
Health Disparities

Determinants • population genetics • environmental exposures • clinical inequities

Dr Abu Suraih Sakhri

MBBS, MD (Pathology)

www.abusuraihsakhri.com

Learning objectives

- Define incidence, prevalence, severity, and burden disparities.
- Explain intersecting social, environmental, and health care determinants.
- Distinguish socially defined race, ethnicity, and geographic ancestry.
- Interpret the pollution, mortality, CPR, eGFR, and genetic-disease examples.

Health disparities: What the term measures

- Unequal incidence and prevalence across population groups
- Differences in disease severity and cumulative burden
- Unequal patterns of injury and mortality
- A population-level description—not a diagnosis or biological trait of a person

Incidence, prevalence, severity, burden

Incidence

New cases in a defined period

Prevalence

Existing cases at a given time

Severity

How serious the condition becomes

Burden

Aggregate health impact, including disability or death

Each measure answers a different epidemiologic question.

Health disparities are comparisons between groups

Useful comparison

- Specify the population and comparison groups
- Choose an outcome such as mortality or disease burden
- State the observation and its time/place

Invalid shortcut

- Do not equate group labels with causal mechanisms
- Do not infer an individual's biology from a group average
- Do not confuse description with explanation

A disparity prompts causal investigation; It does not identify a cause by itself.

A multideterminant view of health

Material resources

Employment · income · food security

Living conditions

Housing · neighborhood infrastructure

Clinical access

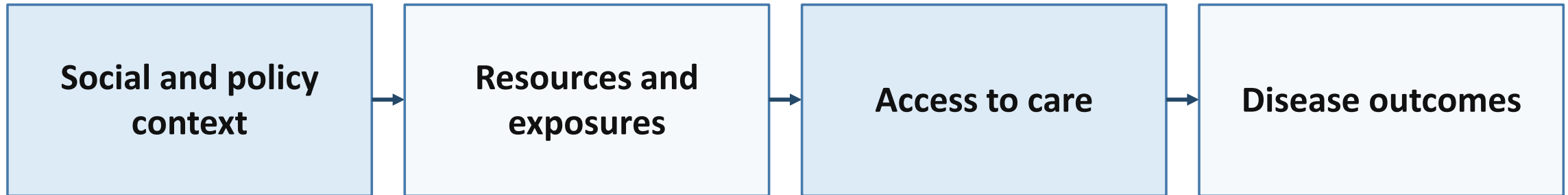
Health care · insurance status

Social context

Education · ethnicity · partnership status

Policies, behaviors, racism, and sexism interact with these domains.

Health status is not reducible to one determinant

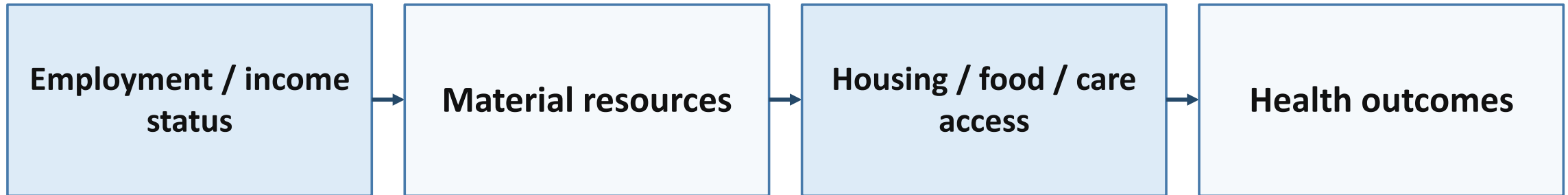


- Multiple determinants operate together.
- The same outcome may reflect several linked pathways.

Education as a context for disparities

- Education level is explicitly named among disparity-associated factors.
- It should be examined alongside income, employment, and access to care.
- An education gradient does not establish an intrinsic biological difference.
- Identify correlated circumstances before drawing causal conclusions.

Employment and income shape material conditions



- Employment and income among interacting determinants.
- This flow depicts a plausible linkage, not measured effects from the textbook.

