

HEALTH INFORMATION SYSTEMS 2024

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EDGEWOOD CAMPUS



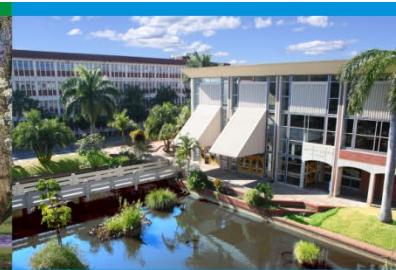
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PIETERMARITZBURG CAMPUS



WESTVILLE CAMPUS

UKZN INSPIRING GREATNESS

LEARNING OBJECTIVES

- To define a health information system
- To explain the information cycle
- To explain the tools needed for effective use of health information
- To describe the management of health information

DEFINITION

- That system which transmits information about the health of individuals/ populations



Figure 1 The six components of a Health Information System

WHY ARE “HIS” IMPORTANT

- Underpinnings of decision making
 - Data generation
 - Compilation
 - Analysis and synthesis
 - Communication and use

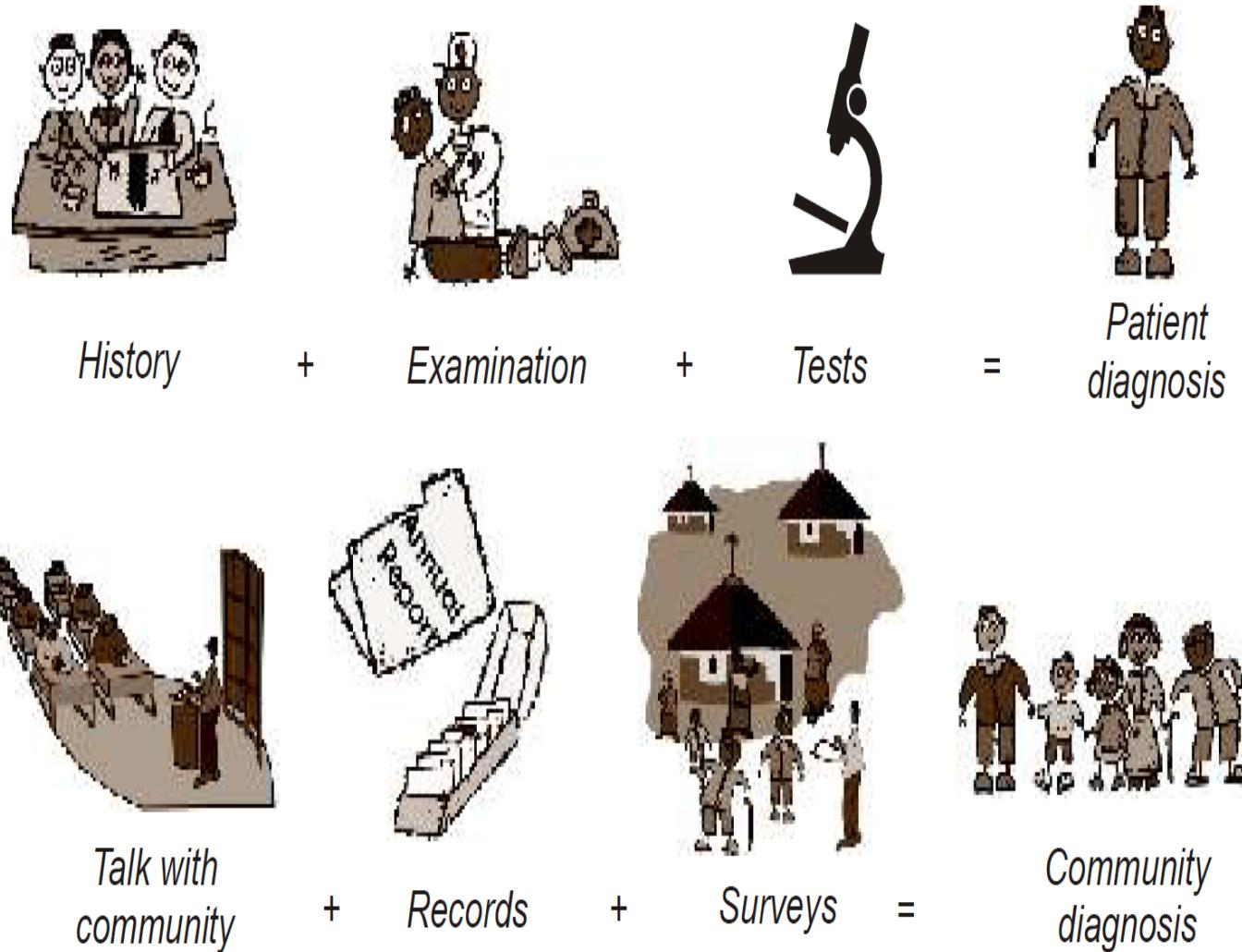


Figure 1: Patient and community diagnosis

Who gets sick? ...

With what?

Where?

When?

Why?



For whom?

Where?

When?

Why?

What health services exist

How much?

Figure 3: Who, what, where and why of ill health
(From "Helping Health Workers Learn" by David Werner)

INFORMATION ON WHO GETS SICK

- Tick registers
 - Need patient identification with services provided
- Tally sheets
 - Important conditions and services not needing follow-up
- Programme registers
 - EPI, ANC, FP, TB
- Reports
 - Selection of services provided sent to district office

WHAT CONDITIONS?

- Childhood illnesses
- Communicable.....
- Non-communicable.....

WHERE DO CLIENTS COME FROM

- Catchment population
- Geographical distribution.....important in disease outbreaks

WHEN DO THEY GET SICK?

