INTRODUCTION

Dr Moses Ngari

Preparation and instruction by

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March 15th – 19th, 2021

Outline of the course

- Each day has a theme
- Short presentations
  - (usually 30 but no more than 1 hour)
  - given the compressed nature of the presentations note questions for practical and review sessions
  - notes in folder are more comprehensive explanations of presentations
- Practical sessions
- Reviews to sum up and consolidate main themes

Aims of course

- Enable researchers to better apply statistical techniques
- Introduce statistical concepts dealing with descriptive statistics, comparisons and statistical modelling
- Introduce and extend participants knowledge of and expertise with the R programming to do statistical analyses

What is research?


Search
http://
Analysis
RESEARCH
Data
WWW.
test
customer

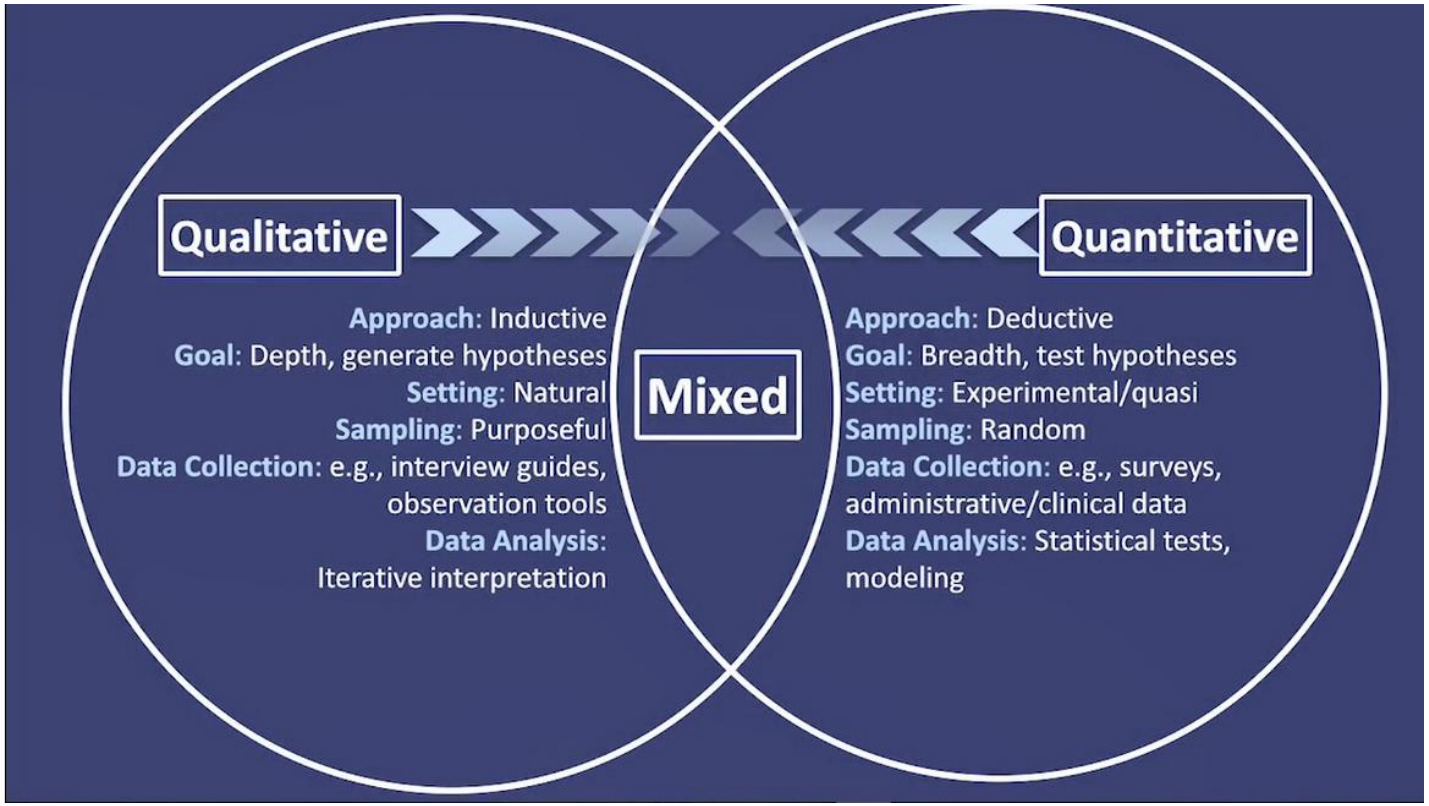
“the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions.”

"research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue"

Research  Research Methods

- Data collection methods (**bias**)
- Establishing relationships (statistical techniques) (**Validity**)
- Evaluating the accuracy of the results obtained (***Reliability***).

Research Methods



Qualitative Vs Quantitative

Qualitative

- Understanding
- Interview/observation
- Discovering frameworks
- Textual (words)
- Theory generating
- Quality of informant more important than sample size
- Subjective
- Embedded knowledge
- Models of analysis: fidelity to text or words of interviewees

Quantitative

- Survey/questionnaires
- Existing frameworks
- Numerical
- Theory testing (experimental)
- Sample size core issue in reliability of data
- Model of analysis: parametric, non-parametric

Stakeholders understanding of the concept of benefit sharing in health research in Kenya: a qualitative study

Geoffrey M Lairumbi[1*], Michael Parker[2], Raymond Fitzpatrick[3] and English C Mike[1]

Abstract

Background: The concept of benefit sharing to enhance the social value of global health research in resource poor settings is now a key strategy for addressing moral issues of relevance to individuals, communities and host countries in resource poor settings when they participate in international collaborative health research. The influence of benefit sharing framework on the conduct of collaborative health research is for instance evidenced by the number of publications and research ethics guidelines that require prior engagement between stakeholders to determine the social value of research to the host communities. While such efforts as the production of international guidance on how to promote the social value of research through such strategies as benefit sharing have been made, the extent to which these ideas and guidelines have been absorbed by those engaged in global health research especially in resource poor settings remains unclear. We examine this awareness among stakeholders involved in health related research in Kenya.

Methods: We conducted in-depth interviews with key informants drawn from within the broader health research system in Kenya including researchers from the mainstream health research institutions, networks and universities, teaching hospitals, policy makers, institutional review boards, civil society organisations and community representative groups.

Results: Our study suggests that although people have a sense of justice and the moral aspects of research, this was not articulated in terms used in the literature and the guidelines on the ethics of global health research.

Conclusion: This study demonstrates that while in theory several efforts can be made to address the moral issues of concern to research participants and their communities in resource poor settings, quick fixes such as benefit sharing are not going to be straightforward. We suggest a need to pay closer attention to the processes through

Croatia first to introduce early screening for lung cancer

20th January 2020

THIS STORY IS FROM OCTOBER 17, 2019

53% of female lung cancer patients in Hyderabad are smokers, reveals study

Are smokers more likely to develop lung cancer than non-smokers?

Exposure and outcome

- The exposures and outcomes of interest are specific to study hypotheses
- Should always be clearly defined before the study starts
- Type of outcome determines the analysis that will be used.