Food security is a determinant, not a diagnosis

- Food security belongs in an account of population health inequality.
- It can intersect with household resources and neighborhood conditions.
- Assessment of disparities should include food-related context.
- The Health Disparities section provides no specific nutritional prevalence estimates.

Housing and neighborhood conditions

Relevant circumstances

- Housing circumstances vary across groups
- Neighborhoods may lack adequate infrastructure
- Proximity to industrial activity may alter exposure

Clinicopathologic interpretation

- Look for environmental exposure opportunities
- Consider access to high-quality services
- Do not attribute effects to race as a genotype

The environment experienced by a group can differ from its genetic ancestry.

Infrastructure influences opportunities for health

Roadways and rail

Sources of traffic-related exposure

Ports and industry

Concentrated surrounding emissions

Water infrastructure

Availability of safe drinking water

Care infrastructure

Access to high-quality health services

These settings enter the disparity pathway through differential exposures or access.

Health care access is a core determinant

- High-quality care may be less accessible to marginalized groups.
- Access influences whether disease is recognized and addressed promptly.
- Inadequate access to important mortality disparities.
- Barriers can also operate outside conventional clinical settings.

Insurance status is separate from care quality

Coverage dimension

- Insurance status is one recorded dimension
- Coverage can be considered alongside income and employment
- A coverage label alone cannot capture all barriers

Delivery dimension

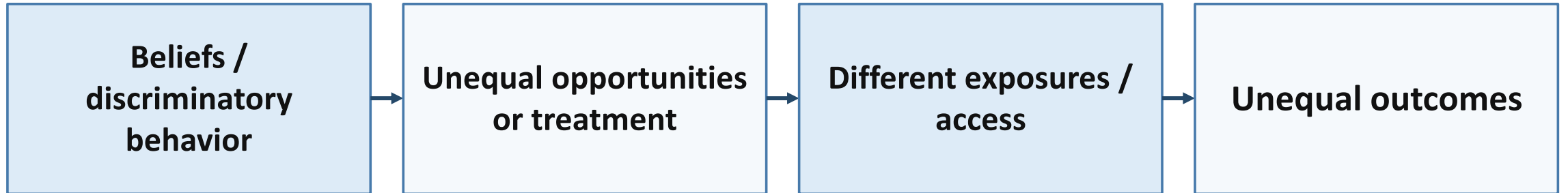
- Actual availability of care also matters
- Quality of available care is relevant
- Neighborhood and discrimination may overlap

Health insurance and health care access are separately named.

Partnership and marital status: A contextual factor

- Partnership or marital status is among the factors listed.
- It belongs in a multidomain characterization of population groups.
- It should not be used as a deterministic biological explanation.
- Interpret its apparent association in the presence of other determinants.

Racism and sexism can modify other determinants



- Robbins explicitly identifies racism and sexism.
- Do not treat these as patient-specific genetic properties.

Political, economic, and health policies matter

Economic policies

Context for employment and income

Political policies

Context for social organization

Health care policies

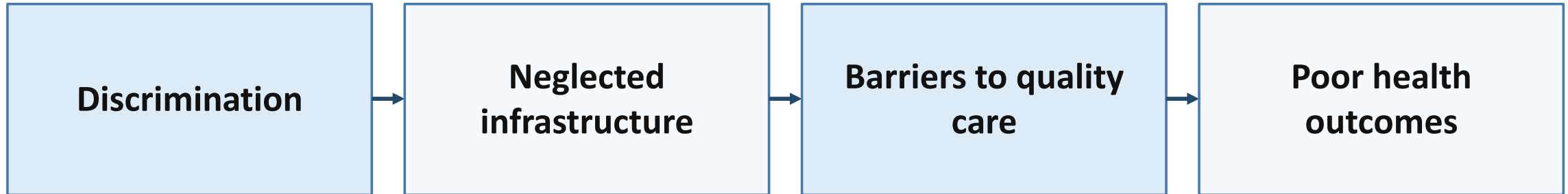
Context for access and delivery

Personal behavior

May interact with the broader setting

The source emphasizes interaction, not a single universal pathway.

