

Measuring Health System Coverage:

A Micro-Simulation Model

International Health Economics Association

Bakuti Shengelia

Ajay Tandon

Evidence and Information for Policy (EIP)

World Health Organization



Measuring Health System Coverage

How to conceptualize health care need?

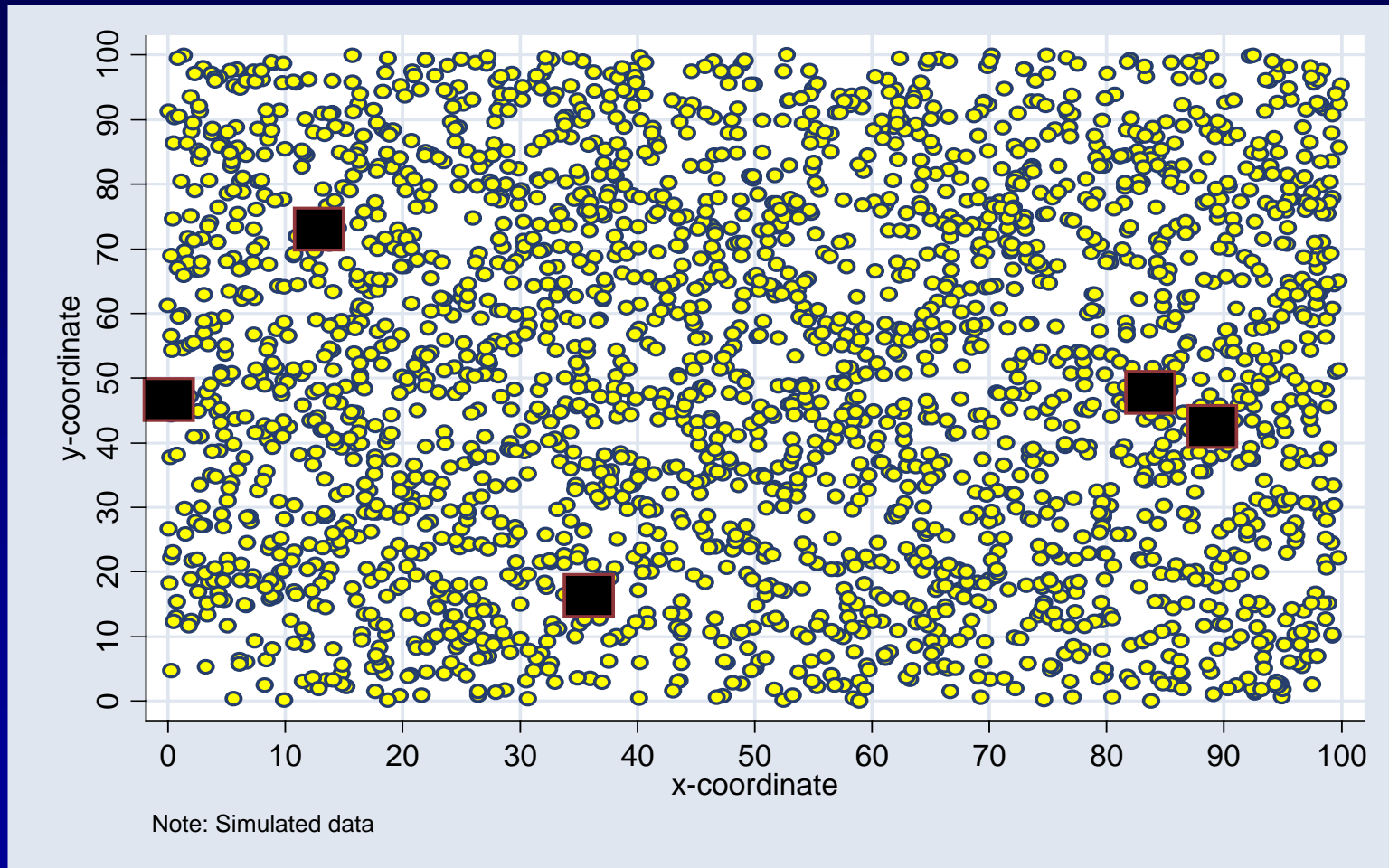
An individual has a health care need if:

- The individual has an illness, and an effective intervention is available for the illness.
- The individual faces a risk of illness, and an effective preventive intervention is available.
- Magnitude of health care need defined by magnitude of possible health gain.



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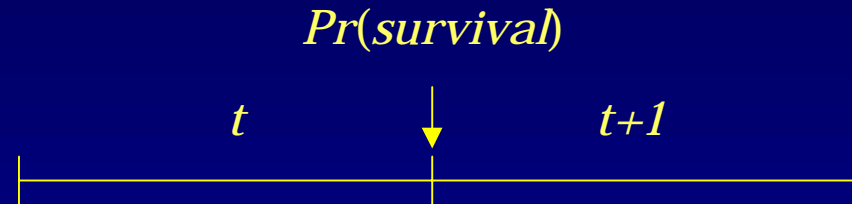
Characterizing the environment:



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What drives demand for health care?

- Two-period utility model: probability of survival to second period.