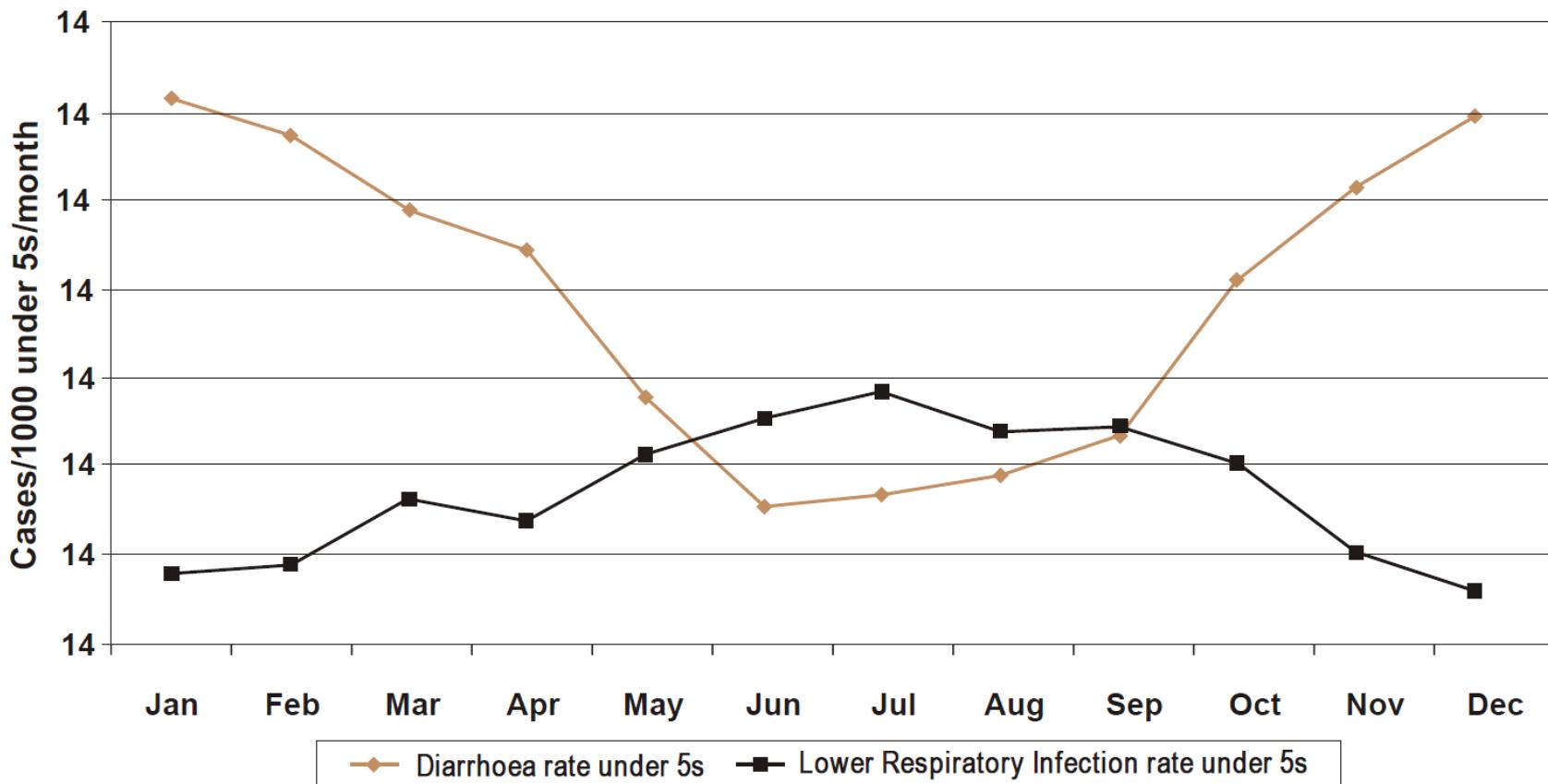


Figure 6: Seasonality of diarrhoea and pneumonia in children under five

WHY DO THEY GET SICK?

- Social conditions & Economic conditions
 - Water
 - Sanitation
 - Behaviour

MANAGEMENT INFORMATION SYSTEM

- What service exists
 - curative, preventive, promotive, rehabilitative
- For who is the service provided
 - Challenge because only know about users
- Where are services provided
 - Catchment map shows all services
- When are the services provided
 - Tick register /tally sheet shows times of consultation
- How much do they cost
 - Do we really know?

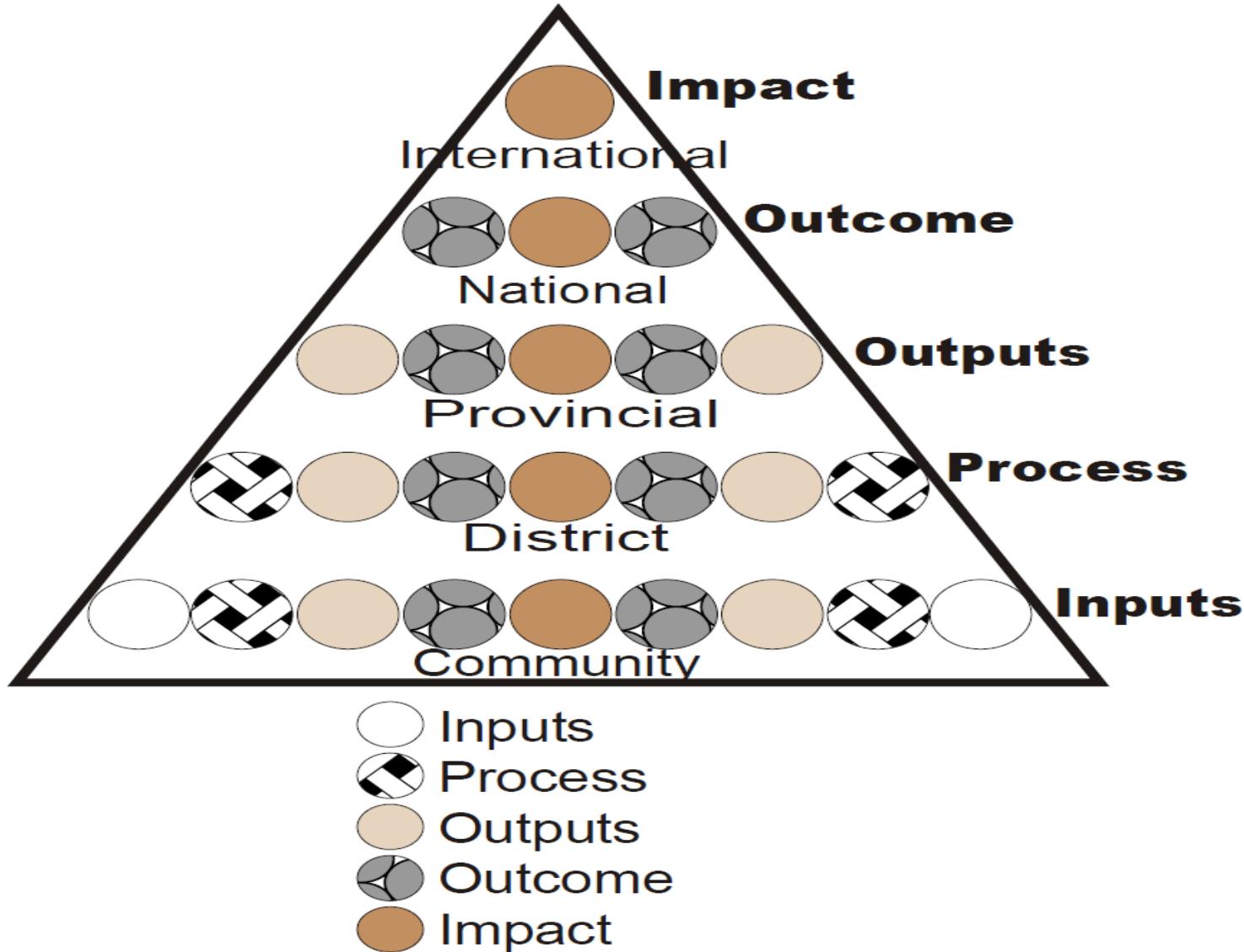


Figure 4: Information Pyramid

DISTRICT HEALTH INFORMATION SYSTEM

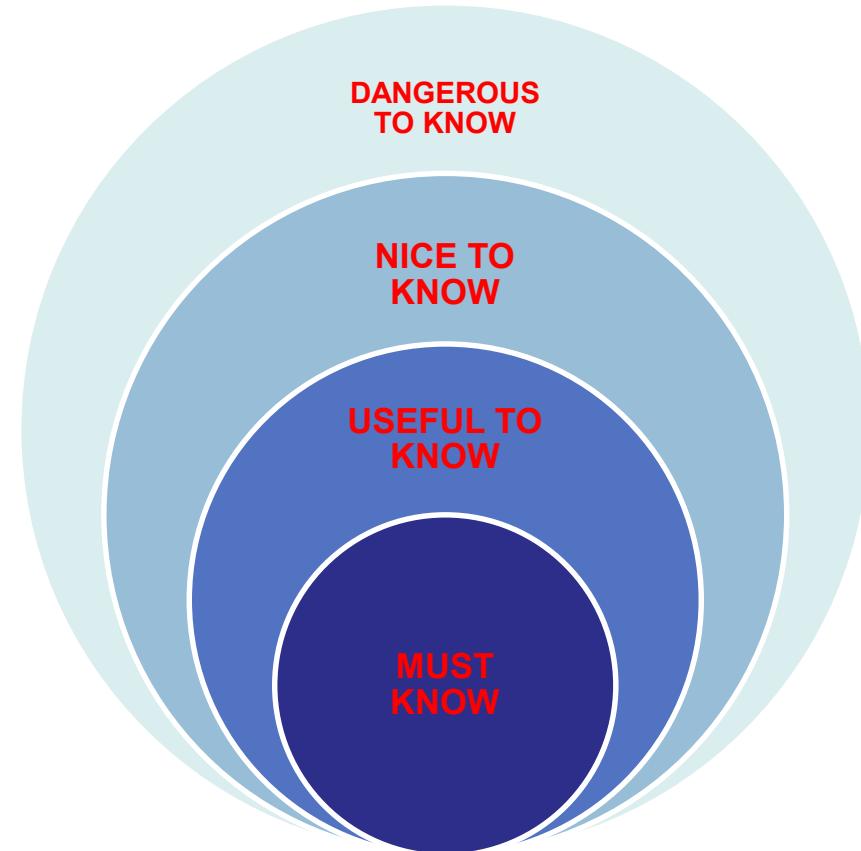
- Vision

“support the development of an excellent and sustainable health information system that enables all health workers to use their own information to improve coverage and quality of health care”
- Basic principles
 - Support district-based PHC approach
 - Essential data used to calculate indicators
 - Decentralised use of information
 - Includes service providers at all levels
 - Integrated and supports other information systems