Outcome

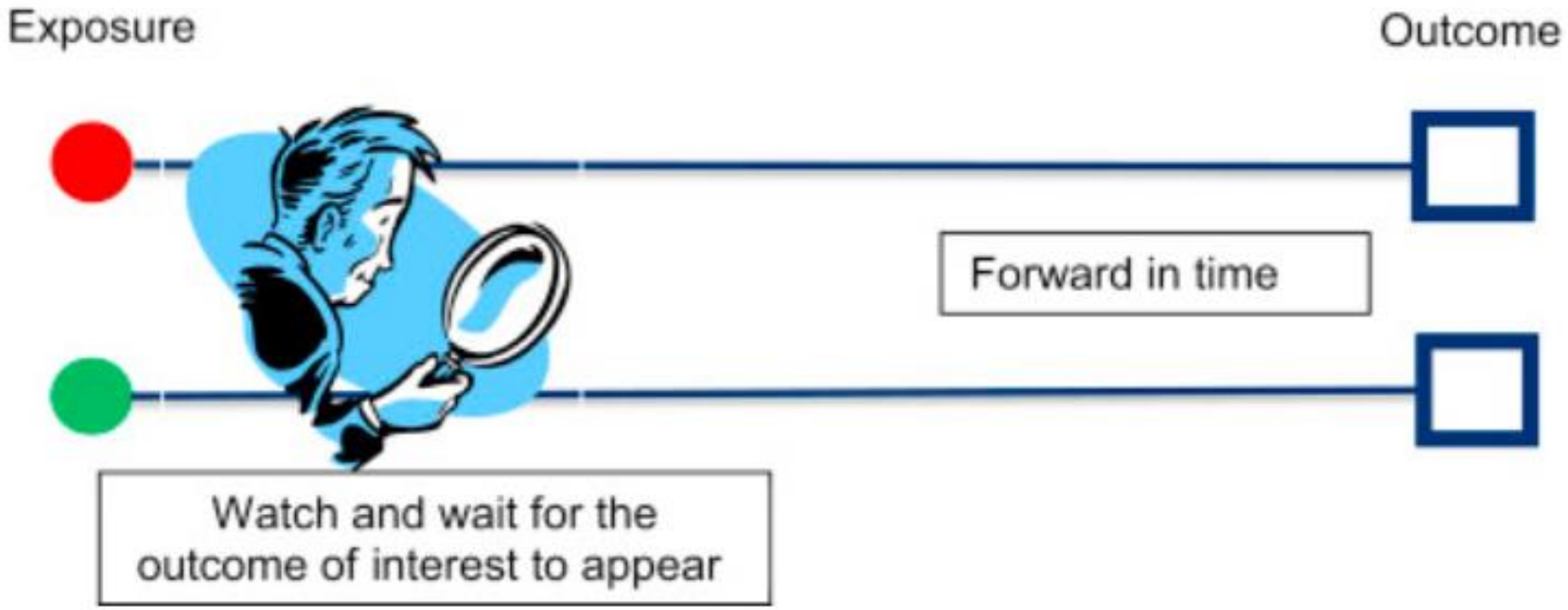
- The outcome of a study is a broad term for any defined disease, state of health, health-related event or death.

- An outcome is the result of an experiment or other situation involving uncertainty.
- Its the focus of your attention – seeking to understand its occurrence and variation
- In some studies, there may be multiple outcomes.

Exposure

- The exposure of interest may be associated with either an increased or a decreased occurrence of disease or other specified health outcome.

- May relate to the environment, or inborn or inherited characteristics


Exposure
Outcome
Forward in time
Watch and wait for the
outcome of interest to appear

In the smoking example, what is

Exposure?

Outcome?