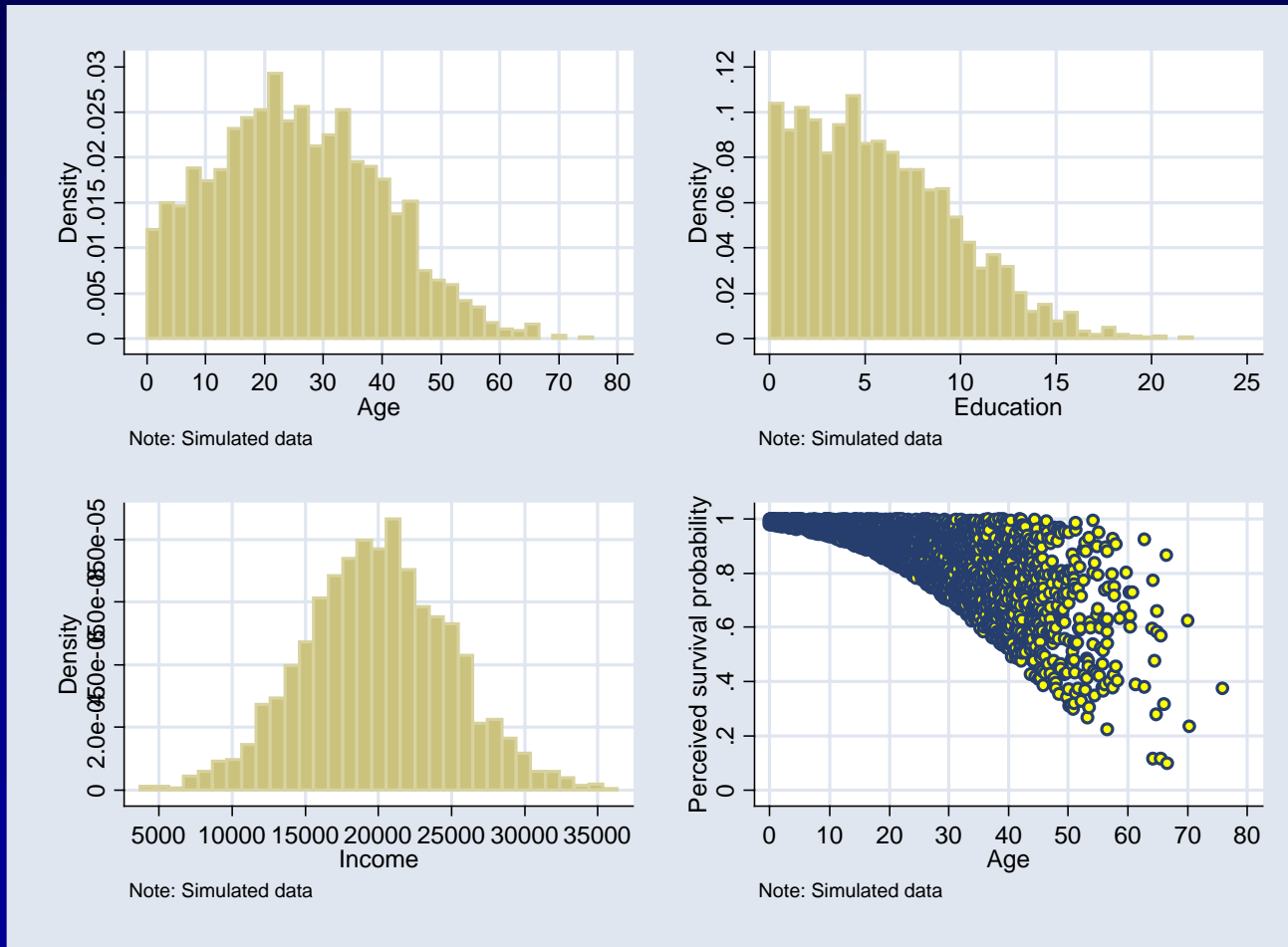


- First period: Some individuals have one (or both) of two diseases prevalent in the population. Choice between consuming health care, or consuming other goods.
- Second period: Survival probability for those who have the disease is a function of decision to seek care in the first period.



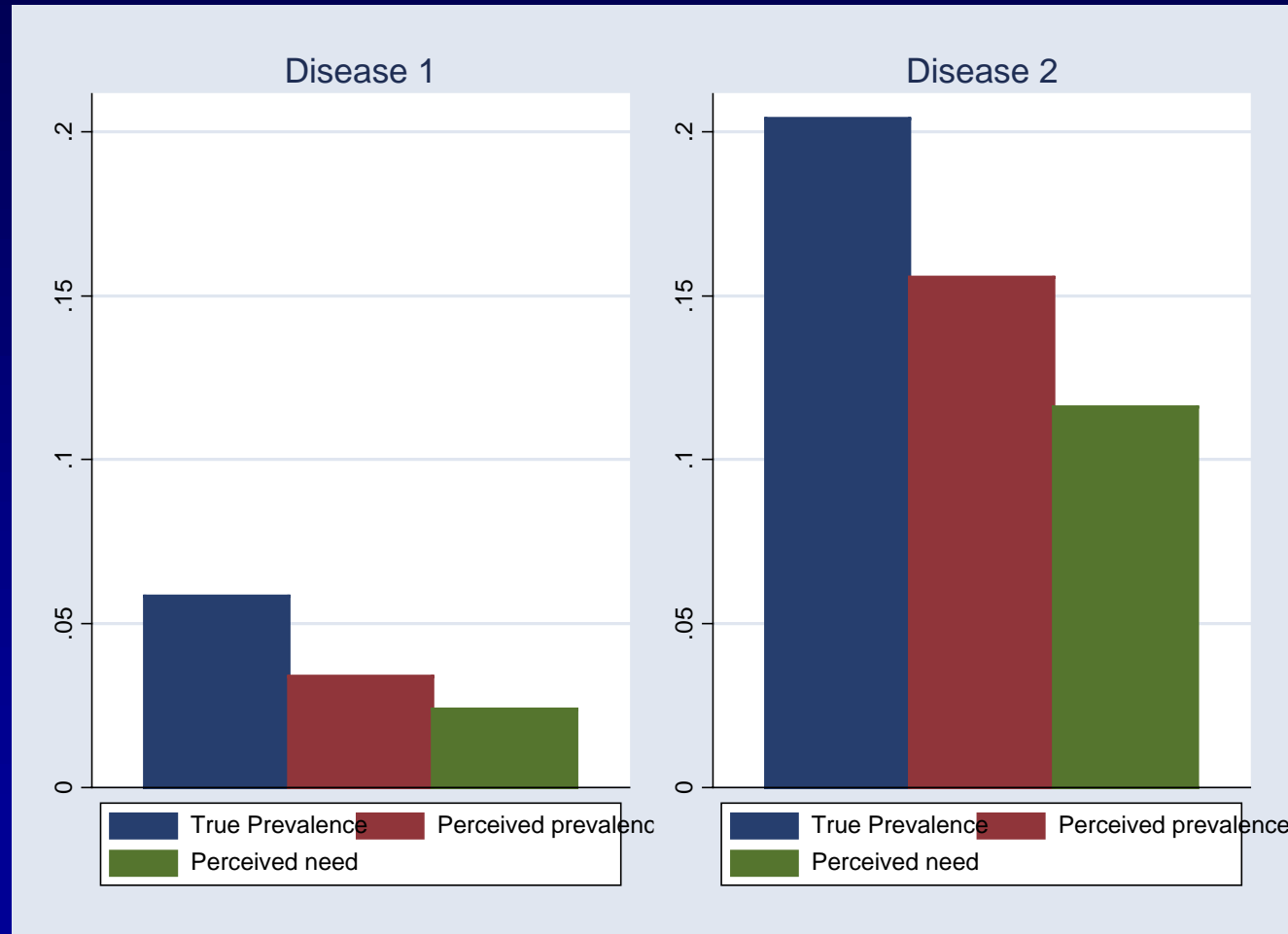
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Individual characteristics:



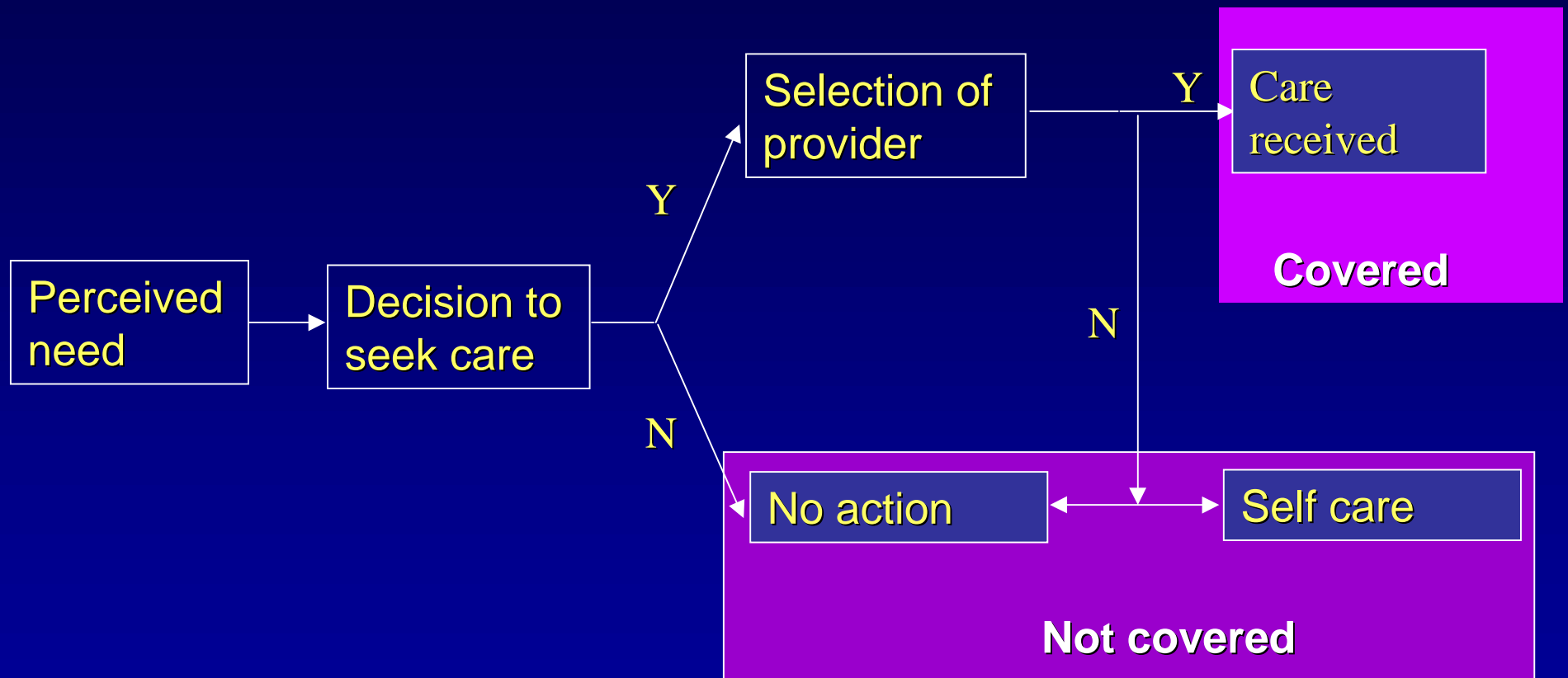
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What drives demand for health care?