SUPPORTS DISTRICT-BASED PHC APPROACH

- Provides a set of tools which encourages the use of information for decentralised health service management
- Monitor services through coherent information system
- Managers use limited resources to deliver

COLLECTS ESSENTIAL DATA BASED ON INDICATORS



Must know	% of under 1 year olds fully immunised
Useful to know	Measles coverage
Nice to know	Other programme vaccines given
Dangerous to know	All doses over 1 year given

DECENTRALISED PLANNING AND MANAGEMENT

- Managers who use data to plan and evaluate make better decisions
- Use facility data to monitor progress toward targets

INCLUDES ALL SERVICE PROVIDERS

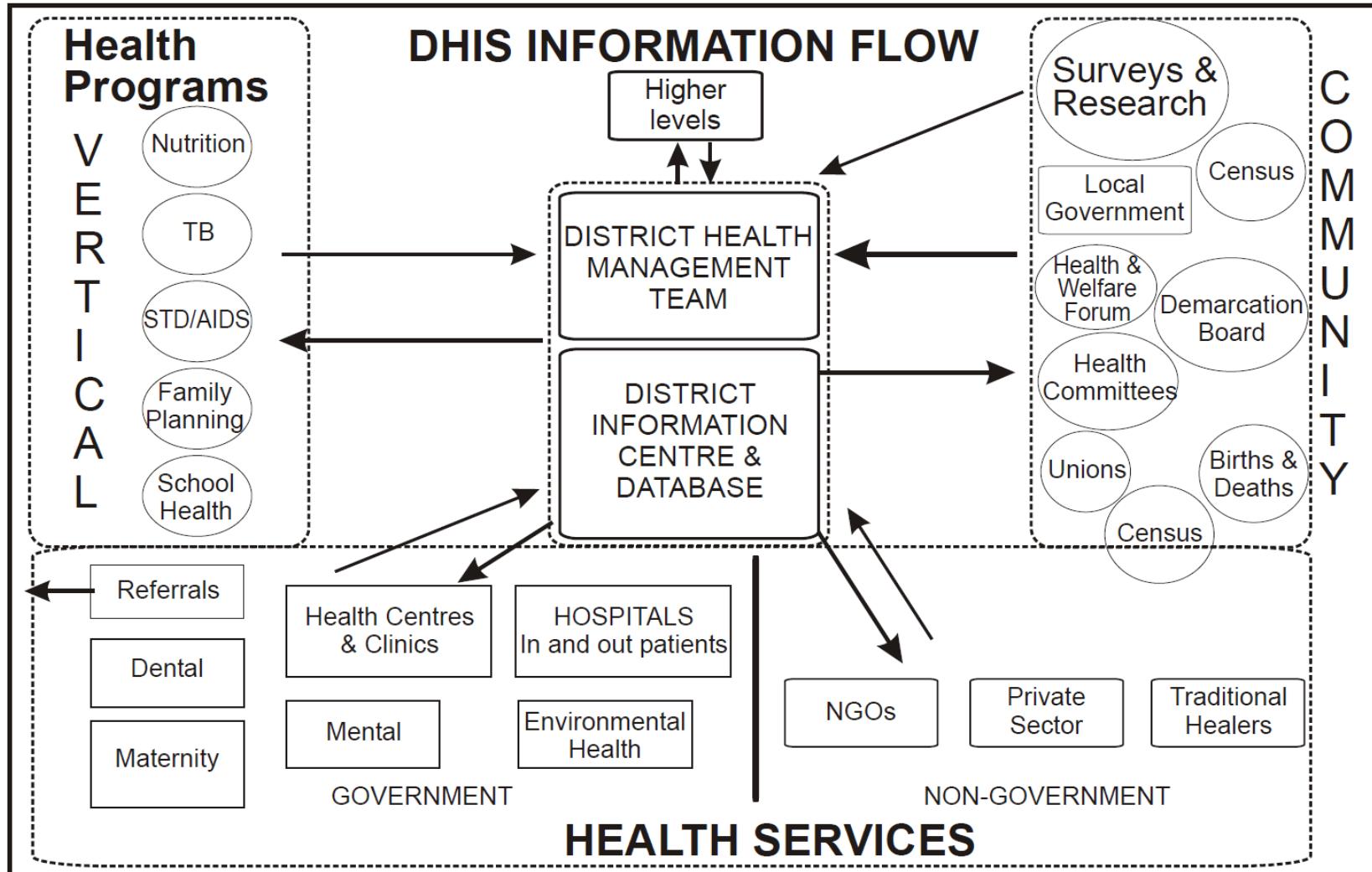


Figure 8: The DHIS flow diagram

INTEGRATION WITH OTHER INFORMATION SYSTEMS

- DHIS concentrates on PHC services and district services
- Feed to other levels of health and social services