Marginalization: Interacting disadvantages



- One community may face several disadvantages simultaneously.
- The source explicitly combines these examples.

Social determinants and personal behaviors

Context and opportunity	Individual-level factors
• Education, income, housing, and neighborhood • Health care coverage and access • Discrimination and structural policies	• Individual beliefs and behaviors also influence health • Behavior occurs within a social setting • Avoid blaming individuals for structural exposures

Behavioral and structural factors as interacting.

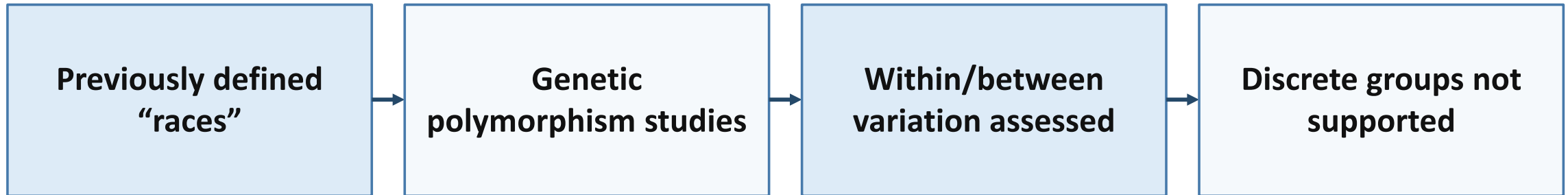
Interpretation: Association does not specify causation

- A group-level excess of disease is a finding, not a full mechanism.
- Consider exposure, resources, clinical access, and discriminatory processes.
- Multiple explanations can coexist and require separate assessment.
- Avoid converting an observed association into biological essentialism.

Why does Robbins interrogate “race”?

- Historically, societies sorted people using physical appearance or origin.
- These socially applied labels do not define genetic populations.
- Population genetics tests variation within and between human groups.
- The clinical hazard is mistaking a social category for a genotype.

Genetic polymorphisms challenge discrete races



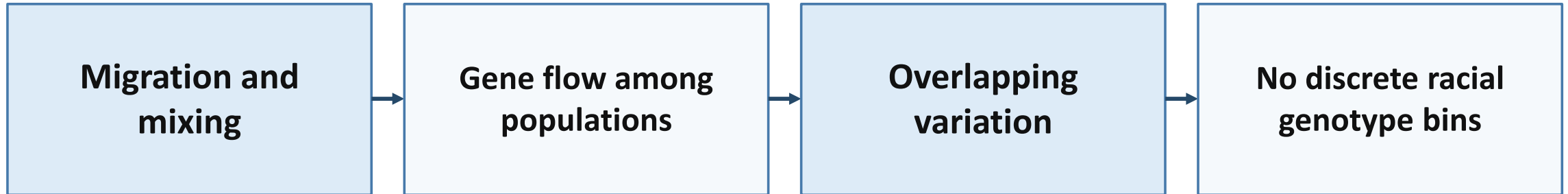
- This evidence has accumulated since the 1960s.
- The finding concerns genetic boundaries, not social consequences.

Within-population variation exceeds between-group variation

Within groups	Between groups
• People assigned the same broad population label are genetically variable • Broad labels do not describe homogeneous genotypes	• Differences between continental population groupings exist • Their boundaries are not discrete biological “races”

Greater variation within than between broad human populations.

Gene flow makes human variation continuous



- Genetic variation does not respect rigid social categories.
- Geographic ancestry can still associate with allele frequencies.

A continuum is not a set of genetic boxes

Within group A	Within group B
Substantial diversity	Substantial diversity
Between groups	Across geography
Overlapping genetic distributions	Continuous variation with gene flow

Conceptual schematic: Groups are social labels, not disjoint genetic classes.

Modern humans do not divide into biological races

- Robbins rejects the concept of genetically discrete modern human races.
- The conclusion follows from within-group diversity and gene flow.
- Socially defined race is not a standalone inherited risk factor.
- Ancestry-associated variants must be assessed without rigid exclusions.