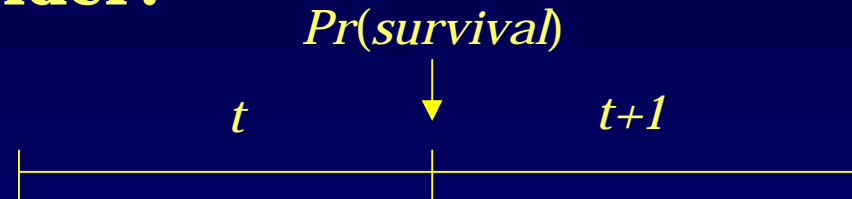
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What drives demand for health care?



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Choice of provider:



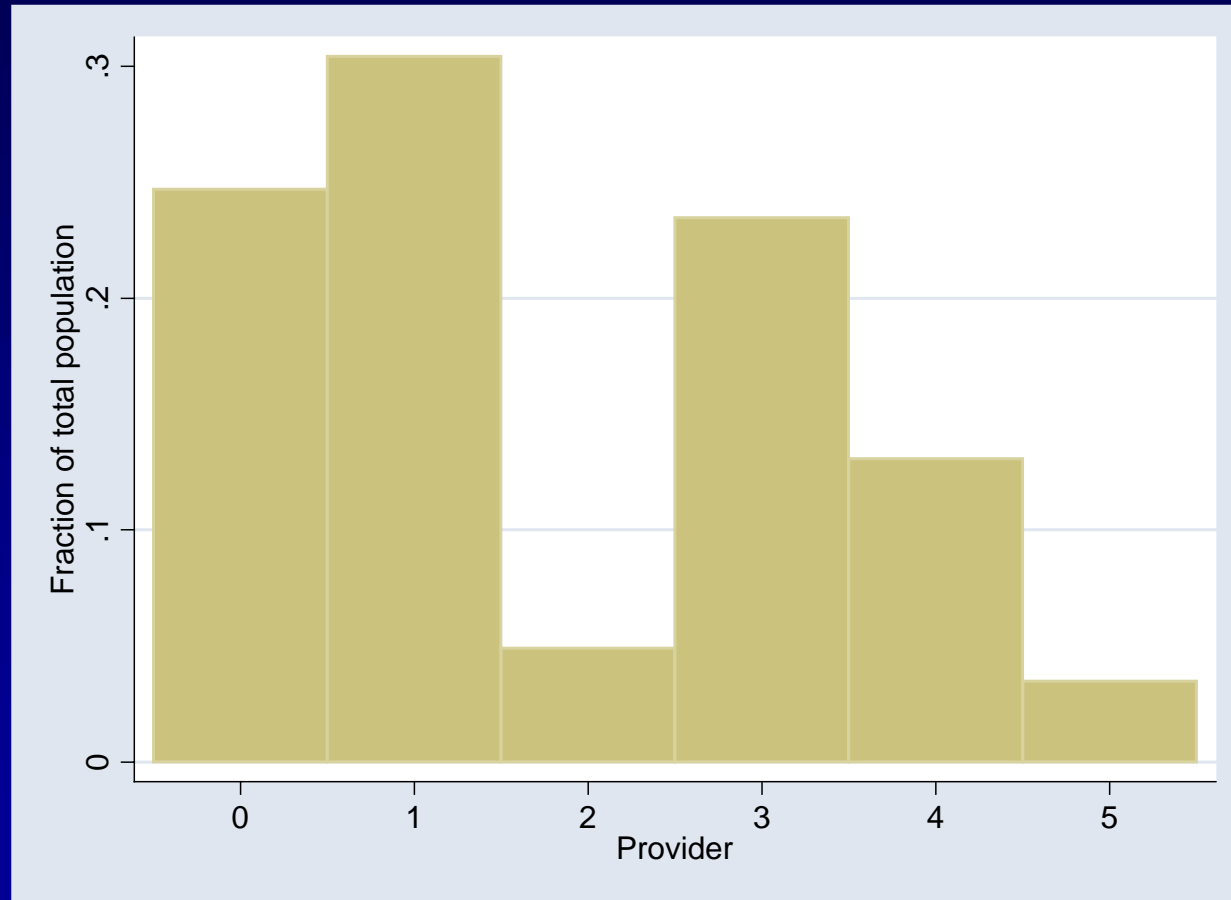
- First period: Utility a function of income net of health expenditure, and provider characteristics (responsiveness; distance).
- Second period: Probability of survival to second period function of decision to seek care. Second-period utility function of income.