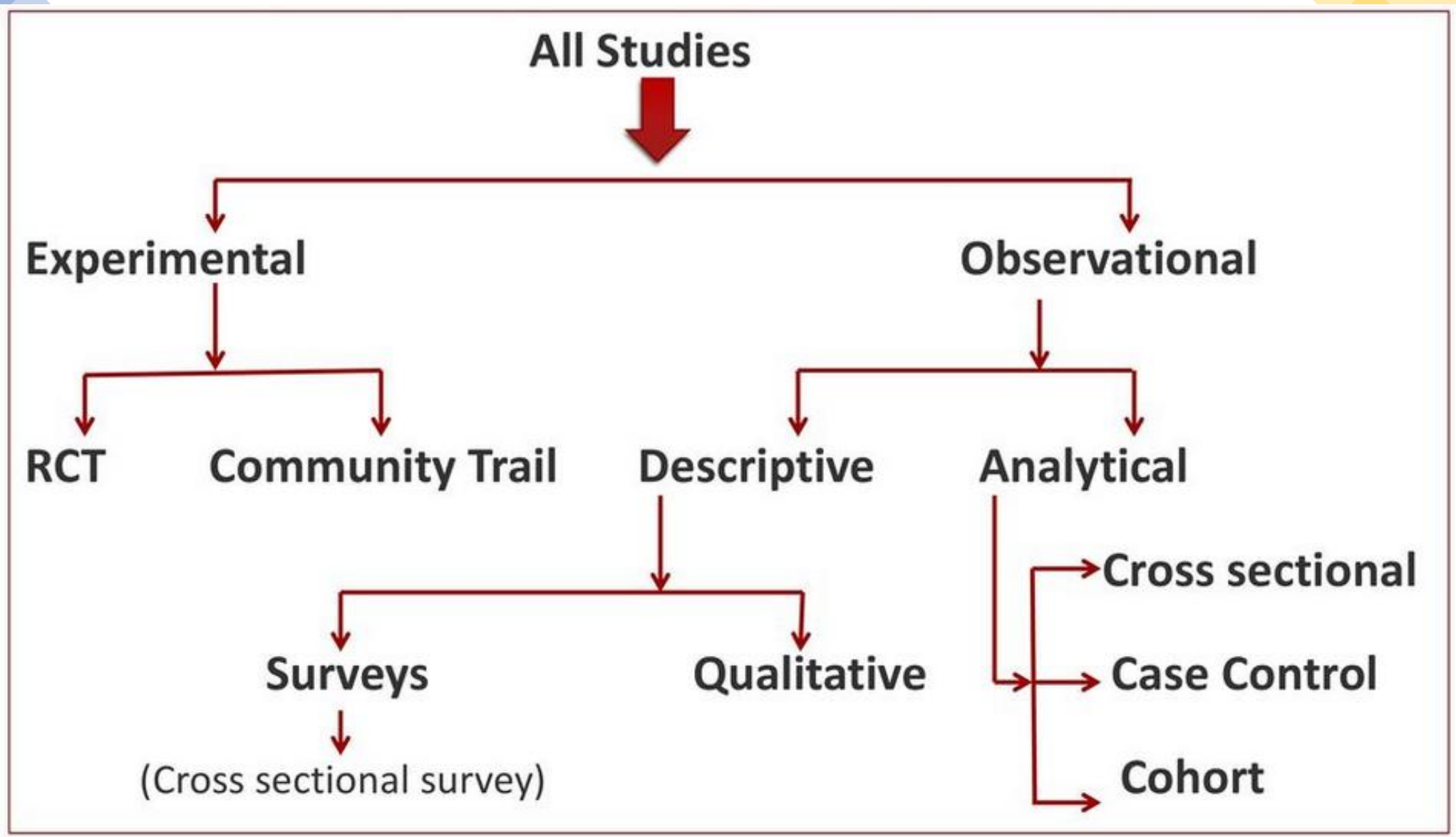
In the smoking example, what is

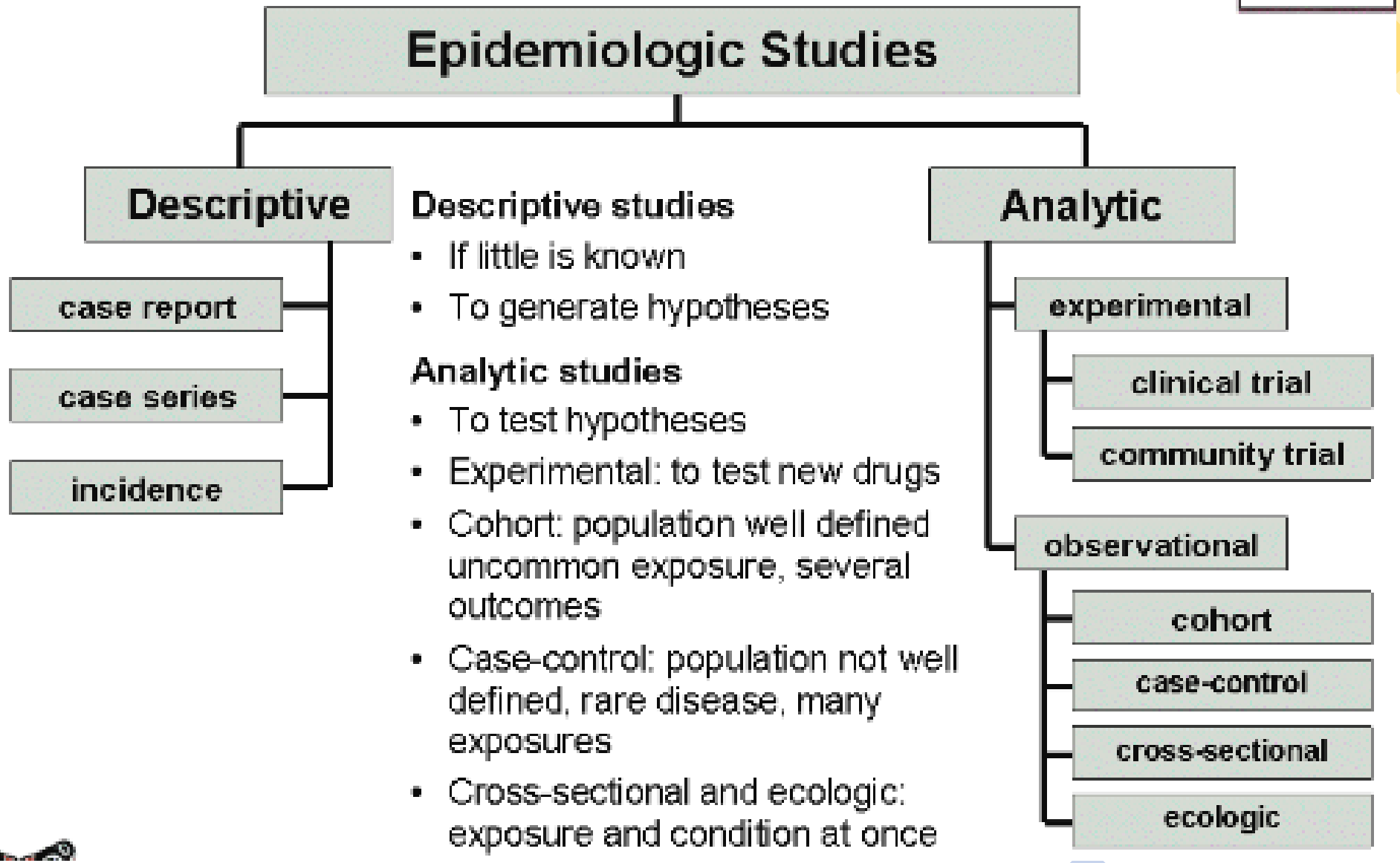
Exposure?

- Smoking status

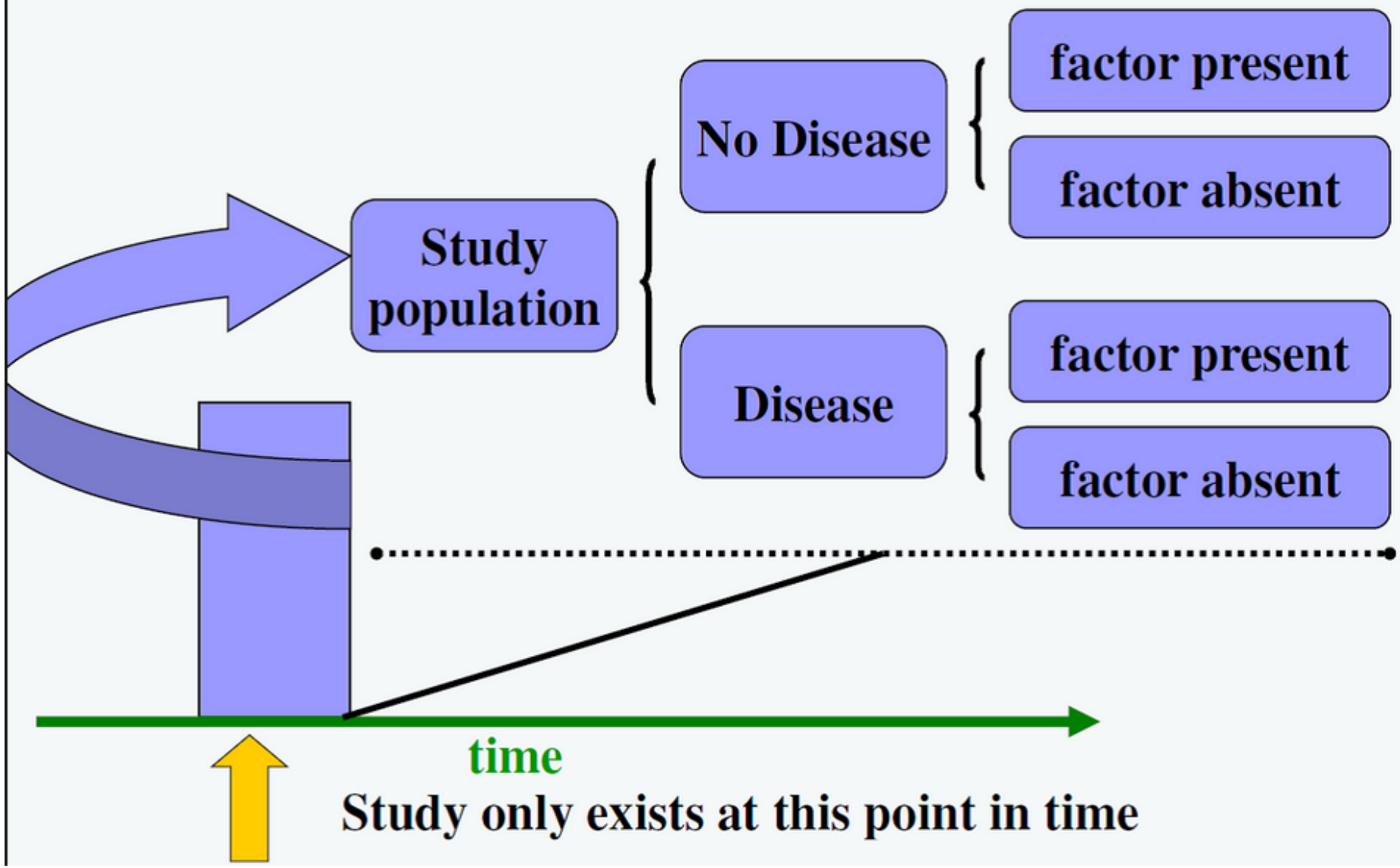
Outcome?

- Diagnosis of Lung Cancer


All Studies
Experimental
Observational
RCT
Community Trail
Descriptive
Analytical
Surveys
Qualitative
(Cross sectional survey)
Cross sectional
Case Control
Cohort


Epidemiologic Studies
Descriptive
case report
case series
incidence
Descriptive studies
If little is known
To generate hypotheses
Analytic studies
To test hypotheses
Experimental: to test new drugs
Cohort: population well defined uncommon exposure, several outcomes
Case-control: population not well defined, rare disease, many exposures
Cross-sectional and ecologic: exposure and condition at once
Analytic
experimental
clinical trial
community trial
observational
cohort
case-control
cross-sectional
ecologic

Cross-sectional Design



Antimicrobial Resistance Profile of *E. coli* Isolated from Raw Cow Milk and Fresh Fruit Juice in Mekelle, Tigray, Ethiopia.

Tadesse HA[1], Gidey NB[1], Workelule K[1], Hailu H[1], Gidey S[1], Bsrat A[1], Taddele H[1].