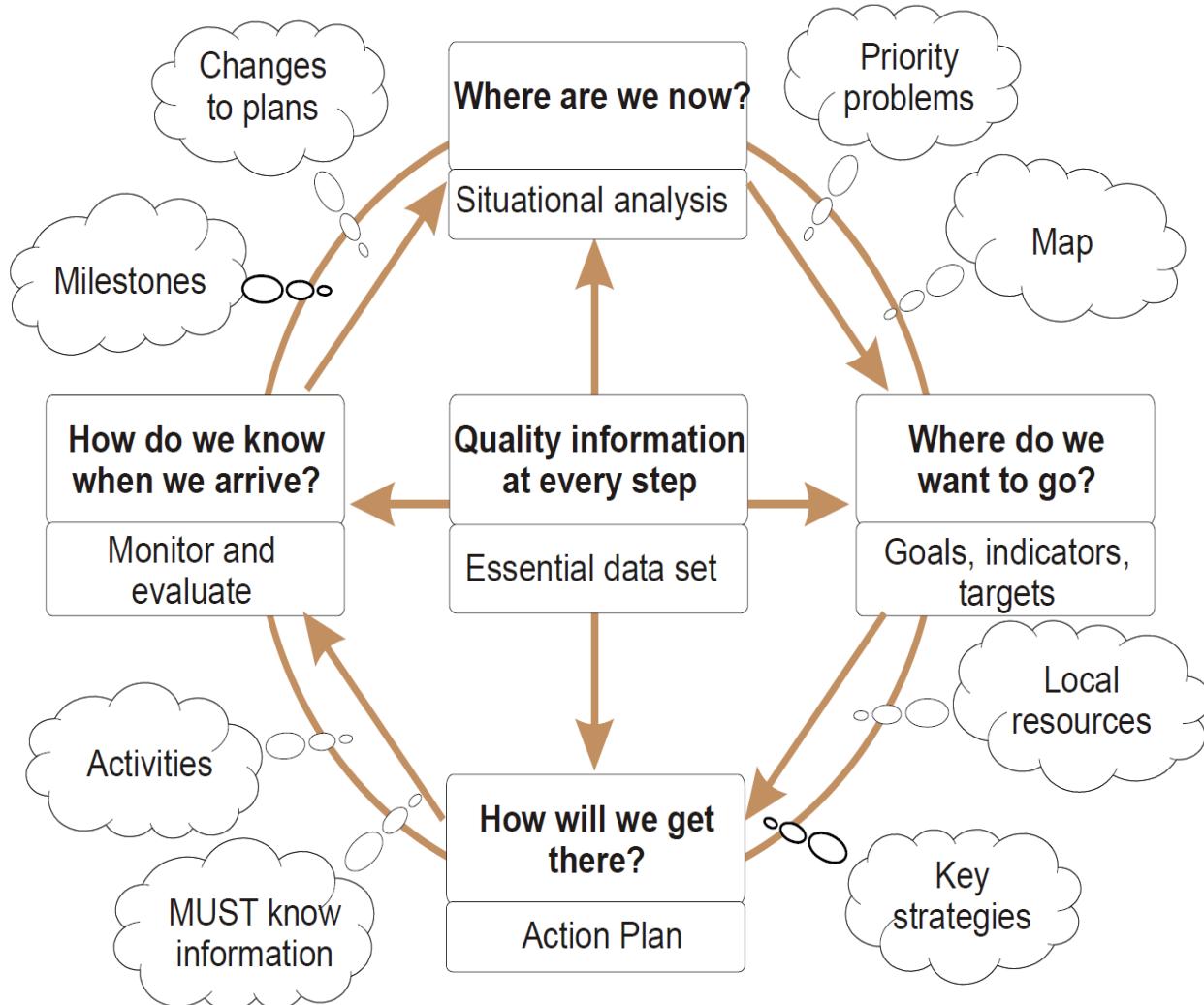
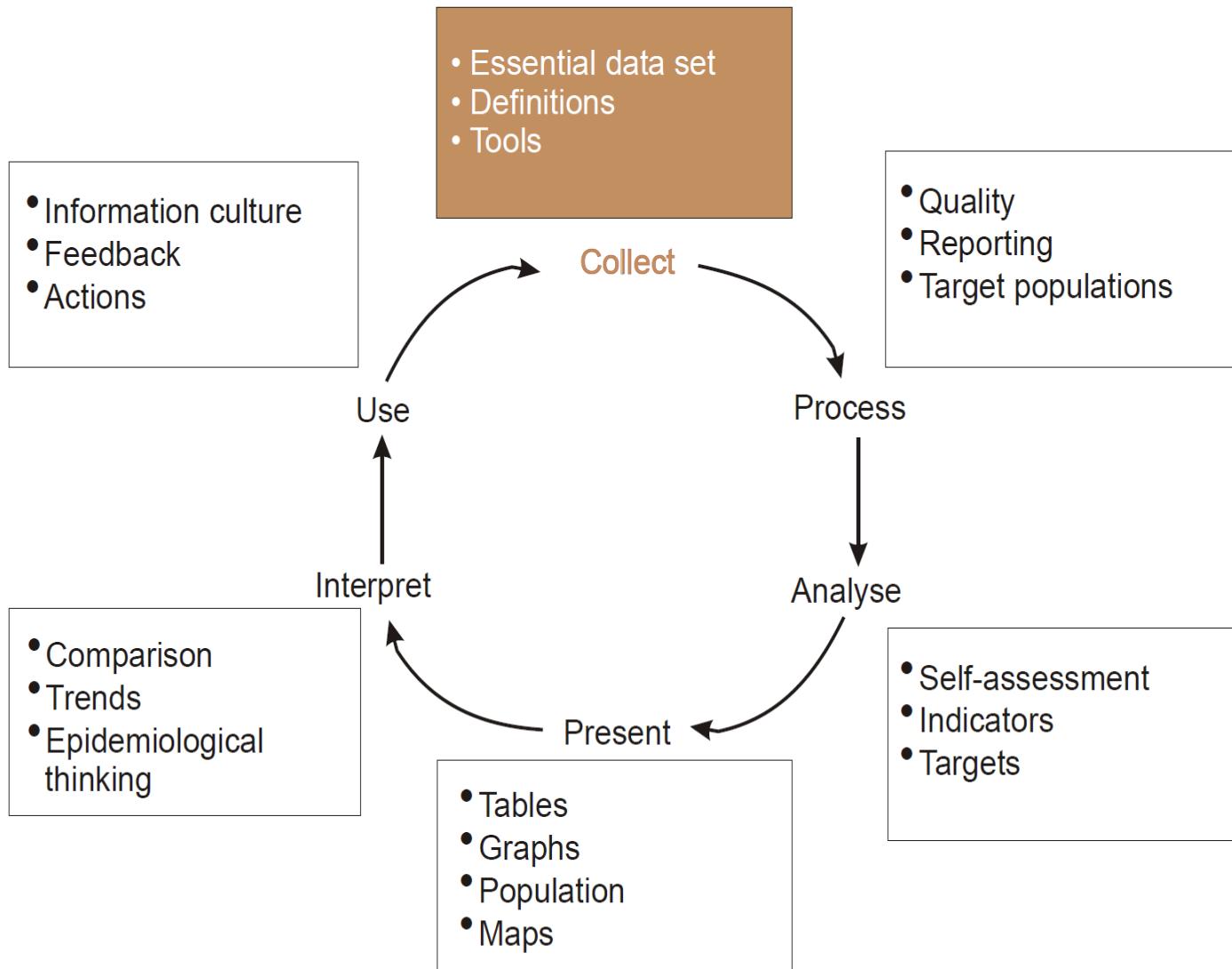


Figure 9: The planning cycle

Information is core to Planning

The Information Cycle



ESSENTIAL DATASET FOR A HEALTH FACILITY

Special Program Activities

- Maternal & reproductive health
- Child health & nutrition
- Chronic illness
- HIV/AIDS, STI and TB

Routine Service Activities

- Minor ailments
- Non-priority activities

Epidemiological Surveillance

- Notifiable diseases
- Environmental health

Administrative Systems

- Infrastructure, equipment
- Human resources
- Drugs, transport, laboratories, finances, budget, staff

Population

- Census: age, sex, place
- Births & deaths registration

Figure 11: Information collected at PHC facilities

DATA DEFINITIONS

Data Field	Definitions
PHC headcount under 5 years	All individual patients not yet reached five years (60 months) of age attending the facility during the period.
PHC headcount 5 years and older	All individual patients five years (60 months) and older attending the facility during the period.
DOTS visit – Facility	Directly Observed Treatment System visit (usually daily) by a diagnosed tuberculosis patient to receive medication.
Nurse clinical work days (PHC)	The number of actual work days by nurses, irrespective of rank, used to perform Primary Health Care services in the month.
First antenatal visit	A first visit by a pregnant woman to a health facility for the primary purpose of receiving antenatal care.
Follow-up antenatal visit	Any antenatal visit other than a first antenatal visit.
Tet Tox 3 rd /booster dose to pregnant woman	The final Tet Tox dose given to a pregnant woman. Women who have proof of being fully immunised during a previous pregnancy need only a single booster.
Oral pill cycle	A packet (cycle) of oral contraceptives issued to a woman.
Nuristerate injection	Any Nuristerate (Norethisterone enantate) injection given into a woman between 15 and 45 years.
Depo-provera/Petogen injection	Depo-provera/Petogen (Medroxyprogesterone acetate) injection given to a woman between 15 and 45 years.
Condoms distributed	Condom that has been given out or taken from distribution points in facilities or elsewhere (including campaigns).
Referred for Termination of Pregnancy	A client referred to a facility that provides Termination of Pregnancy Services.

