applications.
4. Define incidence and prevalence. Explain endemic, epidemic, and pandemic with examples.

Short answer:

1. What are the objectives of India's National Health Policy?
2. Differentiate between odds ratio and relative risk.
3. Name the types of data with one example each.

MCQs:

1. Prevalence measures: (a) Total cases at a point in time (b) Only new cases (c) Deaths only (d) Recoveries — Ans: (a)
2. NRHM focuses on: (a) Rural areas (b) Urban areas (c) Foreign aid (d) Private hospitals — Ans: (a)
3. A disease constantly present in an area is: (a) Endemic (b) Epidemic (c) Pandemic (d) Sporadic — Ans: (a)
4. Relative risk greater than 1 means: (a) Exposure increases risk (b) Exposure protects (c) No relation (d) Study failed — Ans: (a)

Viva / application-based:

1. In a village of 5,000, 50 new malaria cases occurred in June. Calculate incidence. (50/5,000 = 10 per 1,000.)
2. A pharmacist notices many ADRs for a new drug — which field studies this? (Pharmacoepidemiology/pharmacovigilance.)

2.16 References

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