Socially defined race remains consequential for health

Social classification	Health consequences
• Social labels can be used to create group hierarchies • Social subordination is historically documented • Groups may face discriminatory treatment	• Living environments can differ • Access to timely care can differ • Disease burden and mortality can differ

A social construction can produce biologically important exposures.

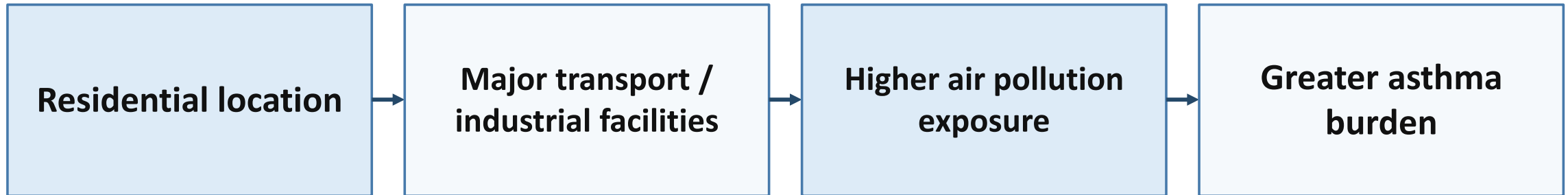
Classification by phenotype or origin has limitations

- Skin pigmentation is one historical basis for race labels.
- Geographic-origin labels are also socially used.
- Terms such as “Caucasian” are identified as outdated.
- None provides a precise substitute for an individual’s genotype.

Race, ethnicity, ancestry: Different constructs

Construct	What Robbins emphasizes	Common error
Socially defined race	Classification by society and history	Treating label as genetic category
Ethnicity	Culture, origin, language, religion	Collapsing distinct communities
Geographic ancestry	Origin associated with some allele frequencies	Assuming an absolute disease boundary

An environmental example: Residence near pollution



- Higher proximity/exposure for African Americans compared with European Americans.
- This is an environmental pathway, not a claim of racial genetic susceptibility.

Which physical settings does Robbins list?

Major roadways

Traffic-related air exposure

Rail lines

Transport corridor exposure

Ports

Freight and activity zones

Industrial facilities

Industrial air emissions

The common principle is unequal proximity to pollution sources.

Asthma burden: An exposure pathway

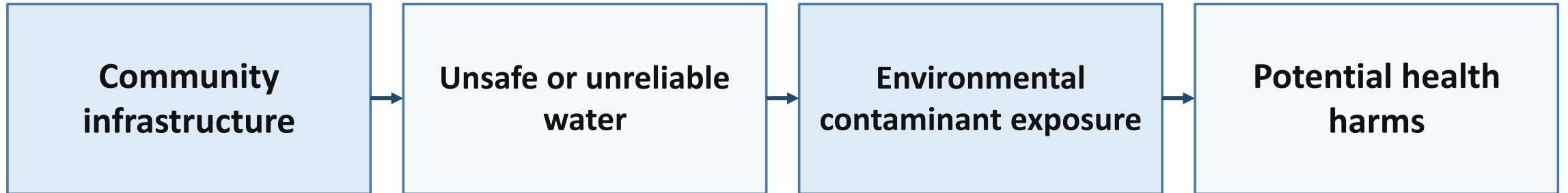
Textbook example	Clinical reasoning
• Residential proximity to pollution sources differs • Exposure opportunity is elevated in affected locations • The text describes an increased asthma burden	• Race label alone does not reveal an exposure dose • Do not infer a genetic asthma mechanism • Consider the patient's actual surroundings

Exposure assessment offers a more actionable explanation than a race label.

Flint and Jackson: Failures of safe-water access

- Flint, Michigan, and Jackson, Mississippi.
- Both examples concern major water crises in majority African American cities.
- Safe drinking-water access was compromised.
- Residents were exposed to hazardous environmental contaminants.

Water crises as a disparity mechanism



- The chapter establishes exposure and compromised access.
- It does not quantify disease incidence attributable to each water crisis.

Environmental justice is clinically relevant

- Unequal exposure may arise from where people live and work.
- Environmental histories can identify mechanisms hidden by group labels.
- Discriminatory structures can affect infrastructure and care access.
- These connections with pollution and water examples.