$$U = U_t + \delta \cdot [ps \cdot U_{t+1}]$$



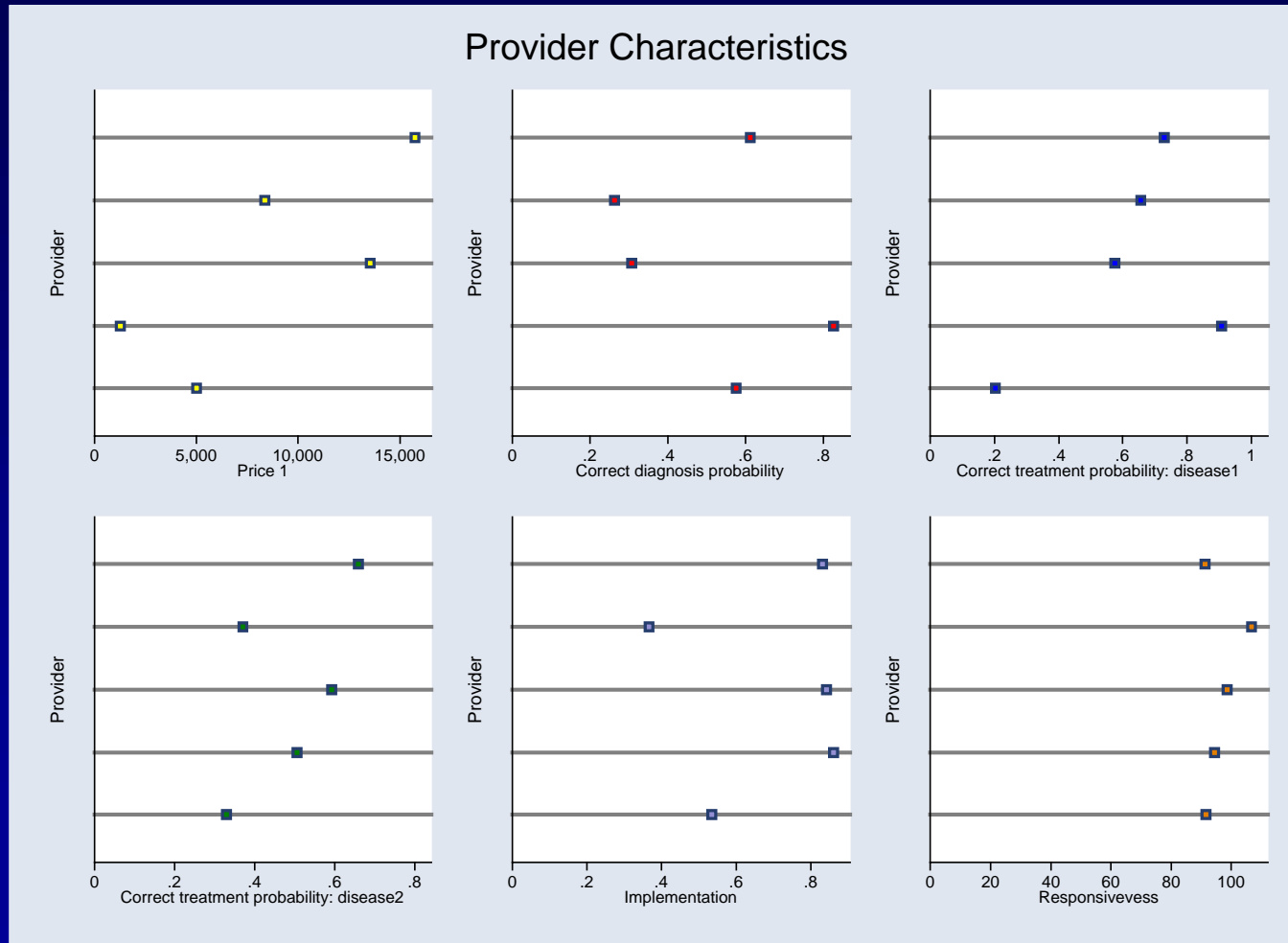
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Utilization:



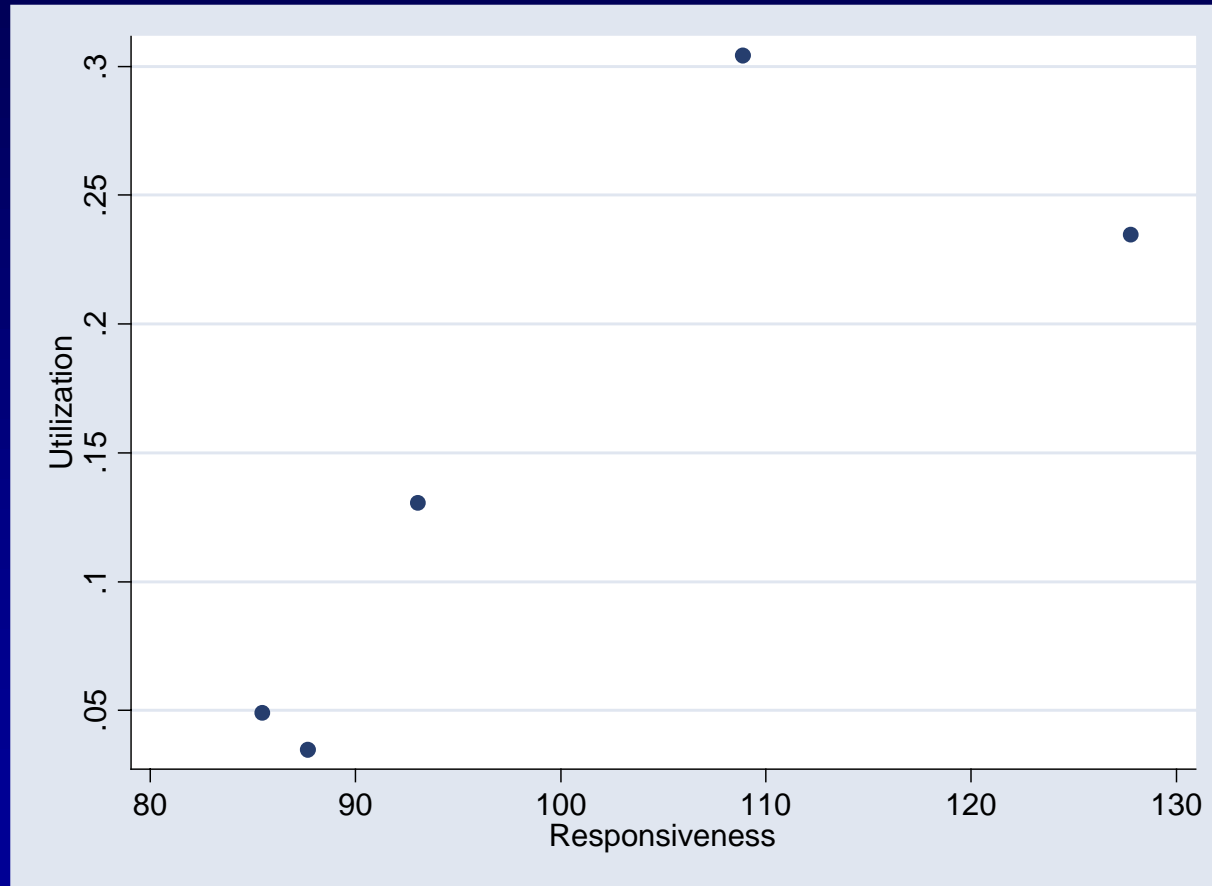
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Provider characteristics:



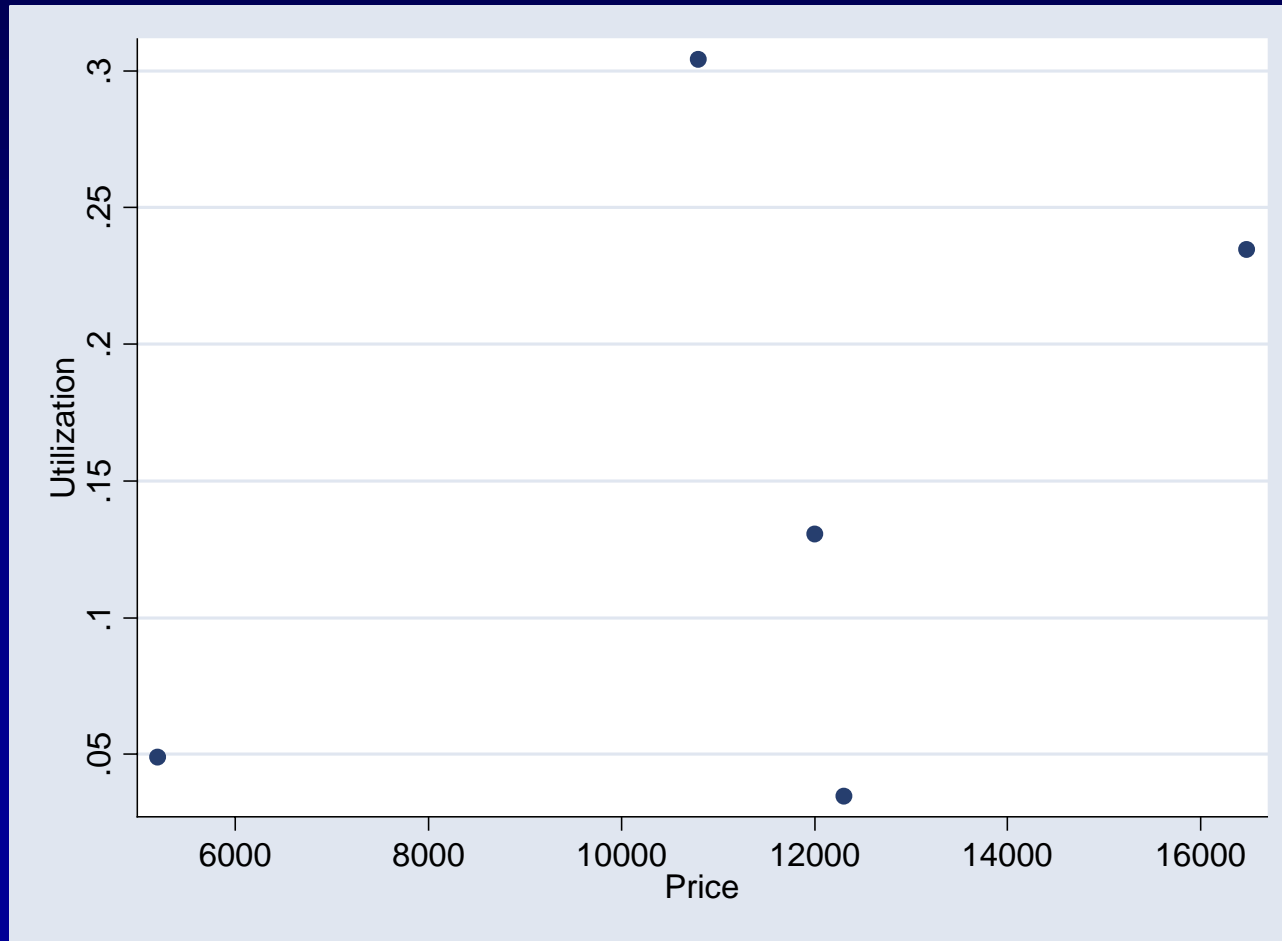
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Utilization versus responsiveness:



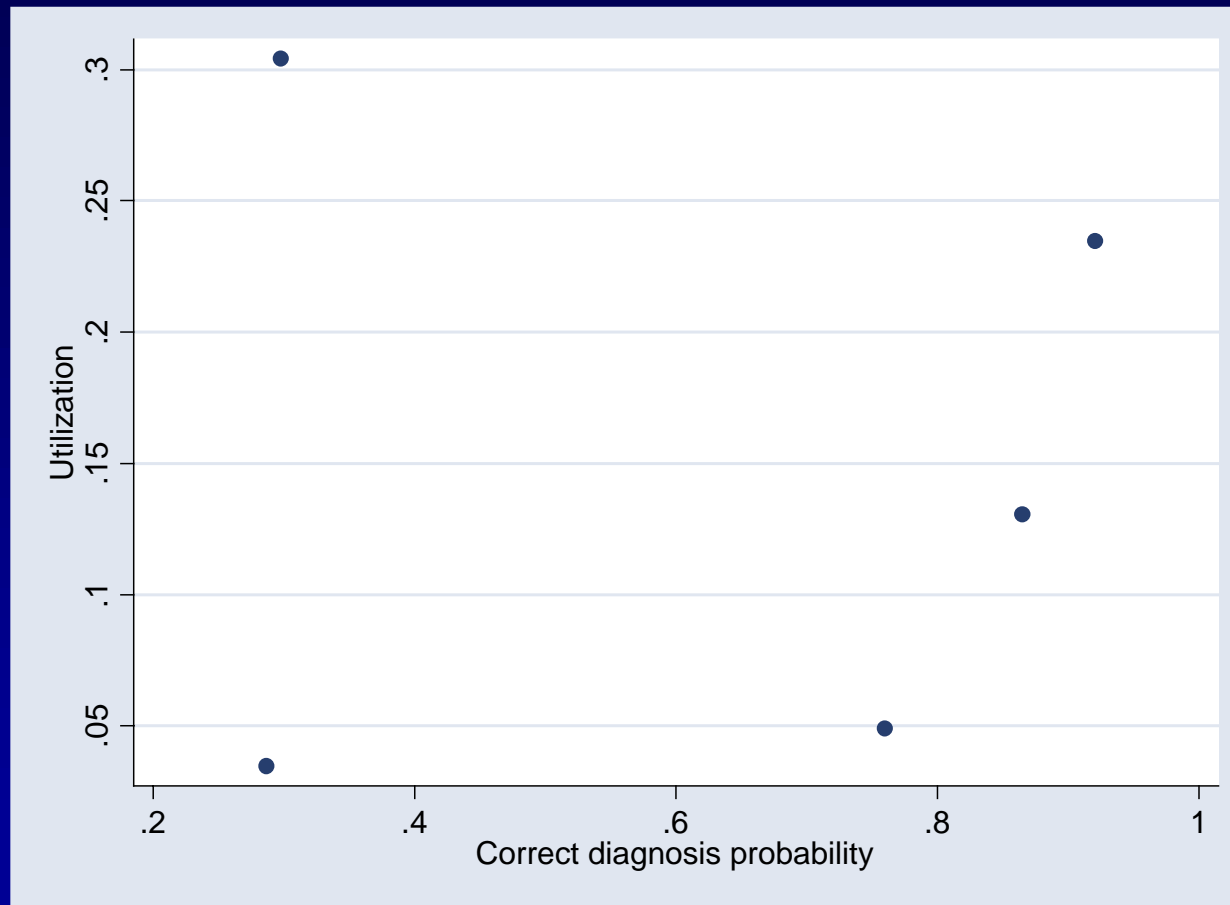
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Utilization versus price:



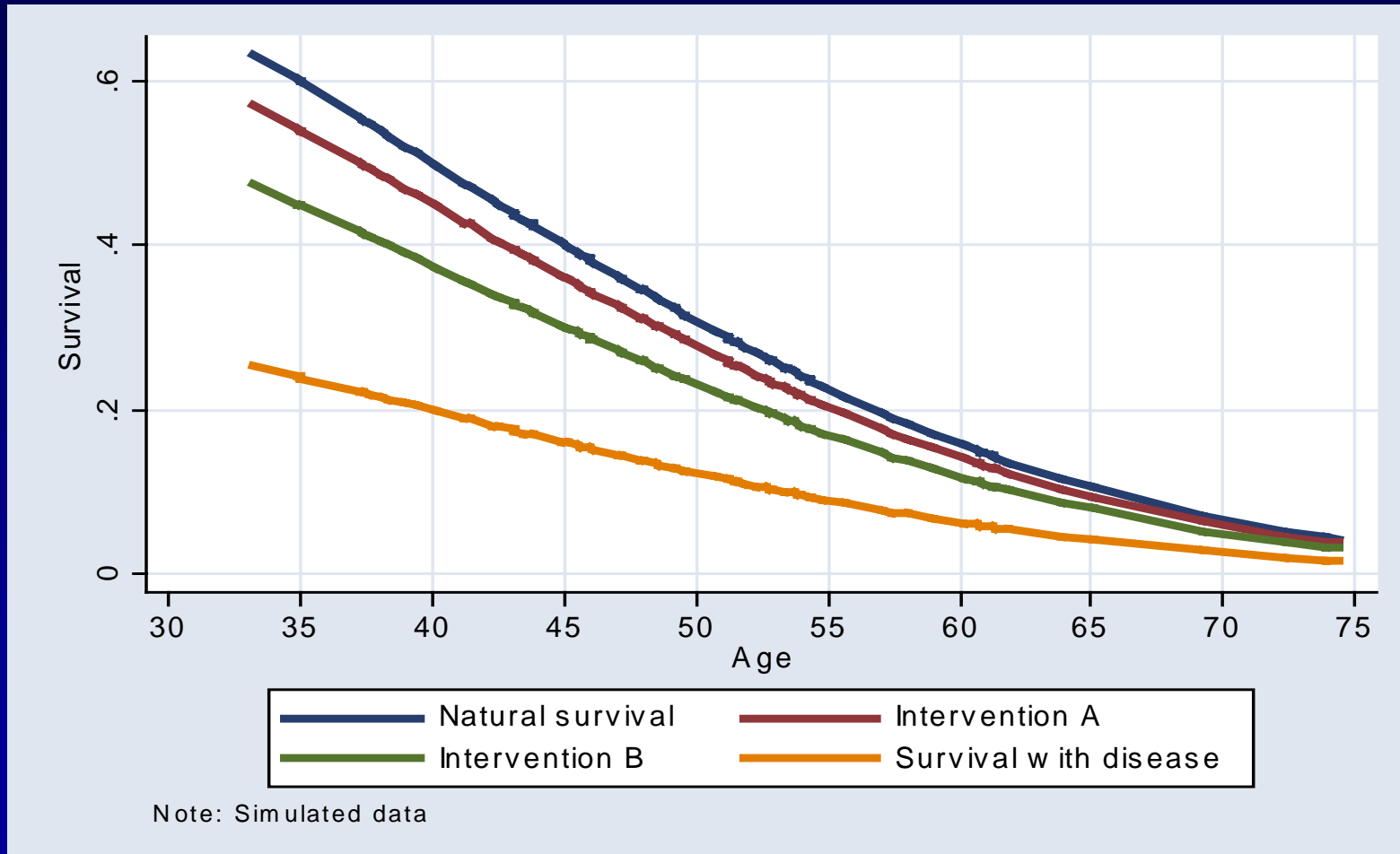
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Utilization versus correct diagnosis probability:



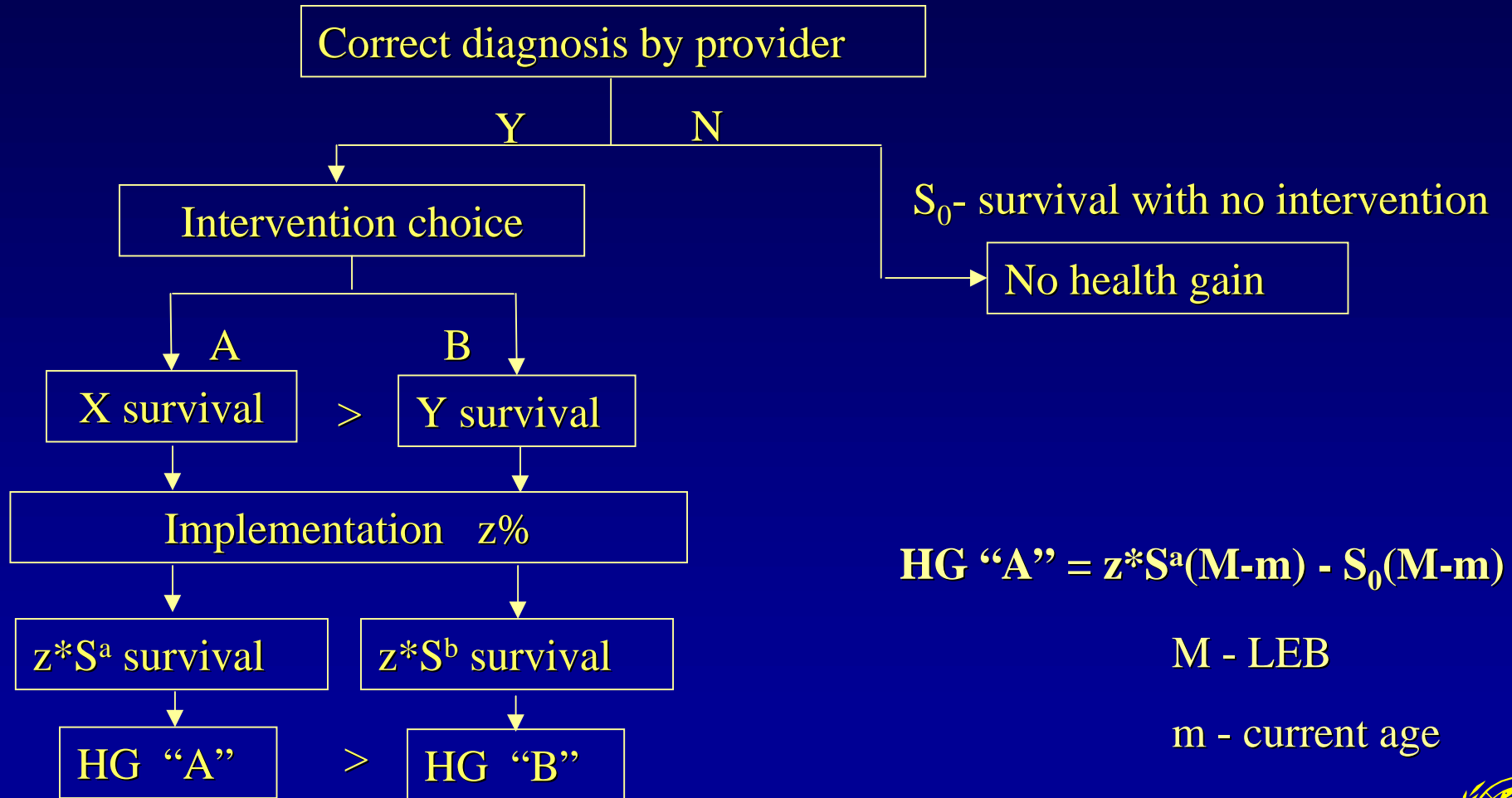
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Health gains:



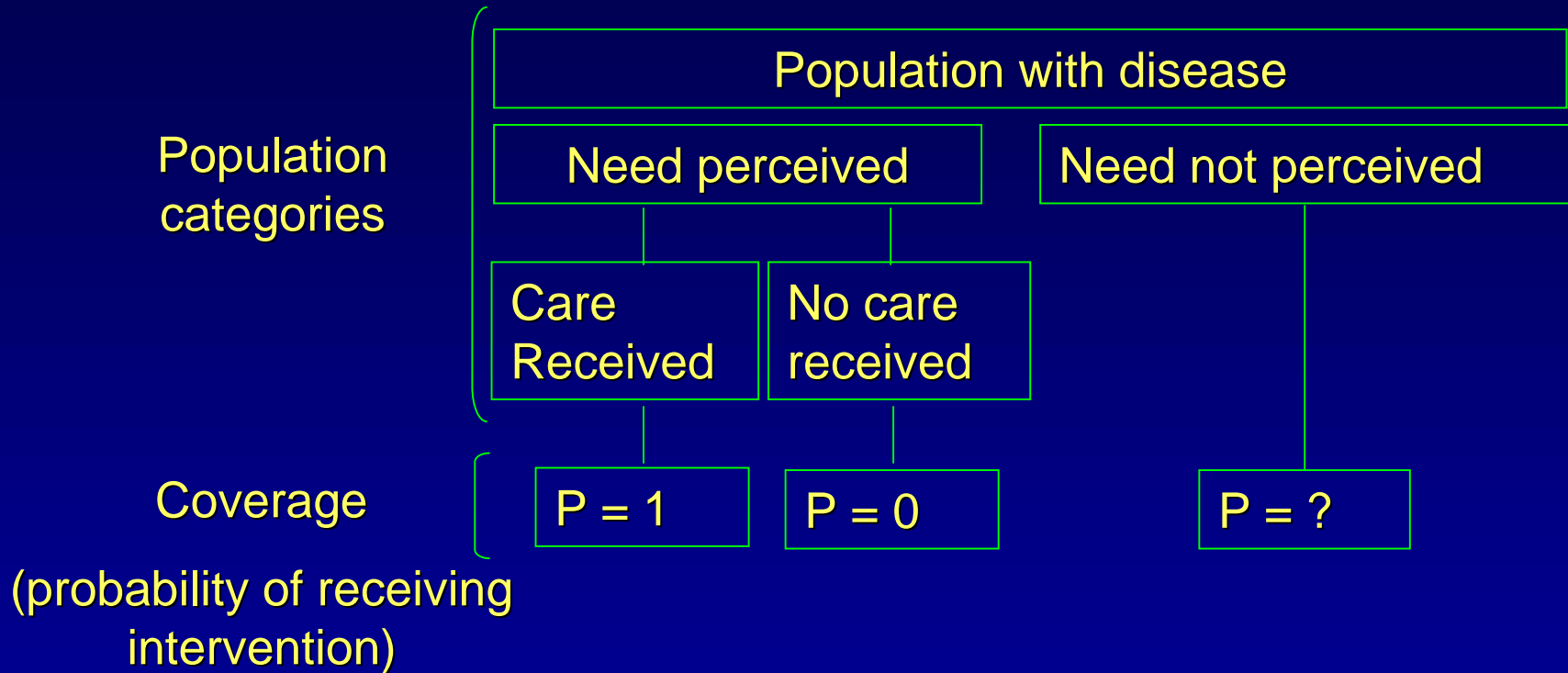
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Health gains:



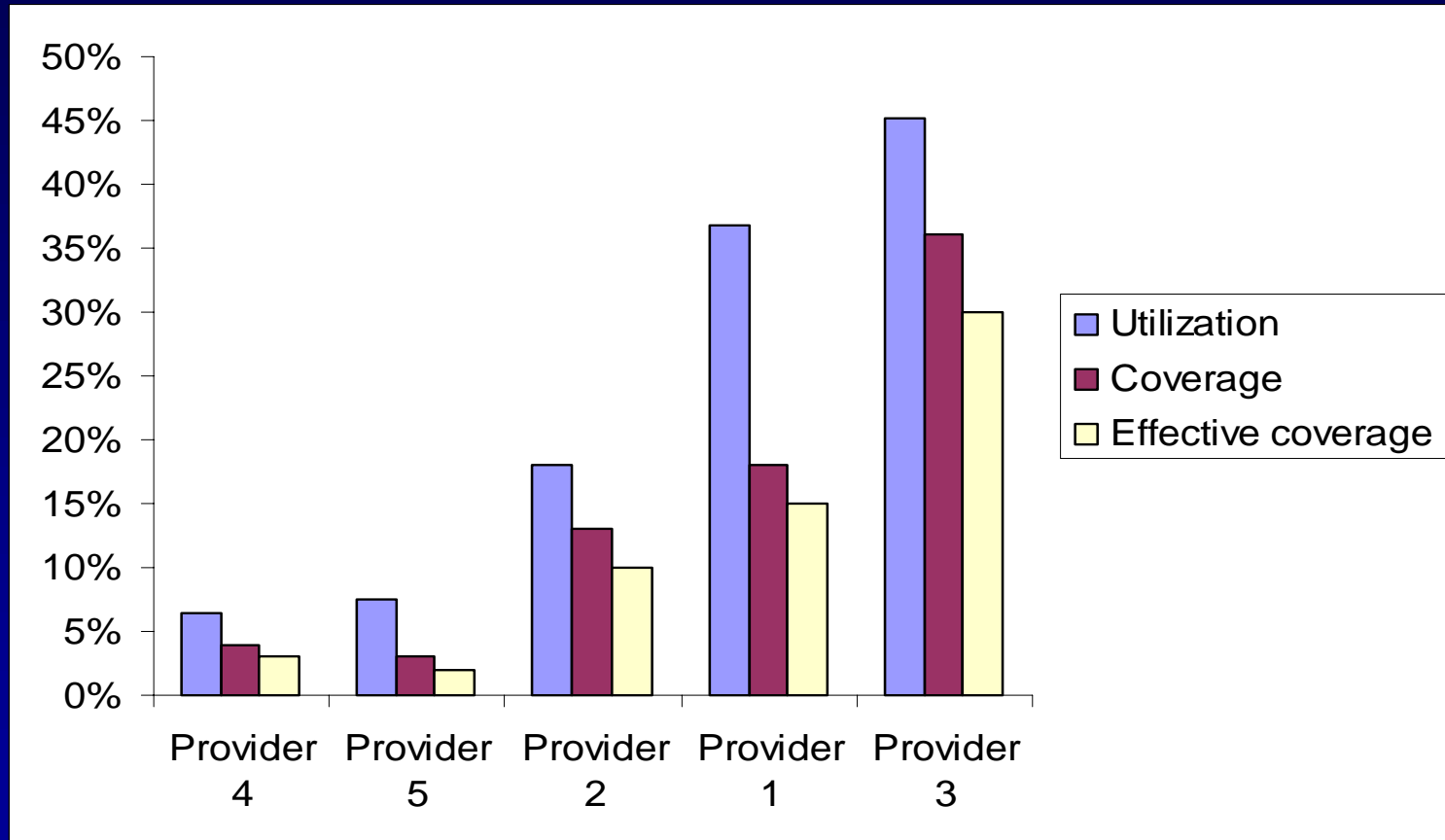
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Predicted coverage:



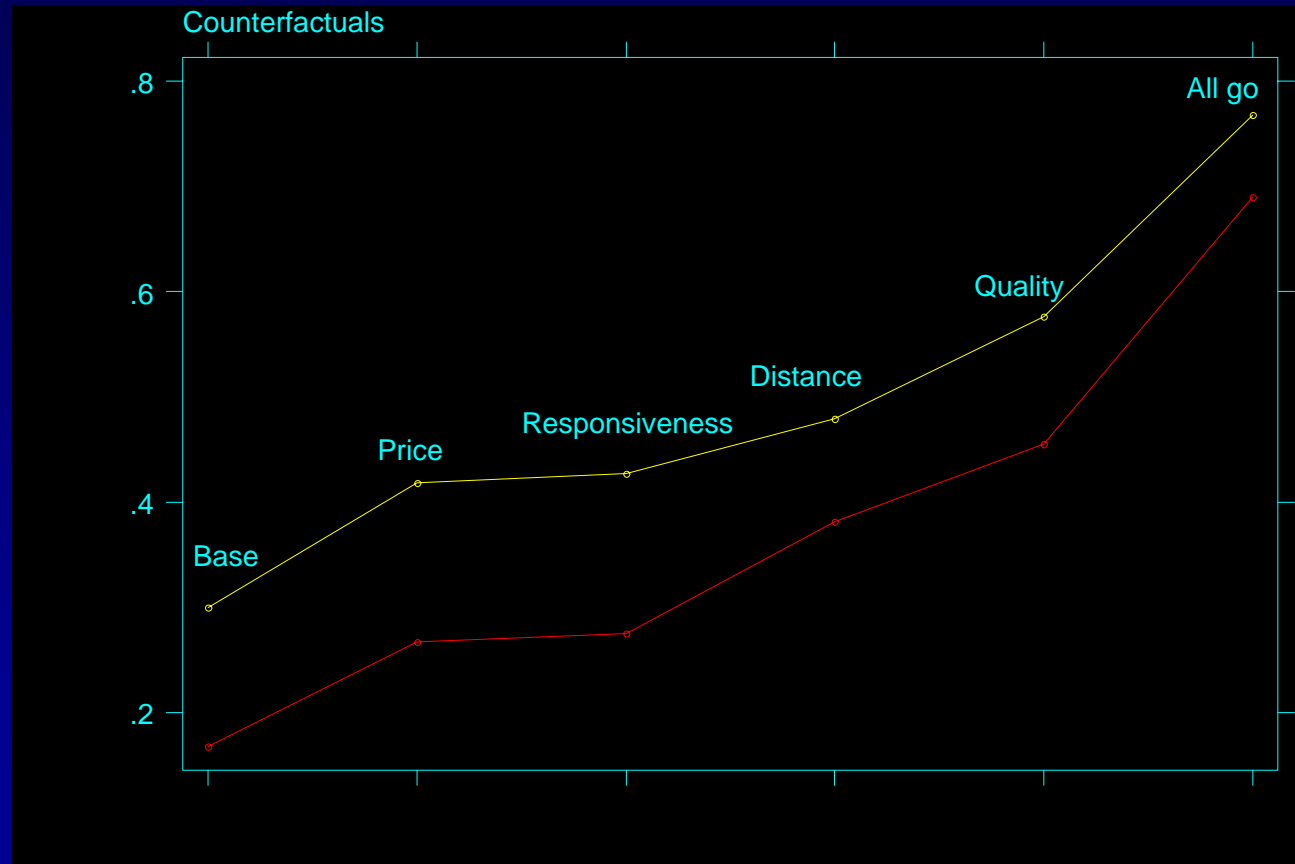
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Utilization, coverage, effective coverage:



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Counterfactual analysis:



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What are the implications for strategies for measurement of health care needs?

Normative

- Health care need determined by individual's age and sex (e.g., childhood immunization, antenatal care, etc.).
- “Life-cycle” related interventions.

Probabilistic:

- Health care need determined by presence of disease or abnormal health condition.
- True presence can only be determined by clinical diagnostic procedures.
- Population level: presence of disease determined probabilistically.



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Estimation of probabilistic health care needs:

1. Have you ever had attacks of shaking of the arms or legs which you could not control?
2. Have you ever had attacks in which you fall and become pale?
3. Have you ever lost consciousness?
4. Have you ever had attacks in which you fall with loss of consciousness?
5. Have you ever had attacks in which you fall and bite your tongue?
6. Have you ever had attacks in which you fall and lose control of your bladder?
7. Have you ever had brief attacks of shaking or trembling in one arm or leg or face?
8. Have you ever had attacks in which you lose contact with the surroundings and experience abnormal smells?
9. Have you ever been told that you have or had epilepsy or epileptic fits?

Diagnostic algorithm: any 3 affirmative answers out of 9 are classified as epileptic.

Probabilistic diagnostic scale: using Bayesian methods, function of how well an item differentiates between disease-positives and disease-negatives.



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Estimation of probabilistic diagnostic scale:

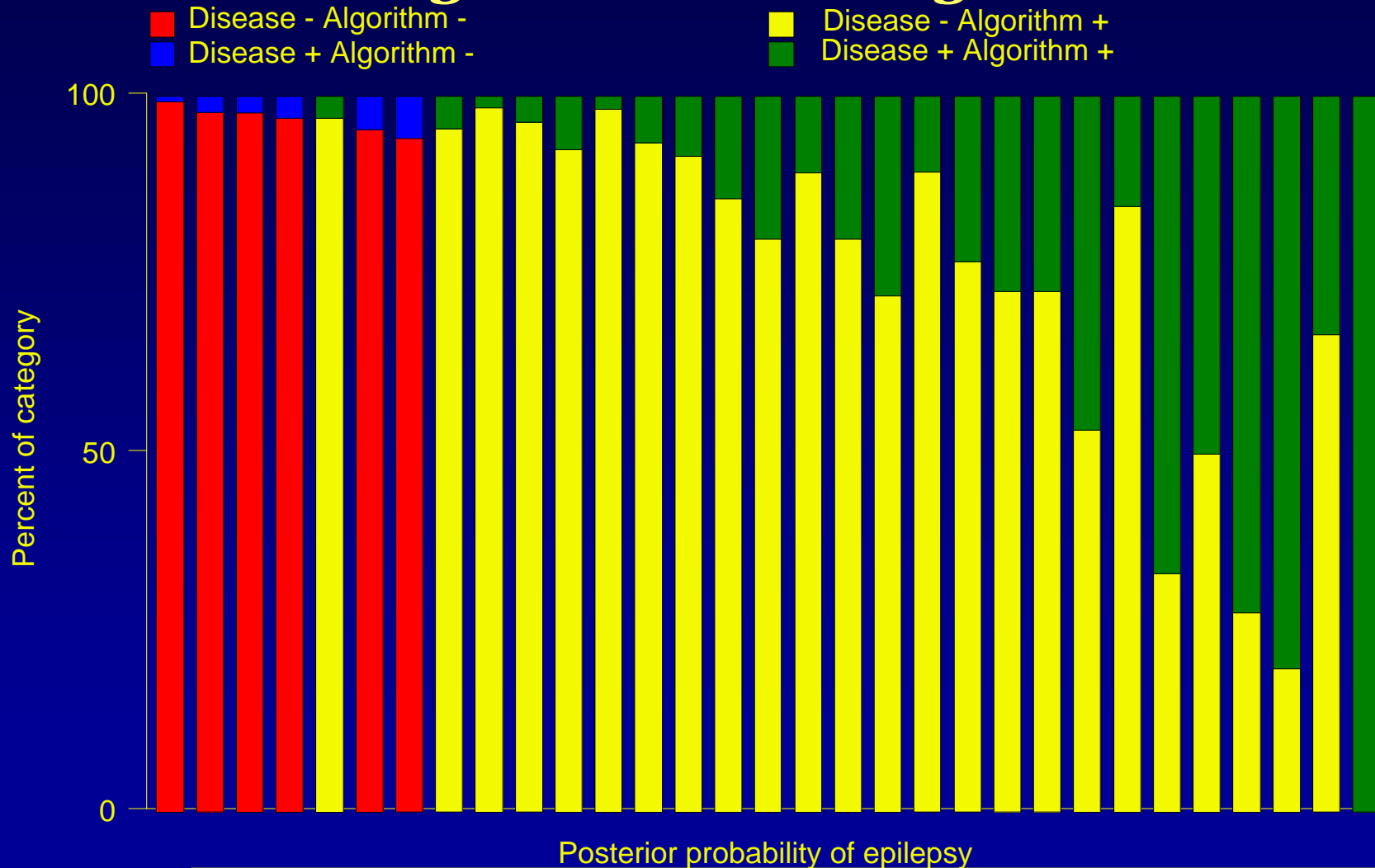
$$P(D^+|Q_1, Q_2, \dots, Q_k) = \frac{P(D^+)P(Q_1, Q_2, \dots, Q_k|D^+)}{P(D^+)P(Q_1, Q_2, \dots, Q_k|D^+) + [1 - P(D^+)]P(Q_1, Q_2, \dots, Q_k|D^-)}$$

- $P(D^+|Q_1, \dots, Q_k)$: Probability of disease given responses to items (posterior probability of disease).
- $P(D^+)$: Prevalence of disease in the population.
- $P(Q_1, \dots, Q_k|D^+)$: Probability of item response given the presence of disease.
- $P(Q_1, \dots, Q_k|D^-)$: Probability of item response without disease.



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Probabilistic diagnostic scale vs. Algorithm:



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Measuring use of health services:

Nationally-representative surveys: Who did and did not receive interventions? Travel time, price paid for health care, perceived quality, perceived responsiveness, etc..

Provider surveys: Location, observed responsiveness, quality of providers, implementation, price, etc.