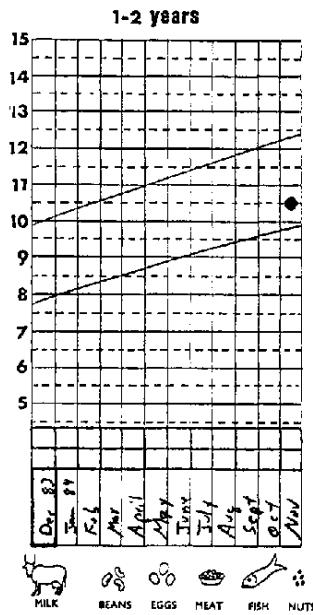
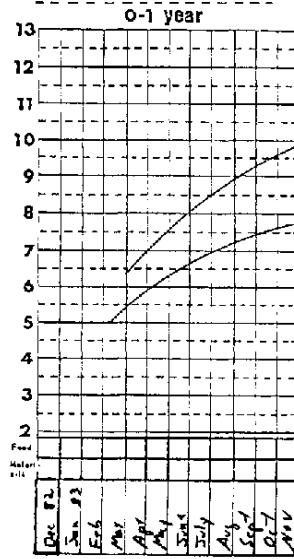
Table 3: Partial list of the DHIS data definitions

DATA COLLECTION TOOLS

- Patient record cards
- Tally sheets
- Registers

PATIENT-HELD RECORDS

Reasons for special care



VIRGINIA DEPARTMENT OF HEALTH DIVISION OF TB CONTROL DIRECTLY OBSERVED THERAPY (DOT) LOG

DOT Month:	DOT Year:	DOT Case Manager:	Case Mgr Phone:				
Patient Name:	Patient Address:	Med/Strength	Dosage	# Tablets	Freq/Route	Start date:	Stop date:
Patient Phone: (H) (W) (Cell)	Patient's Sex: M F	INH 300	300mg	1	PO/PO	6/1/03	8/8/03
8.4.03 Cleve Lyle		KIF 600	600mg	2	PO/PO	6/1/03	1
8.4.03 MINNIE MEYER		EMB 400	1200mg	3	PO/PO	6/1/03	1
		RAZ 300	300mg	3	PO/PO	6/1/03	1
DOT Start Date:	DOT Discontinuation Date:	Date: Printed Name:	Signature:	Initials:	Comments	DOT Site: <input checked="" type="checkbox"/> Home <input type="checkbox"/> Work <input type="checkbox"/> Clinic <input type="checkbox"/> Other	Mask Needed? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
8.4.03 Cleve Lyle		Cleve Lyle		CL		<input checked="" type="checkbox"/> Home <input type="checkbox"/> Work <input type="checkbox"/> Clinic <input type="checkbox"/> Other	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No
8.4.03 MINNIE MEYER		MINNIE MEYER		MM		<input checked="" type="checkbox"/> Home <input type="checkbox"/> Work <input type="checkbox"/> Clinic <input type="checkbox"/> Other	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Day of Month	Dose #	Initials of Person Observing or Giving Medication (If Self-Administered, Check the 'Self' Box and Note the Reason in the 'Comment' Column)	Time When Meds. Observed	Side Effects: If present, check and write progress note. If absent, check in the "None" column.											
				None	Nausea/Vomiting	Abdominal Pain	Headache	Loss of Appetite	Jaundice/Yellow Color	Numbness/Tingling	Rash	Fatigue	Joint Pain	Visual Change	Hearing Change
1	36	<input checked="" type="checkbox"/> Self	9:30 AM	<input checked="" type="checkbox"/>											<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
2	37	<input checked="" type="checkbox"/> Self	9:00 AM	<input checked="" type="checkbox"/>											<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
3	38	<input checked="" type="checkbox"/> Self	10:15 AM	<input checked="" type="checkbox"/>											<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
4	39	<input checked="" type="checkbox"/> Self	9:45 AM	<input checked="" type="checkbox"/>											<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
5	40	<input checked="" type="checkbox"/> Self	9:30 AM	<input checked="" type="checkbox"/>											<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
6		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
7		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
8	1	<input checked="" type="checkbox"/> Self	10:45 AM	<input checked="" type="checkbox"/>											<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
9		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
10		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
11	2	<input checked="" type="checkbox"/> Self	11:15 AM	<input checked="" type="checkbox"/>											<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
12		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
13		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
14		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
15		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
16		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
17		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
18		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
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28		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
29		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
30		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
31		<input checked="" type="checkbox"/> Self													<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Sample

TALLY SHEETS & TICK REGISTERS

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Wrong orders	///	HHH	HHH HHH HHH HHH //	/	//	////	HHH //
Reworked orders		/	//	///		/	//
Late deliveries	HHH //	/	///	//		///	//
Shipping damage						HHH HHH HHH HHH	HHH //
Late payments		/					
Totals	11	8	27	6	2	28	19

Attendance	Reproductive Health	Child Health	Immunisation	Tuberculosis Control	Sexually Transmitted Infections	Mental Health	Chronic Care	Referrals	Health Education
PHC headcount <5									
PHC headcount >=5									
DOTS facility									
Nurse work days PHC									
Oral pill cycle									
Nunisolate									
Depo-provera									
Condoms distrib									
Diarrhoea <5									
LRI <5									
Child <5 weighed									
Not gaining wgt <5									
Severe malnutr <5									
PEM client <5									
BCG at birth									
DTP-Hib 1st dose									
DTP-Hib 2nd dose									
DTP-Hib 3rd dose									
OPV 1st dose									
OPV 2nd dose									
OPV 3rd dose									
HepB 1st dose									
HepB 2nd dose									
HepB 3rd dose									
Measles 1st dose									
Fully immunised <1									
Measles 2nd dose									
Suspected TB case									
Case treated as STI									
Urethral disch									
STI slip issued									
STI contact treated									
Mental health visit									
Psych illness visit									
Chronic visit									
Referred to doctor									
Health educ session									
HIV test done									

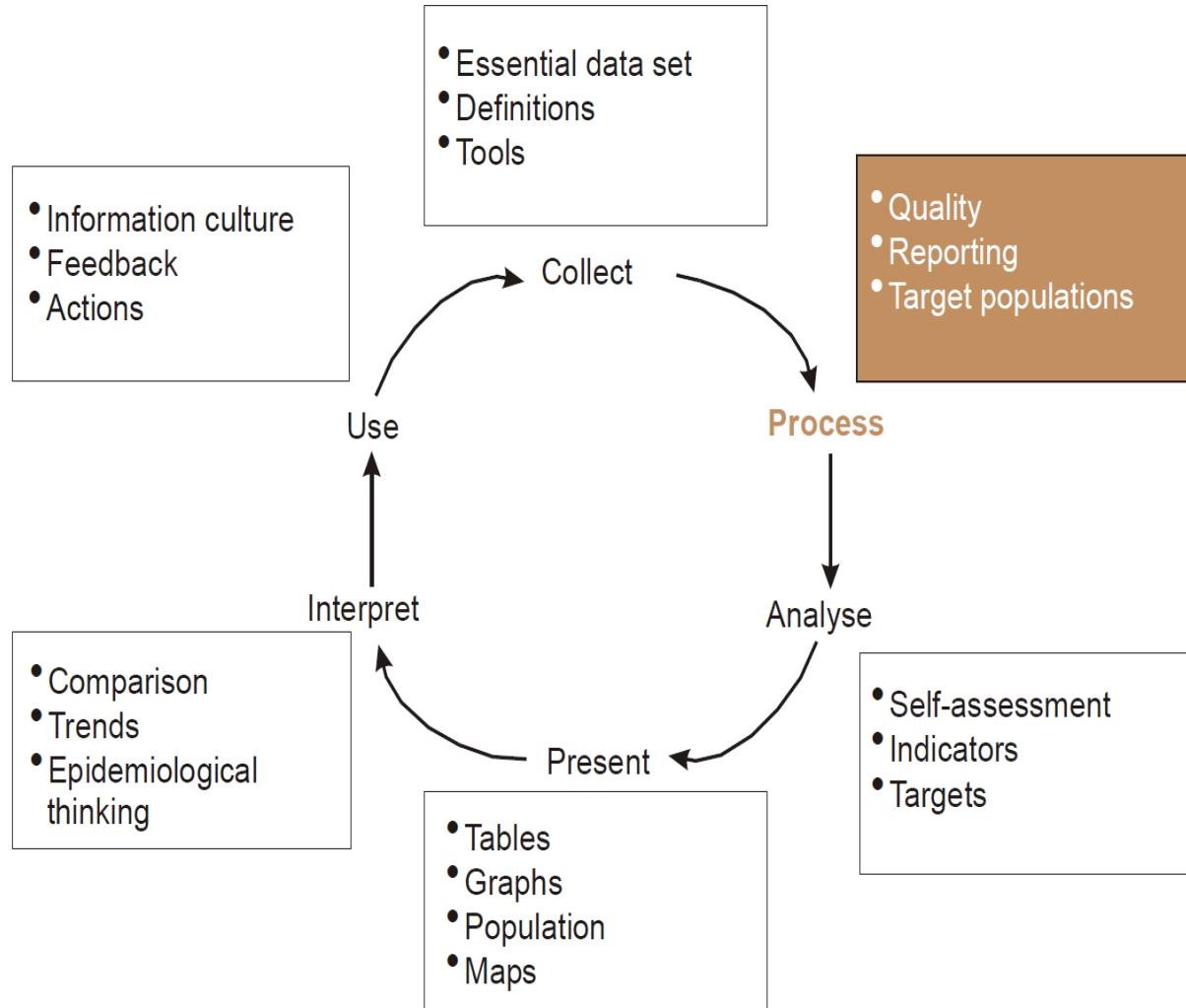
Figure 27: The Eastern Cape PHC tick register