Author information

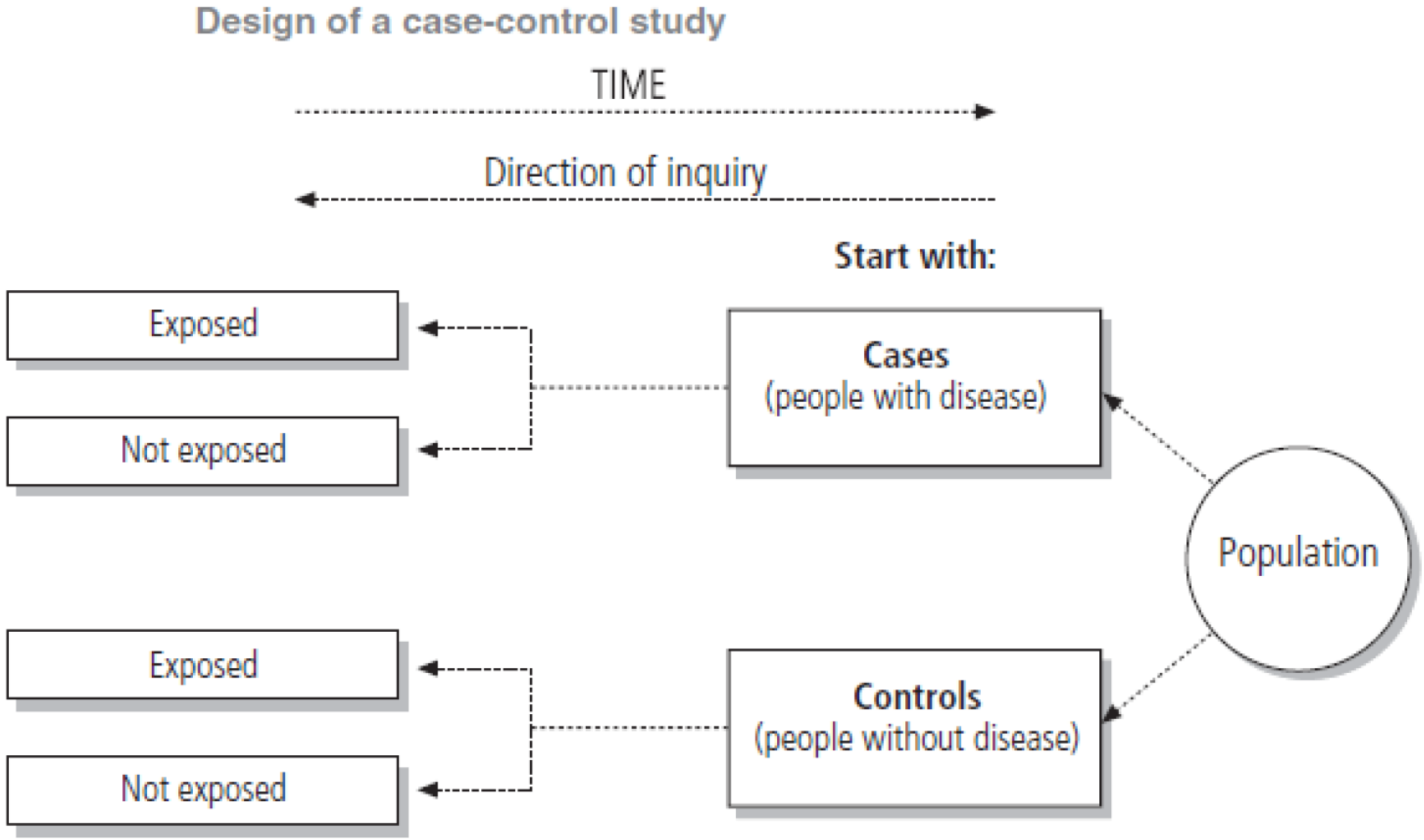
Abstract

AIM: Foodborne illnesses represent a public health problem in developed and developing countries. They cause great suffering and are transmitted directly or indirectly between animals and humans and circulate in the global environment. *E. coli* are among them, causing a major public health problem. The aim of this study was therefore to study the antimicrobial resistance profile of *E. coli* from raw cow milk and fruit juice.

MATERIALS AND METHODS: A cross-sectional study was conducted from October 2016 to June 2017 on 258 samples collected from milk shops (*n* = 86), dairy farms (*n* = 86), and fruit juice (*n* = 86) in different subcities of Mekelle. Bacteriological procedures were used for isolation of *E. coli* in the collected samples and for identification of the antimicrobial resistance profile.

RESULT: The overall mean viable bacterial count and standard deviation of samples from milk shop, fruit juice, and dairy milk were found to be 8.86 ± 10^7, 7.2 ± 10^7, and 8.65 ± 10^7 CFU/ml and 33.87 ± 10^6, 6.68 ± 10^6, and 22.0 ± 10^6, respectively. Of the samples tested, 39 from milk shops (45.35%), 20 from fruit juice (23.26%), and 24 from dairy farms (27.91%) were found to be positive for *E. coli.* The isolated *E. coli* were highly resistant to ampicillin (70%), sulfamethoxazole-trimethoprim (60%),

Case-control studies



Enteric pathogens and factors associated with acute bloody diarrhoea, Kenya

Charles Njuguna[1,2*], Ian Njeru[4], Elizabeth Mgamb[4], Daniel Langat[4], Anselimo Makokha[1], Dismas Ongore[5], Evan Mathenge[2,3] and Samuel Kariuki[3]