Maternal mortality: An inequality reported

- The text reports approximately three-fold higher maternal mortality among African Americans.
- Comparison group: Americans of European descent.
- Inadequate health care access in the explanation.
- Treat this as a textbook-reported estimate, not a current annual surveillance rate.

Infant mortality: A separate reported disparity

- Approximately two-fold higher infant mortality among African Americans.
- The comparator is Americans of European descent.
- Infant and maternal mortality are distinct clinical endpoints.
- Clinical access is one important context named by the source.

COVID-19 mortality: Disparities in a pandemic

- Approximately two-fold higher COVID-19 mortality among African Americans.
- The reported comparison is with Americans of European descent.
- The paragraph links outcome inequalities partly to care access.
- The ratio is historical textbook content, not a claim of present-day rates.

Three outcomes: Approximate ratios in the text

Outcome	Reported African American / European American rate	Important limitation
Maternal mortality	≈ 3-fold	Not dated in this excerpt
Infant mortality	≈ 2-fold	Not a subgroup-specific estimate
COVID-19 mortality	≈ 2-fold	Not a current live estimate

Chronic diseases also show uneven prevalence

Type 2 diabetes

More prevalent in the African American population

Hypertension

More prevalent in the African American population

Obesity

More prevalent in the African American population

Clinical inference

Investigate multiple interacting determinants

The source reports direction, not absolute or relative prevalence estimates.

Prevalence is not an explanation

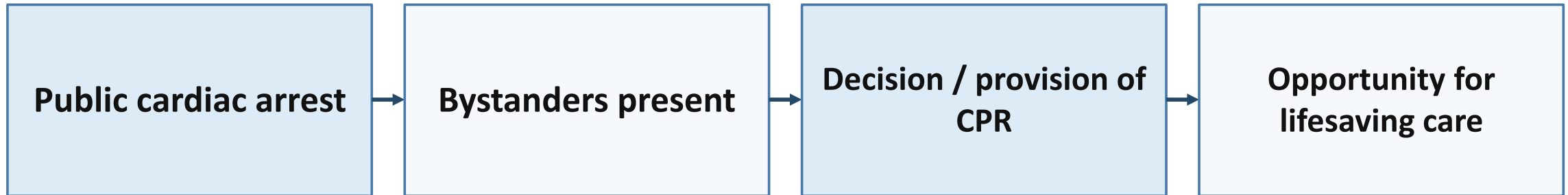
What is reported	What it does not prove
• Type 2 diabetes, hypertension, and obesity • Higher prevalence is a group-level observation • The excerpt supplies no numerical mechanism-specific estimates	• Avoid assuming an inherent racial biology • Evaluate environment, access, and social context • Approach each patient individually

Descriptive epidemiology and causal attribution are different tasks.

Out-of-hospital cardiac arrest exposes another gap

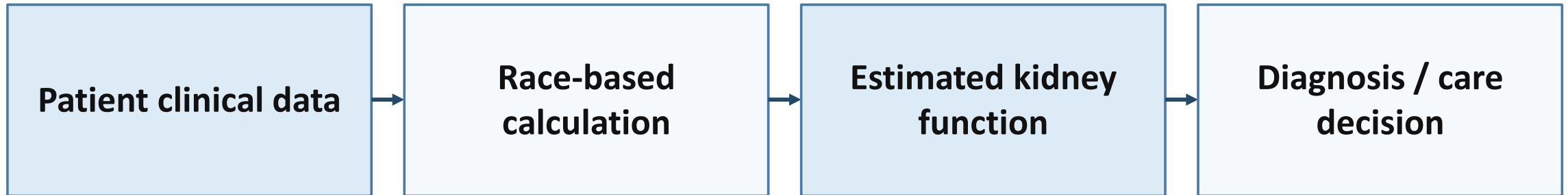
- Cardiac arrests in public locations.
- African American and Hispanic persons are less likely to receive bystander CPR.
- The comparator is persons of European descent.
- The disparity lies outside a traditional hospital care encounter.