ASSESSMENT OF DATA COLLECTION TOOLS

Type of Tool	Purpose	Layout	Relevance	Overlap
How many? <ul style="list-style-type: none">• Client Card• Register• Tally Sheet• Report	Effective decision-making for: <ul style="list-style-type: none">• Public health• Management• Supervision/ Support• Monitoring/ Evaluation	Simple, Clear, Easy to understand <ul style="list-style-type: none">• Priority actions• No useless data• Missing actions evident	Useful for: <ul style="list-style-type: none">• Incidence/ Prevalence• Coverage/ Quality• Expenditure• Input/Process/ Output/ Outcome	No Overlap with other forms <ul style="list-style-type: none">• What• When• How and• Why

Table 4: Criteria for assessing data collection tools

The Information Cycle



ENSURE DATA QUALITY

Good quality data should be :

- Available on time and at all levels
- Correct, complete and consistent
- Reliable and accurate enough to support decisions
- Represent all recorders of similar data
- Comparable i.e. using the same definitions of data items

Old data is of historical value only - decisions must be made based on current information

It is better to be roughly right, than exactly wrong

If we don't measure by the same tool we can't compare each other's results

DATA QUALITY

- Correctness
 - Data in normal ranges
- Completeness
 - Have all units and facilities submitted all data
- Consistency
 - Same range / similarity between facilities

Error	Example
Missing data	Data items for whole months missing
Duplicate data	Multiple counting of a fully immunised child
Thumb suck	When data collection tools are not used routinely, staff just fills in a likely-looking number (often using preferential end digits!)
Unlikely values for a variable	A man being pregnant; low birth weight babies exceeding number of deliveries
Contradictions between variables	100 births in a month when there are only 2,000 women in childbearing age
Calculation errors	Mistakes in adding
Typing error	Data is wrongly entered onto the computer
Capture in wrong box	Condoms distributed in the place of intra-

Figure 29: Common sources of errors

IN THE PRESENCE OF ERRORS...

- Find the cause
 - Identify the source /person
 - Train / re-train
- Correct the error
 - Go to source documents to find correct stats
- Prevent future errors
 - Check in subsequent months

COLLATING OF DATA

- Gathering data into one report
- Make sure no duplication
- Computerised collations

REPORTING

- Monthly PHC reports
- Vertical and horizontal reporting
- Notifiable diseases
- Programmes
 - TB
 - HIV / AIDS

TARGET POPULATION

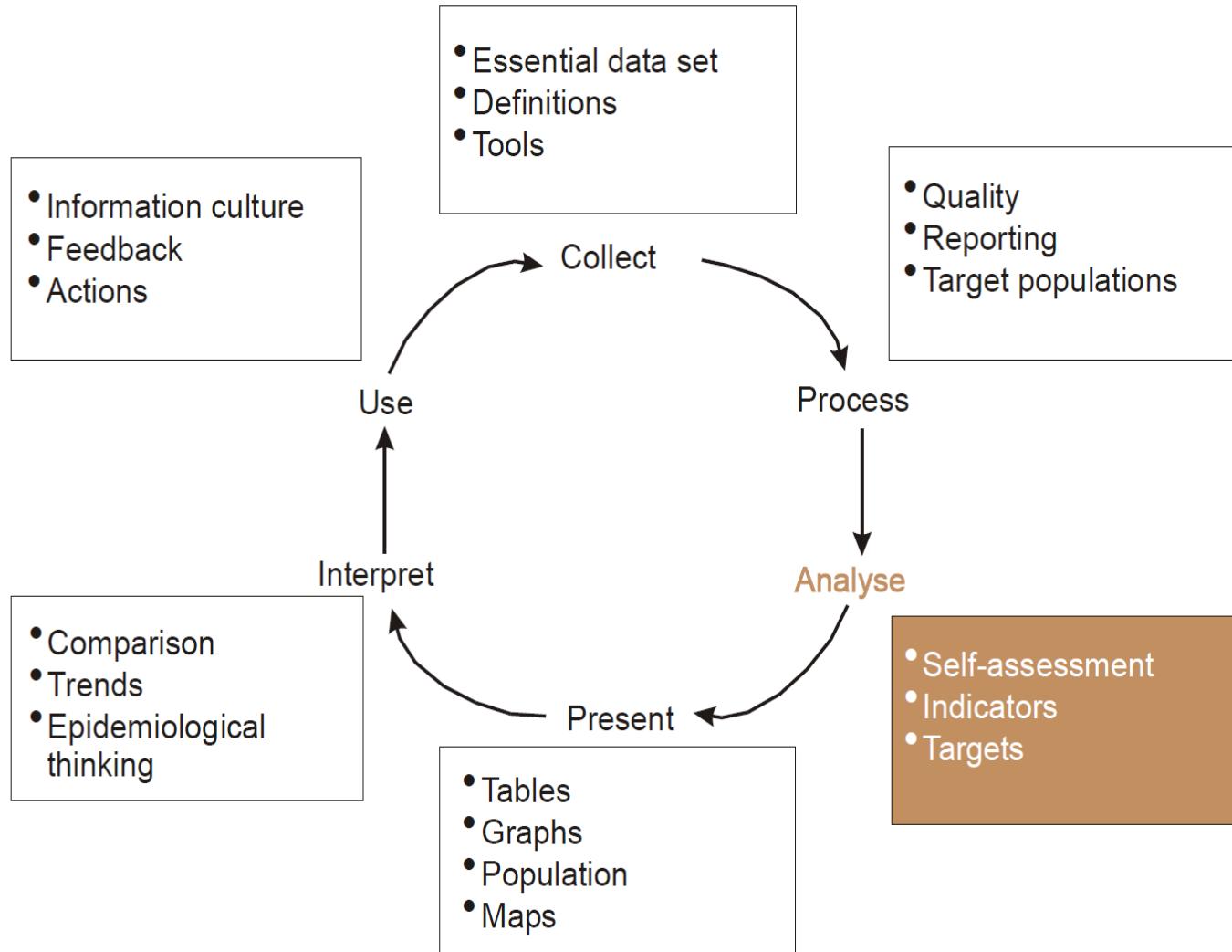
Target population	Percentage (Approximate)
Total population	100%
Pregnant women needing antenatal care and delivery	*
Children under one year needing immunization and growth monitoring	+/- 3%
Children between birth and four years needing growth monitoring	+/- 12%
School age children 5 - 15 needing screening and health education	+/- 17%
Woman between 15 and 45 who are fertile and need family planning services	+/- 23%
Men over 15 years for male urethral discharge	+/- 30%
Both sexes over 45 who may need care for their chronic conditions	+/- 15%

* NB for the purposes of the DHIS, ANC, delivery and children under 1 year are considered to be the same number, though this is not strictly accurate

Table 7: Target population for priority programs

KNOW TARGET POPULATIONS

The Information Cycle



SELF-ASSESSMENT

- **Coverage**
 - Who received service compared to who should have
- **Quality**
 - Did clients receive the best possible care?
 - Standardised care
- **Continuity**
 - Was there continuity of care
 - For example did children receive all their required immunisations
- **Risk**
 - Where clients with specific risks identified
 - What proportion of ANC clients with specific risk factors were identified ?

INDICATORS

- Convert raw data into useful information;
- Are observable markers of progress towards defined targets;
- Are used to describe the situation and to measure changes over time;
- Provide information about a broad range of conditions through a single measure;
- Provide a yardstick whereby institutions or teams can compare themselves to others doing similar work.