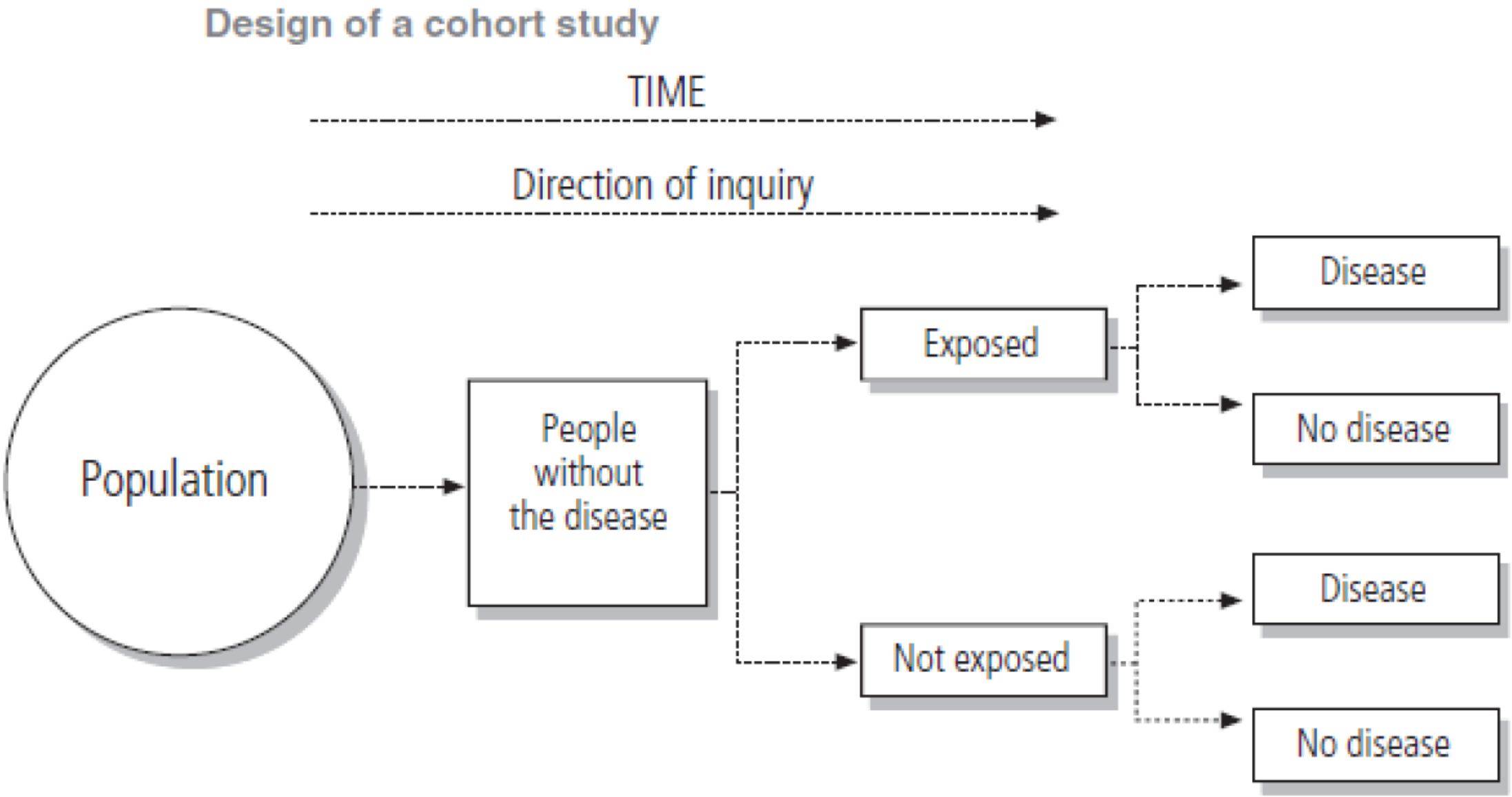
Abstract

Background: Shigellosis is the major cause of bloody diarrhoea worldwide and is endemic in most developing countries. In Kenya, bloody diarrhoea is reported weekly as part of priority diseases under Integrated Disease Surveillance and Response System (IDSR) in the Ministry of Health.

Methods: We conducted a case control study with 805 participants (284 cases and 521 controls) between January and December 2012 in Kilifi and Nairobi Counties. Kilifi County is largely a rural population whereas Nairobi County is largely urban. A case was defined as a person of any age who presented to outpatient clinic with acute diarrhoea with visible blood in the stool in six selected health facilities in the two counties within the study period. A control was defined as a healthy person of similar age group and sex with the case and lived in the neighbourhood of the case.

Results: The main presenting clinical features for bloody diarrhoea cases were; abdominal pain (69 %), mucous in stool (61 %), abdominal discomfort (54 %) and anorexia (50 %). Pathogen isolation rate was 40.5 % with bacterial and protozoal pathogens accounting for 28.2 % and 12.3 % respectively. *Shigella was* the most prevalent bacterial pathogen isolated in 23.6 % of the cases while *Entamoeba histolytica* was the most prevalent protozoal pathogen isolated in 10.2 % of the cases. On binary logistic regression, three variables were found to be independently and significantly associated with acute bloody diarrhoea at 5 % significance level; storage of drinking water separate from water for other use (OR = 0.41, 95 % CI 0.20–0.87, $p = 0.021$), washing hands after last defecation (OR = 0.24, 95 % CI 0.08–.076, $p = 0.015$) and presence of coliforms in main source water (OR = 2.56, CI 1.21–5.4, $p = 0.014$). Rainfall and temperature had strong positive correlation with bloody diarrhoea.

Cohort study



Mortality after inpatient treatment for diarrhea in children: a cohort study

Alison Talbert[1*], Moses Ngari[1,2], Evasius Bauni[1], Martha Mwangome[1,2], Neema Mturi[1], Mark Otiende[1], Kathryn Maitland[1,3], Judd Walson[2,4] and James A. Berkley[1,2,4,5]

Abstract

Background: There is an increasing recognition that children remain at elevated risk of death following discharge from health facilities in resource-poor settings. Diarrhea has previously been highlighted as a risk factor for post-discharge mortality.

Methods: A retrospective cohort study was conducted to estimate the incidence and demographic, clinical, and biochemical features associated with inpatient and 1-year post-discharge mortality amongst children aged 2–59 months admitted with diarrhea from 2007 to 2015 at Kilifi County Hospital and who were residents of Kilifi Health and Demographic Surveillance System (KHDSS). Log-binomial regression was used to identify risk factors for inpatient mortality. Time at risk was from the date of discharge to the date of death, out-migration, or 365 days later. Post-discharge mortality rate was computed per 1000 child-years of observation, and Cox proportion regression used to identify risk factors for mortality.

Results: Two thousand six hundred twenty-six child KHDSS residents were admitted with diarrhea, median age 13 (IQR 8–21) months, of which 415 (16%) were severely malnourished and 130 (5.0%) had a positive HIV test. One hundred twenty-one (4.6%) died in the hospital, and of 2505 children discharged alive, 49 (2.1%) died after discharge: 21.4 (95% CI 16.1–28.3) deaths per 1000 child-years. Admission with signs of both diarrhea and severe pneumonia or severe pneumonia alone had a higher risk of both inpatient and post-discharge mortality than