Bystander CPR: Point-of-event inequality



- Unequal provision at the bystander-CPR stage.
- No specific explanation for the bystander behavior is established in the excerpt.

Diagnostic algorithms may encode disparity



- Race adjustment may change estimated GFR and classification.
- A mathematical correction is not automatically biologically justified.

EGFR: Race correction changes a clinical threshold

With a race correction

- A race-based term modifies estimated GFR
- The estimate contributes to chronic kidney disease diagnosis
- A different reported estimate may alter classification

Without a race correction

- Removal of race-based corrections
- More African American patients would be identified with CKD
- Earlier diagnosis and specialty access may follow

The text does not specify an equation version or diagnostic cut-off.

The direction of the eGFR effect

- Removing race correction is described as increasing CKD diagnoses among African American patients.
- Earlier diagnosis creates an opportunity for timely specialty care.
- Robbins positions this as a health equity implication of clinical testing.
- No precision, sensitivity, or outcome-effect data are provided here.

Review of race-based decision algorithms

Cardiovascular

Cardiology

Maternal / metabolic

Obstetrics · endocrinology

Cancer / respiratory

Oncology · pulmonology

Procedural systems

Urology · surgery · transplantation

Race-based components across these fields are being reviewed.

Clinical algorithm audit: Four questions

Input

Is race entered as an adjustment?

Justification

What causal or measurement rationale exists?

Effect

Who crosses diagnostic or referral thresholds?

Equity

Could the adjustment amplify existing inequity?

Illustrative audit framework derived, not a cited formal guideline.

Ethnicity includes more than a single descriptor

Culture

Shared practices and customs

Country of origin

Geographic and historical links

Language

Communication background

Religion

One possible identity dimension

Robbins treats ethnicity as multidimensional and relevant to outcomes.

“Hispanic” and “non-Hispanic” are U.S. Categories

- The text describes a common U.S. Ethnic classification as Hispanic versus non-Hispanic.
- In U.S. Census/research usage, “Hispanic” refers to Spanish origin or descent.
- This category is not equivalent to a shared genetic ancestry.
- Administrative labels require definition before comparing health outcomes.

Latin American is broader than Spanish-speaking

Hispanic

- Hispanic is framed around Spanish origin or descent
- It is often used as a U.S. Census / research category

Latin American

- Latin American includes Central and South America
- Non-Spanish-speaking Brazilians are included
- Ancestry can include African, Amerindian, and European contributions

Neither label describes a uniform genomic group.

Do not substitute phenotype for ancestry

- Social race labels have used skin pigmentation and geographic terms.
- Human populations have experienced extensive gene flow.
- Population allele frequencies may correlate with regional ancestry.
- An individual diagnostic decision should not depend on appearance alone.

Ancestry-linked risk $\neq$ race-restricted disease

Appropriate population inference

- Allele frequencies can differ by ancestral region
- A disease may be more common in one broad ancestry group
- Such associations may inform prior probability

Inappropriate patient inference

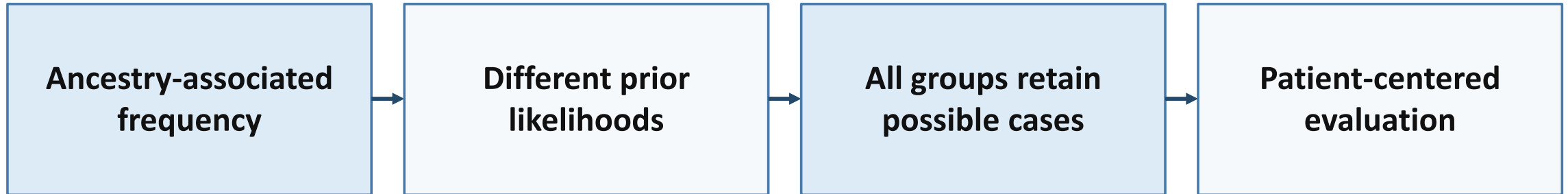
- Disease is not exclusive to one racial label
- Individual patients have mixed and diverse ancestries
- Do not exclude disease solely on a group label

The distinction with cystic fibrosis and sickle cell disease.