Indicators enable us to compare “apples” with “apples”, not with “melons”!

CLASSIFICATION OF INDICATORS

There are four main types of indicators (WHO 2000):

Type of indicator	Description	Example
Count Indicator	Number of events without denominator	Number of new cases of Acute Flaccid Paralysis
Proportion Indicator	Numerator is contained in the denominator	Proportion of health centres without electricity
Rate Indicator	Frequency of the event in a specified time in a given population	Incidence of new TB cases in a given population per year
Ratio Indicator	Numerator is not included in the denominator	Ratio of nurses to population Ratio of male TB deaths to female TB deaths

Table 9: Indicator Type

IDEAL INDICATOR

Reliable	Gives the same results if used by different people in different places
Appropriate	Fits in with local needs, capacity and culture and the decisions to be made
Valid	Truly measures what is of interest
Easy	Able to be simply calculated using routinely available data
Sensitive	Changes in the indicator immediately reflect changes in the actual situation under study



Look
for better
indicators, not
more indicators

OBJECTIVES AND TARGETS

GOALS → OBJECTIVES → TARGETS

OPERATIONAL TARGETS

Specific	Measure real changes in the situation concerned
Measurable	Able to be easily and precisely quantified
Agreed	Consensus reached with all major role-players
Relevant	Fit local needs, capacities and culture using available resources
Time bound	To be achieved by a certain time

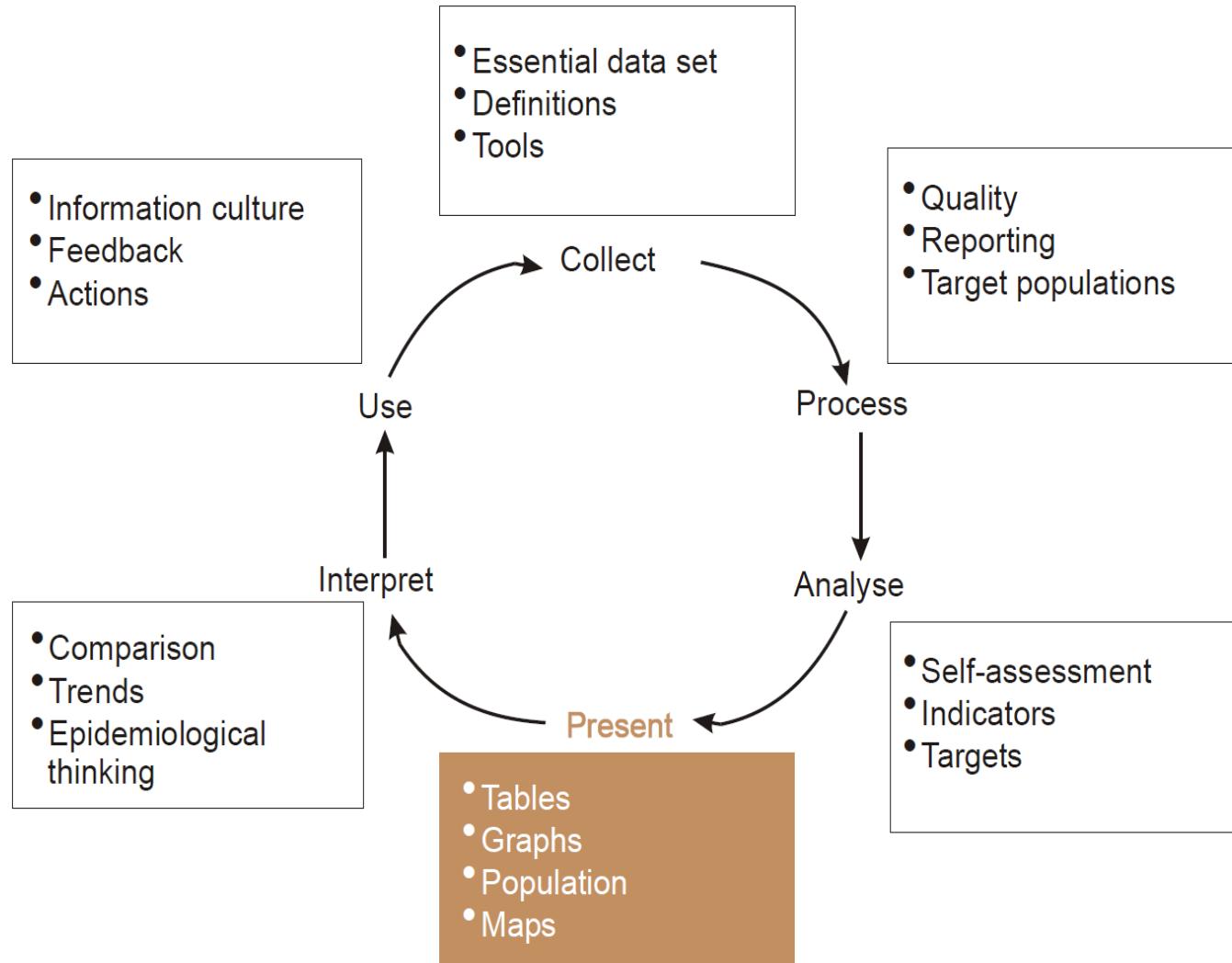
LOCAL OBJECTIVES AND OUTCOMES

- Local objectives adapted from national objectives
- Outputs need to be achieved in a set period of time
 - Collected as part of the Essential Data Set
 - e.g. number of water standpipes installed
 - number of toilets built

Goal: All women to have access to modern family planning

Objectives	Indicators	Outputs (for 1 year)
45% couple year protection (CYP)	Couple (women) year protection rate	1231 couple years of family planning (45% of 2376 fertile women)
Increase proportion of teenagers from 10% to 20% of total CYP	% CYP issued to teenagers	226 couple years issued to female teenagers (20% of the 1231 CYPs)
Issue at least 50 condoms per fertile woman per year	Number of condoms per woman per year	136,800 condoms issued (2736 women X 50)

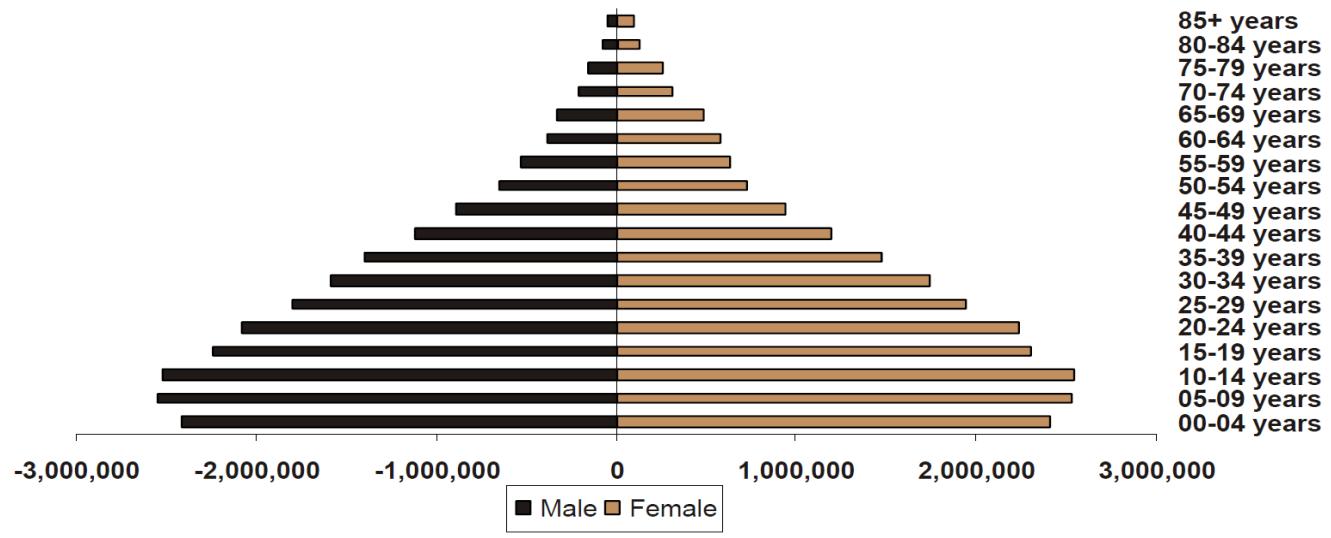
The Information Cycle



PRESENTATION OF DATA

- Tables
- Graphs
- Population Pyramids
- Maps

South Africa - Mid-year 2000 Population Estimates (total 43.5 mill)