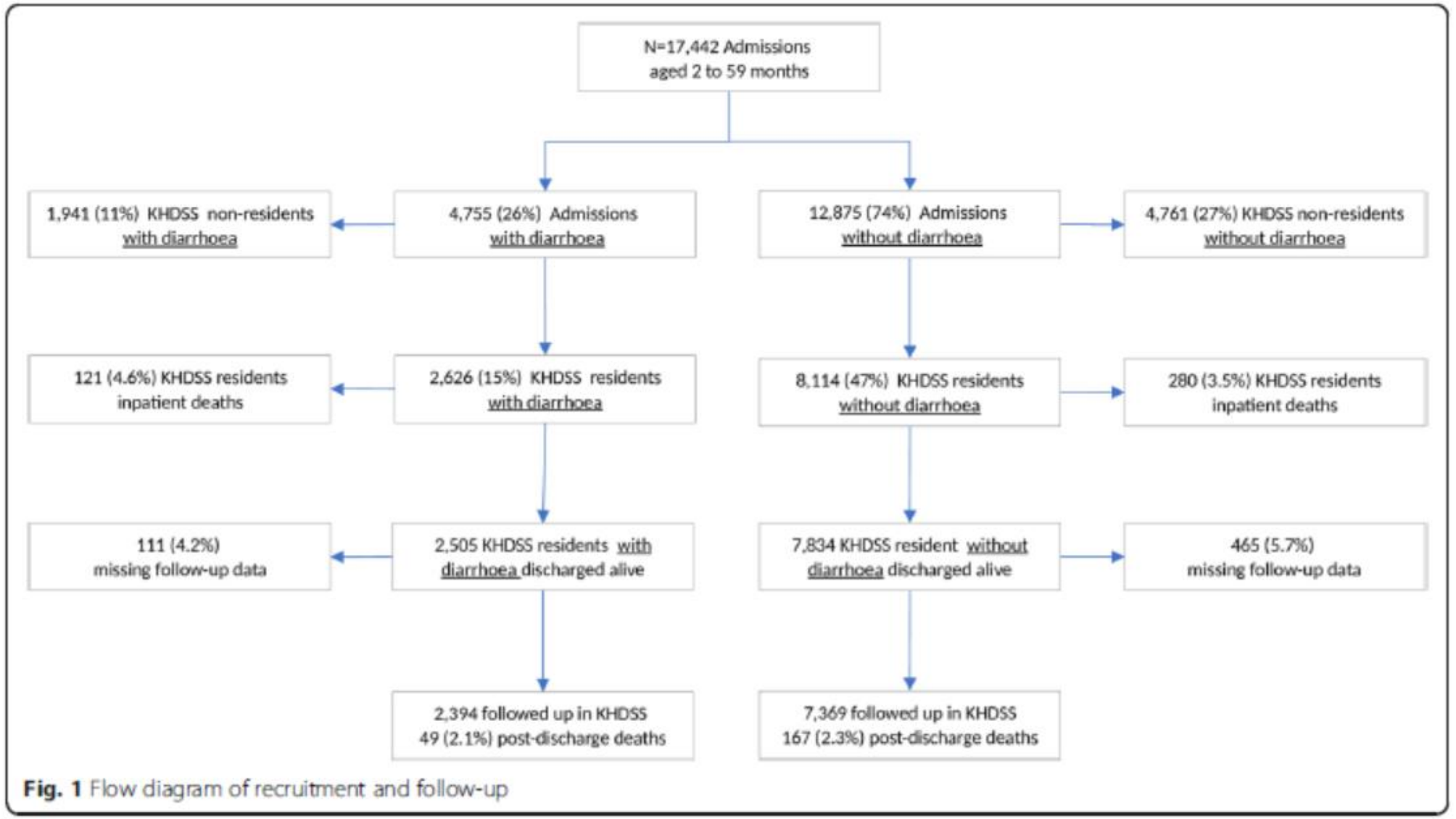
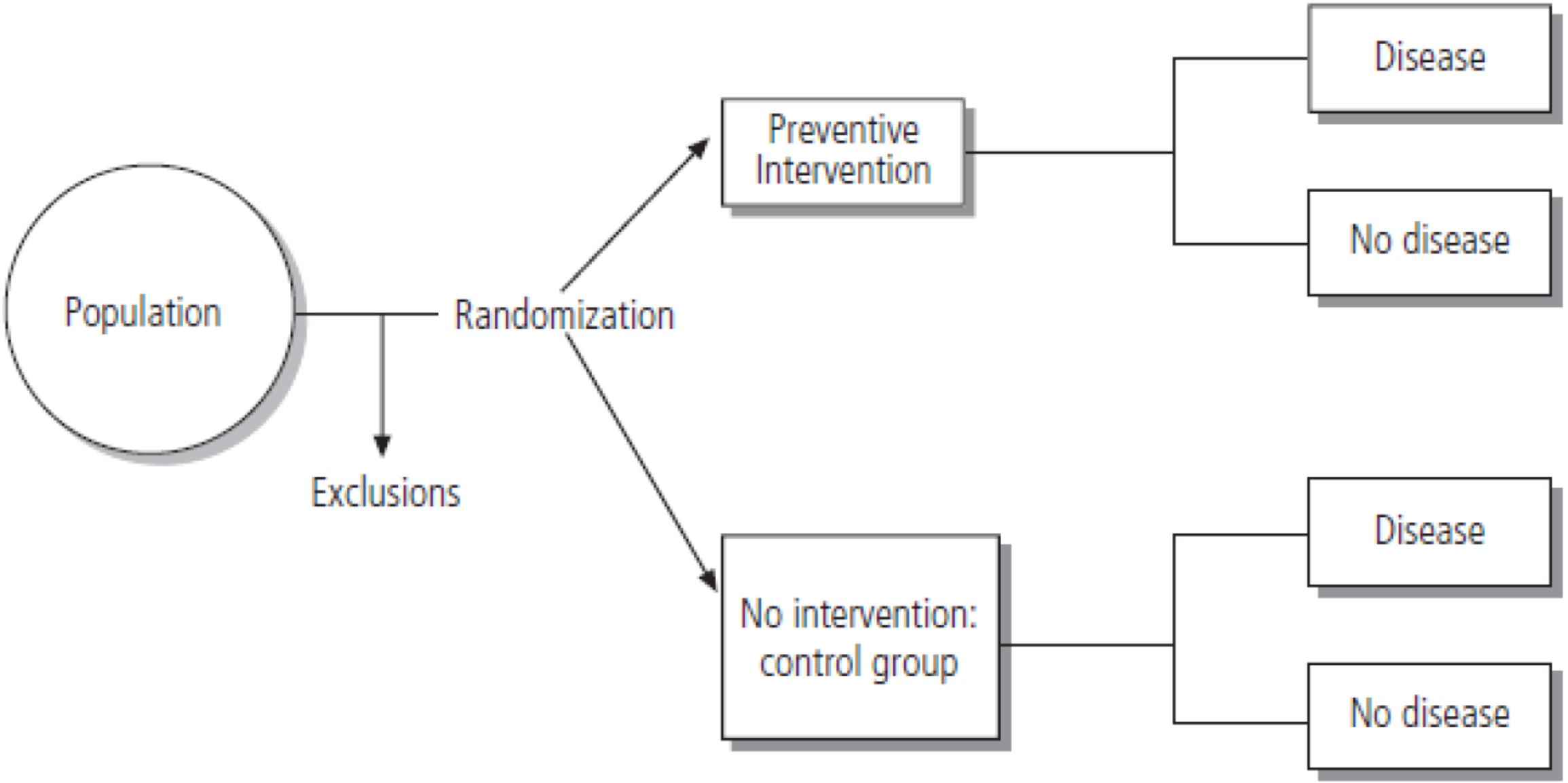


Fig. 1 Flow diagram of recruitment and follow-up

Randomized Clinical Trial



Transfusion Volume for Children with Severe Anemia in Africa

K. Maitland, P. Olupot-Olupot, S. Kiguli, G. Chagaluka, F. Alaroker, R.O. Opoka, A. Mpoya, C. Engoru, J. Nteziyaremye, M. Mallewa, N. Kennedy, M. Nakuya, C. Namayanja, J. Kayaga, S. Uyoga, D. Kyeyune Byabazaire, B. M'baya, B. Wabwire, G. Frost, I. Bates, J.A. Evans, T.N. Williams, P. Saramago Goncalves, E.C. George, D.M. Gibb, and A.S. Walker, for the TRACT Group*