Cystic fibrosis: All cited groups are affected

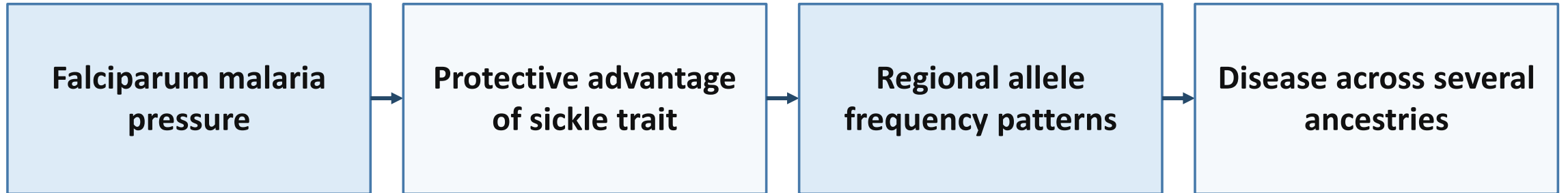
Population descriptor in Robbins	Approximate birth frequency reported	Interpretation
Northern European descent	1 in 2,500	Higher frequency in example
African American infants	1 in 17,000	Disease still occurs
Asian American infants	1 in 31,000	Disease still occurs

Cystic fibrosis does not respect a racial boundary



- The cited figures demonstrate frequency variation, not exclusivity.
- Avoid using ancestry labels as the sole diagnostic rule-out.

Sickle cell disease and historical selection



- The malaria-selection explanation.
- The geographic distribution is broader than West Africa alone.

The sickle mutation spans the malaria belt

Equatorial Africa

Higher-frequency region

Southern Europe

Higher-frequency region

Middle East

Higher-frequency region

Parts of Asia

Higher-frequency region

These are examples of regions named by Robbins—not prevalence measurements.

A patient's identity is not a diagnostic exclusion

- Ancestry-associated conditions may occur outside commonly associated groups.
- Distinguish geographic allele-frequency patterns from social race labels.
- Keep phenotype, family history, and appropriate testing conceptually separate.
- Robbins explicitly warns against biasing the approach to individual patients.

Applied case: Asthma and the built environment

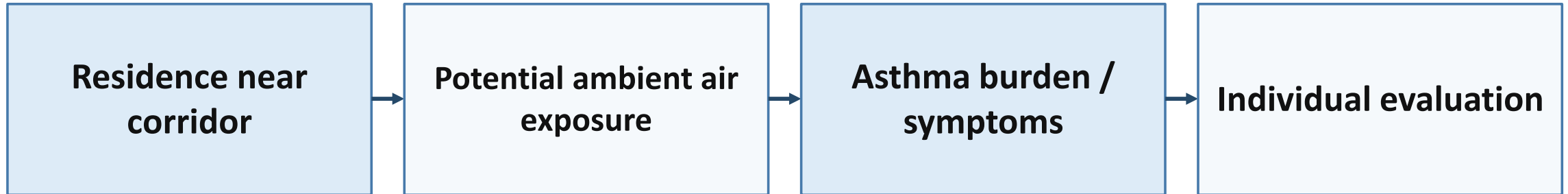
HYPOTHETICAL CASE

A patient with recurrent asthma symptoms lives near an industrial transport corridor. A group-level report shows greater pollution exposure in similar neighborhoods.

Interpretive questions

- Which exposure pathway is plausible from the Robbins example?
- What environmental history would help characterize this patient?
- Why would a race label alone be a weak causal explanation?

Case discussion: Follow the exposure pathway



- Environmental history tests a plausible mechanism.
- Group associations cannot substitute for patient-level assessment.