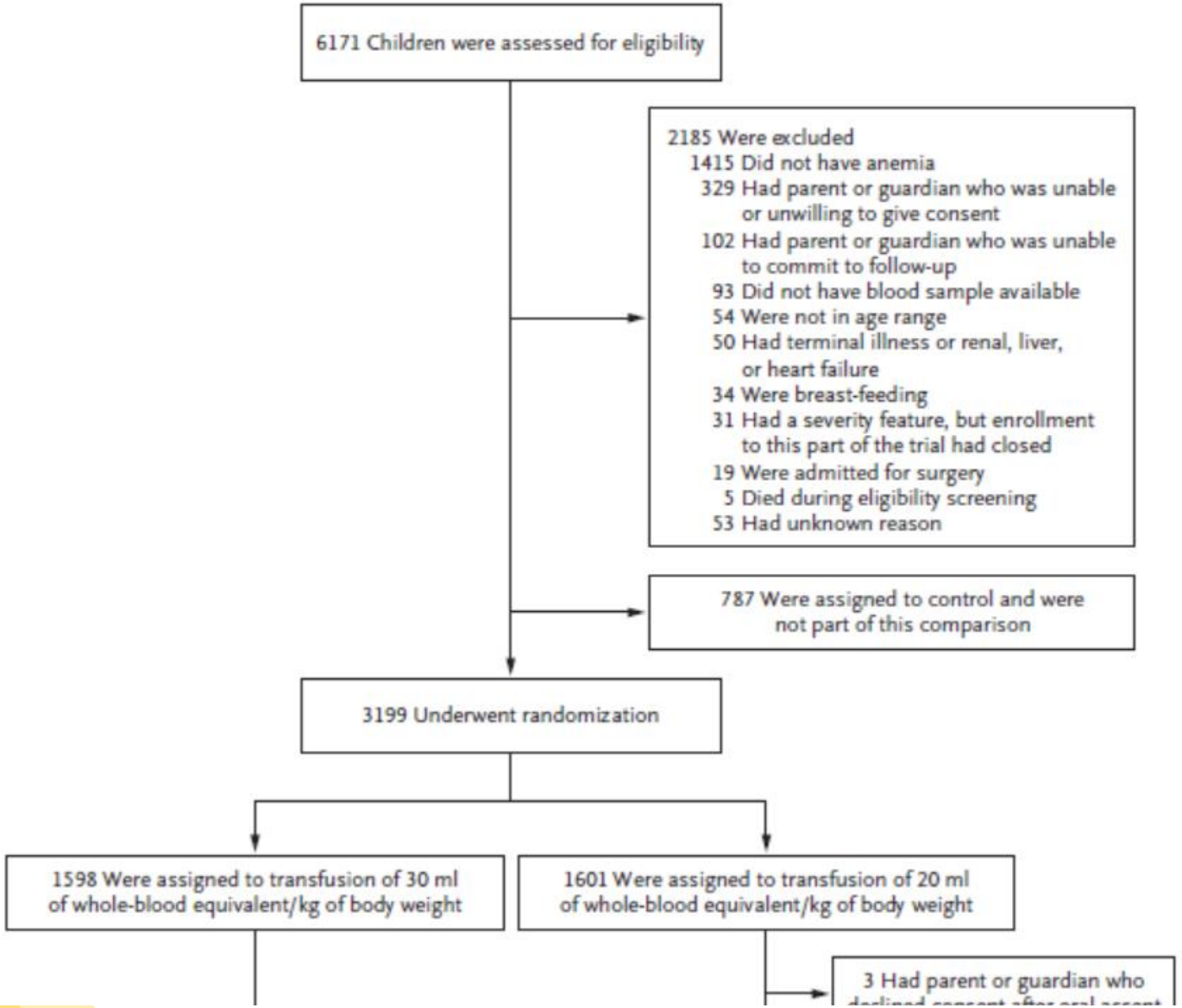
ABSTRACT

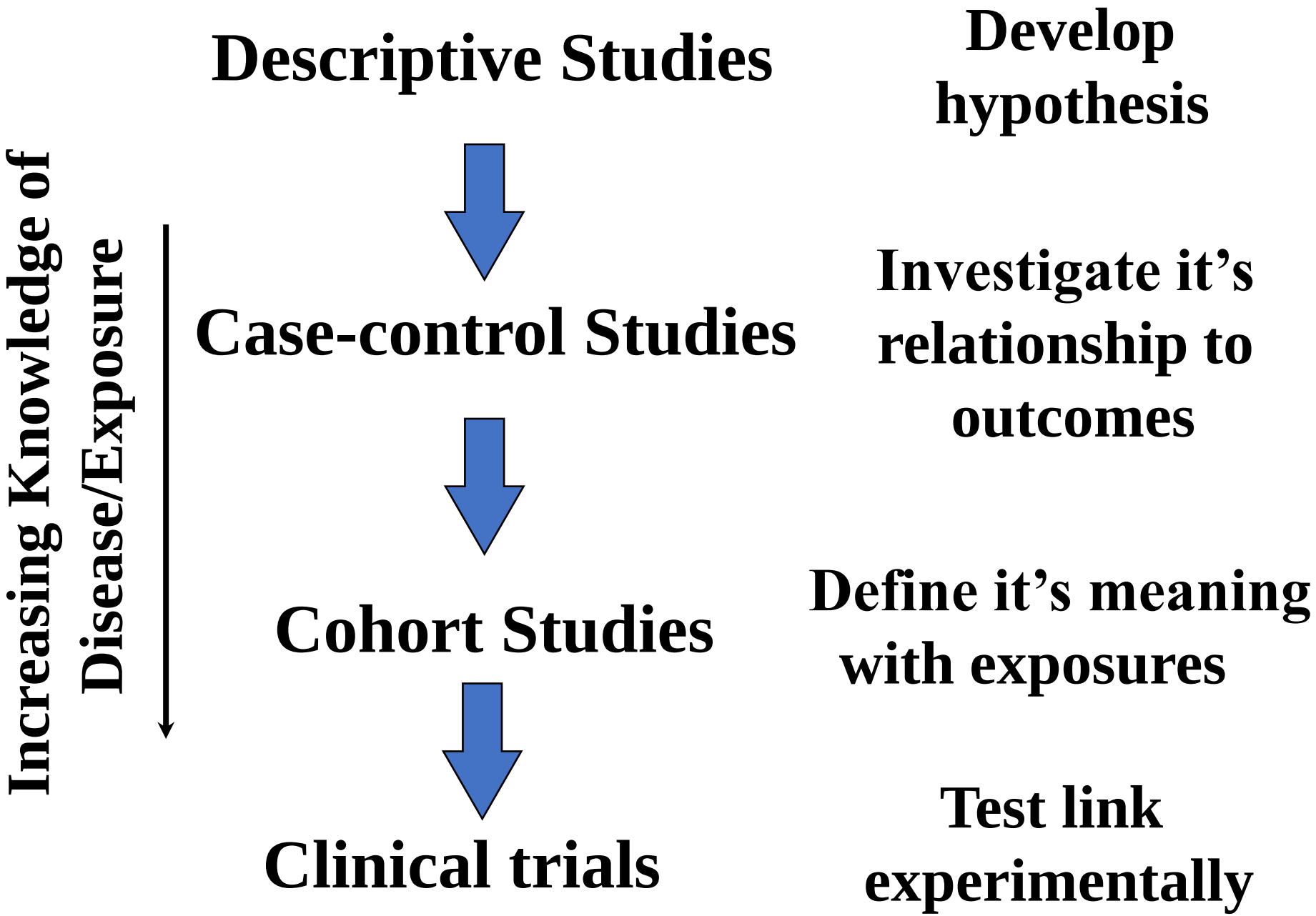
BACKGROUND

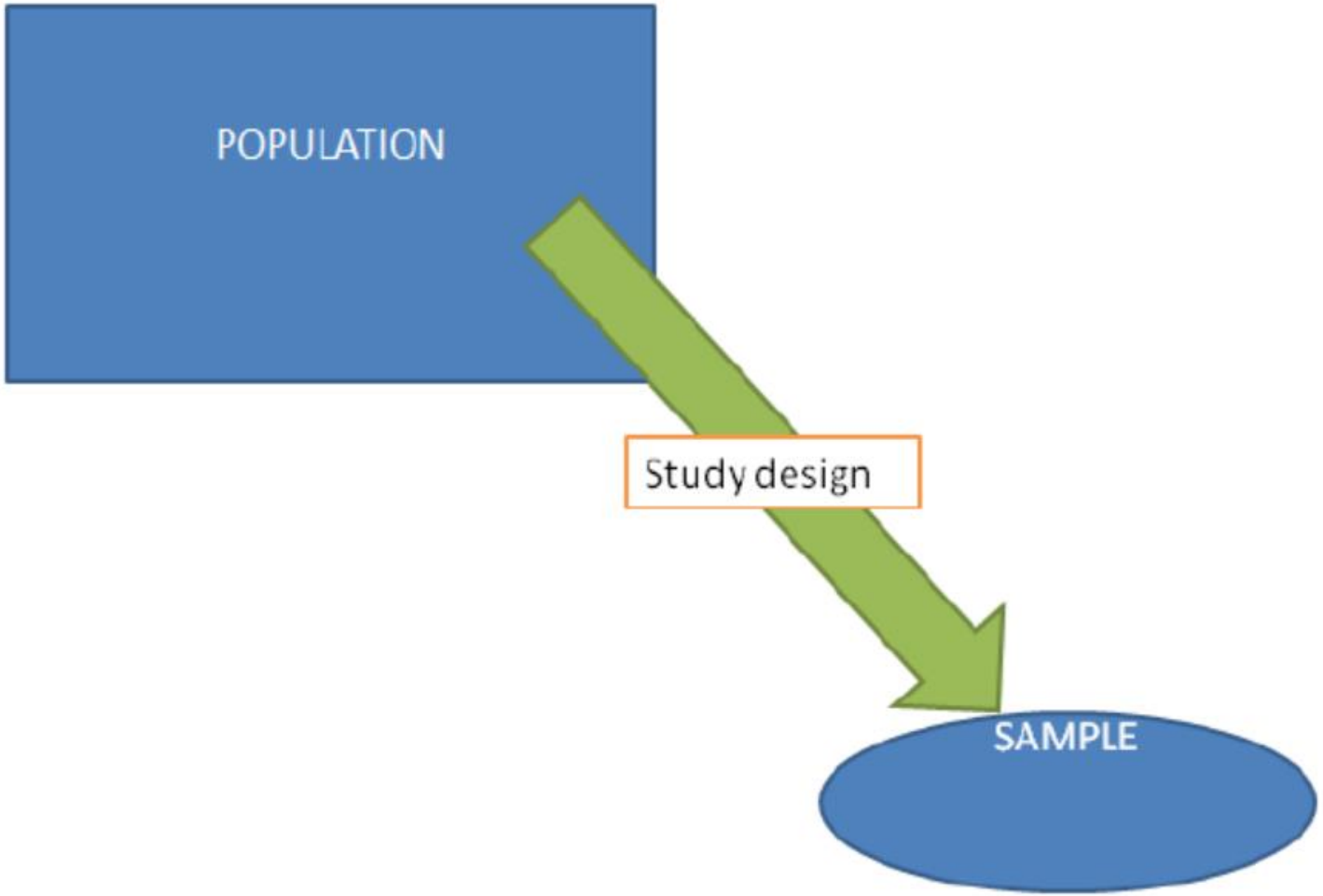
Severe anemia (hemoglobin level, <6 g per deciliter) is a leading cause of hospital admission and death in children in sub-Saharan Africa. The World Health Organization recommends transfusion of 20 ml of whole-blood equivalent per kilogram of body weight for anemia, regardless of hemoglobin level.