Applied case: Interpreting kidney function

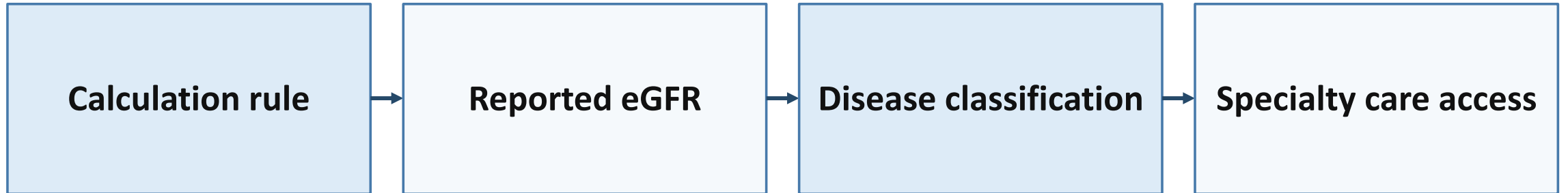
HYPOTHETICAL CASE

Two reports use different eGFR approaches for the same hypothetical patient; One includes a race adjustment and the other does not.

Interpretive questions

- Which reported value could affect CKD classification?
- What downstream access-to-care consequence does Robbins identify?
- Why should the equation's adjustment be critically examined?

Case discussion: Why an equation matters



- Removing race correction with additional CKD diagnoses.
- Changes in classification create opportunities for earlier referral.

Applied case: Ancestry and cystic fibrosis

HYPOTHETICAL CASE

A clinician considers cystic fibrosis but is tempted to dismiss it because a patient is not described as having Northern European ancestry.

Interpretive questions

- What do the three birth-frequency examples demonstrate?
- Why does a lower population frequency not imply impossibility?
- How can anchoring on a social group label bias care?

Case discussion: Probability is not impossibility

Population information

- Different population birth frequencies
- Northern European ancestry has the highest cited frequency
- A group association can shape population expectations

Individual care

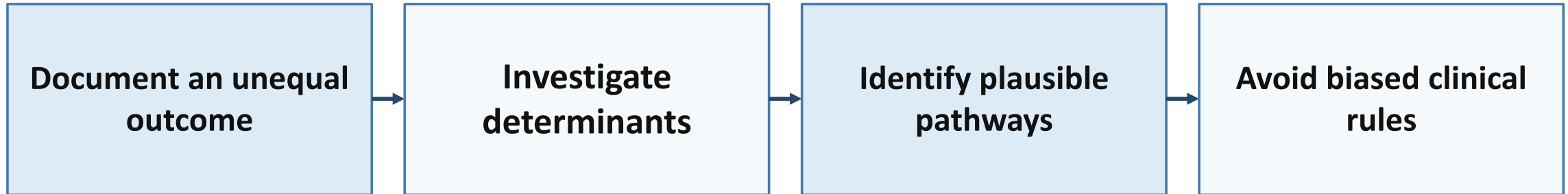
- Affected infants occur in each cited group
- Labels cannot establish individual genotype
- Avoid withholding evaluation due to an assumed exclusion

The correct lesson is graded prior likelihood—not an absolute racial boundary.

How to read Robbins Figure 9.1 responsibly

- Figure 9.1 concerns county-level differences in life expectancy by racial/ethnic group.
- Comparisons are made relative to a White population in U.S. Counties for 2019.
- County and group must both be considered when interpreting the displays.
- The source figure itself is not reproduced: No values or map patterns are inferred.

Integrating observation, pathway, and response



- An observed disparity is the beginning of explanation, not its endpoint.
- Source examples span environmental exposures, access, and algorithms.

Five claims that should remain distinct

- Health disparities concern unequal disease outcomes across groups.
- Intersecting social, environmental, policy, and health care factors matter.
- Socially defined race does not establish genetically discrete human groups.
- Clinical algorithms and bystander actions can amplify unequal access.
- Ancestry-linked disease associations are probabilistic, not absolute.

Primary source and figure provenance

Robbins, Cotran & Kumar. Pathologic Basis of Disease. 11th ed. (2026). “Health Disparities.”

Dwyer-Lindgren K, et al. Life expectancy by county, race, and ethnicity in the USA, 2000–19: a systematic analysis of health disparities. Lancet. 2022;400(10345):25–38. (Credited in Robbins Fig. 9.1 caption.)

Figure 9.1 was not copied; only its supplied textbook caption informed the lecture.