METHODS

In this factorial, open-label trial, we randomly assigned Ugandan and Malawian children 2 months to 12 years of age with a hemoglobin level of less than 6 g per deciliter and severity features (e.g., respiratory distress or reduced consciousness) to receive immediate blood transfusion with 20 ml per kilogram or 30 ml per kilogram. Three other randomized analyses investigated immediate as compared with no immediate transfusion, the administration of postdischarge micronutrients, and postdischarge prophy-


6171 Children were assessed for eligibility
2185 Were excluded
1415 Did not have anemia
329 Had parent or guardian who was unable or unwilling to give consent
102 Had parent or guardian who was unable to commit to follow-up
93 Did not have blood sample available
54 Were not in age range
50 Had terminal illness or renal, liver, or heart failure
34 Were breast-feeding
31 Had a severity feature, but enrollment to this part of the trial had closed
19 Were admitted for surgery
5 Died during eligibility screening
53 Had unknown reason
787 Were assigned to control and were not part of this comparison
3199 Underwent randomization
1598 Were assigned to transfusion of 30 ml of whole-blood equivalent/kg of body weight
1601 Were assigned to transfusion of 20 ml of whole-blood equivalent/kg of body weight
3 Had parent or guardian who


Descriptive Studies
Develop hypothesis
Increasing Knowledge of Disease/Exposure
Case-control Studies
Investigate it's relationship to outcomes
Cohort Studies
Define it's meaning with exposures
Clinical trials
Test link experimentally


POPULATION
Study design
SAMPLE

Exposure & outcome measurements

- Need to describe your population & sample
- Measure the exposure: smoking or not smoking
- Measure the outcome: diagnosis of lung cancer

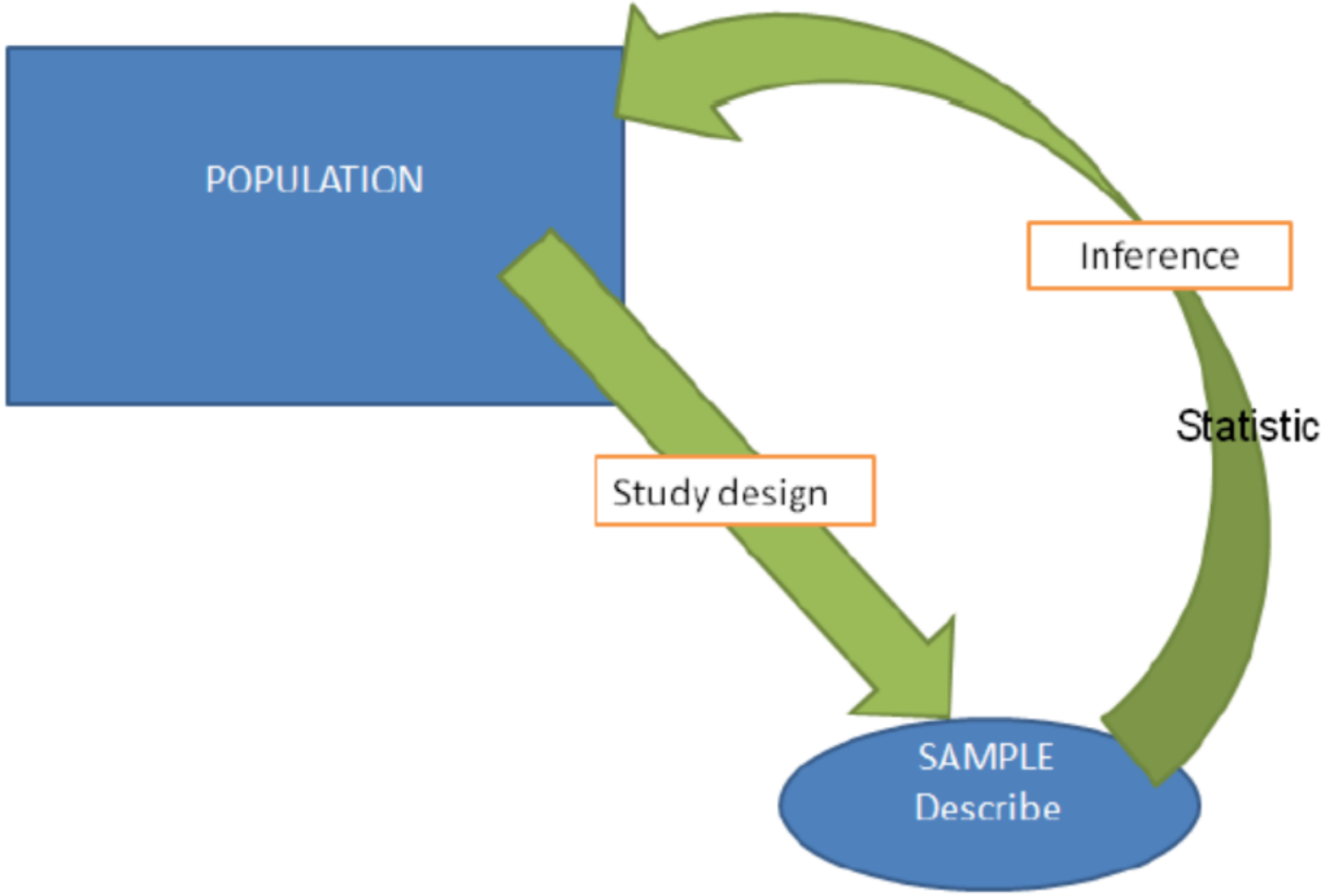
- These can be categorical or quantitative

Categorical variables

- Unordered categorical variables
  - Marital status
    - married, divorced etc
  - Ethnic group
    - Kikuyu, Luo, Kamba
  - none is higher than the other
- Ordinal categorical variables
  - Wealth quantiles
    - High, medium, low
  - Employment
    - unemployed, casual laborer, etc

Quantitative variable

- Takes numerical values, which differ in magnitude. Each value is greater than or lower than any other possible value
  - Discrete
    - Number of children: 0, 1, 2, 3, 4, ...
  - Continous
    - Weight


POPULATION
Inference
Statistic
Study design
SAMPLE
Describe

Statistics

- Allow us to use the sample to make inferences about the population from which it was derived. . . . . .

- Statistics can be computed using different software:

R programming

SPSS

STATA

SAS

If statistics programs/languages were cars...


"That's
all
folks!"