Norway - Population 1 January 2001 (total 4.503 mill)

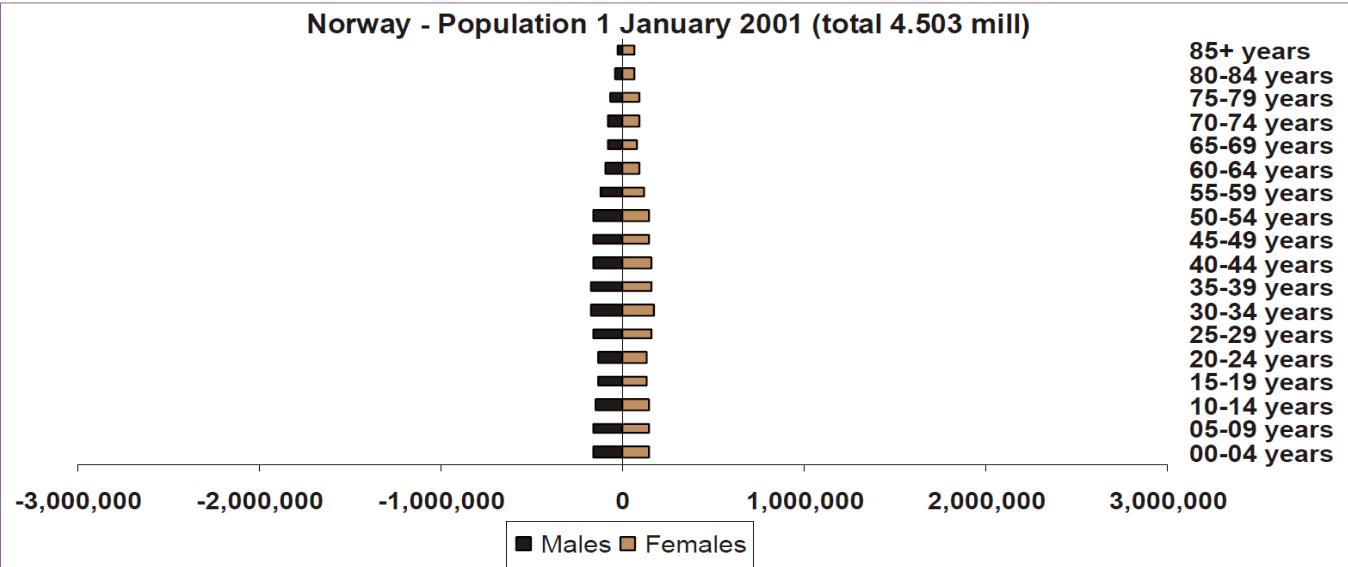
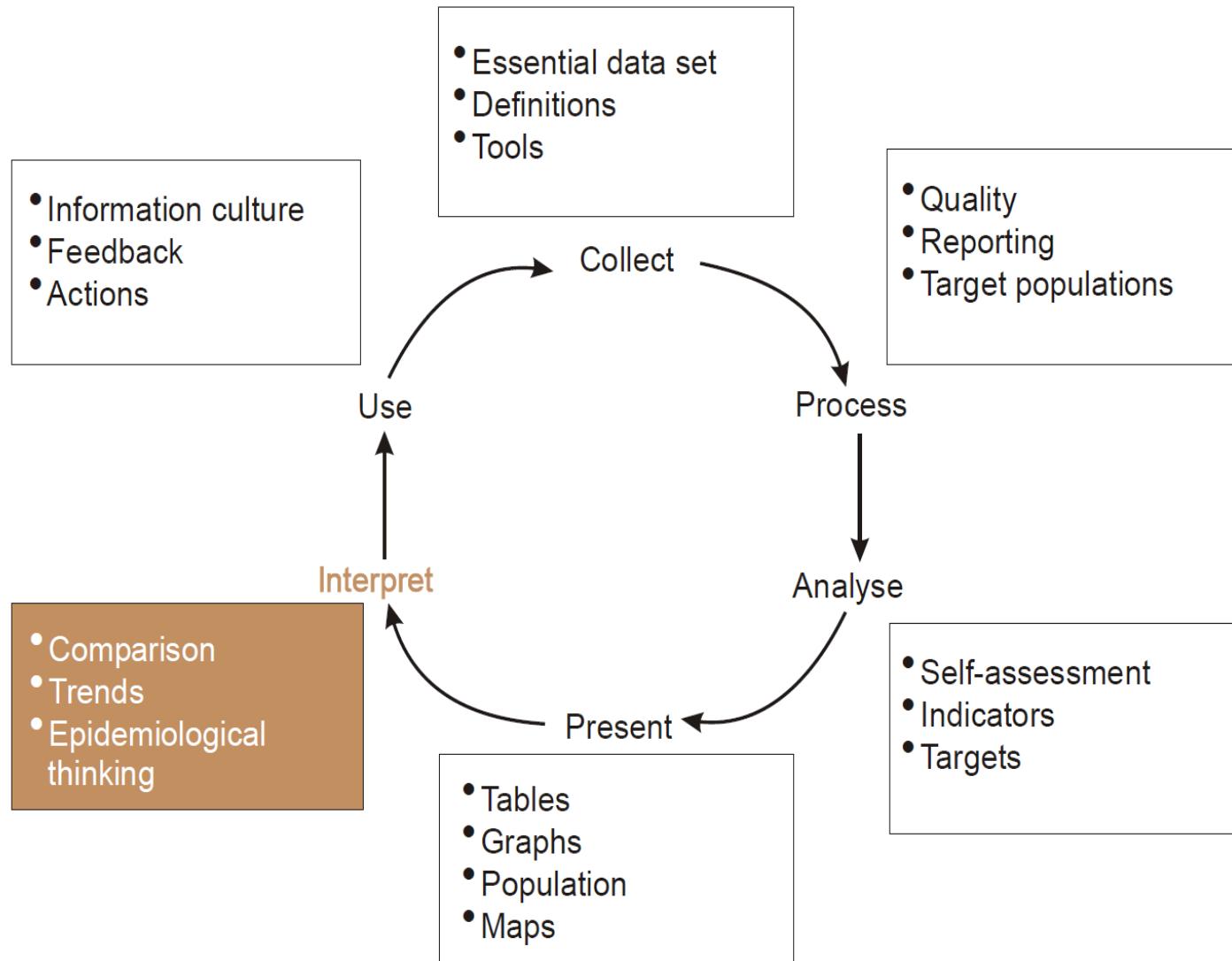


Figure 37: Population pyramids for South Africa and Norway

The Information Cycle



COMPARISON

- Comparison to
 - Targets
 - Met targets ???
 - other facilities/ geographic areas
 - Similar, better or worse, what can we learn
 - Norms
 - EPI coverage of 90% of all infants
 - ANC visits of 3 or more per pregnancy

TRENDS

- Comparison over time
 - Changing patterns of population health
 - Use to improve services

EPIDEMIOLOGICAL THINKING

Measure	Definition	Examples		
		Numerator	Denominator	Standard
Proportion	Numerator divided by denominator	# girls	# pupils	1
Rate	Numerator is part of the denominator	# children attending	Total people attending	100 (%)
		# cases diarrhoea <5 yrs	Population of children <5 yrs	1,000 (per mille)
		# of new cases of TB in one year	Total population	100,000
Ratio	Numerator and denominator are NOT the same	Total headcount in month	Total # of days workload by all nurses	1 day
		Maternal deaths	Live births	100,000 (births)

Figure 41: Definitions and examples of proportions, rates and ratios

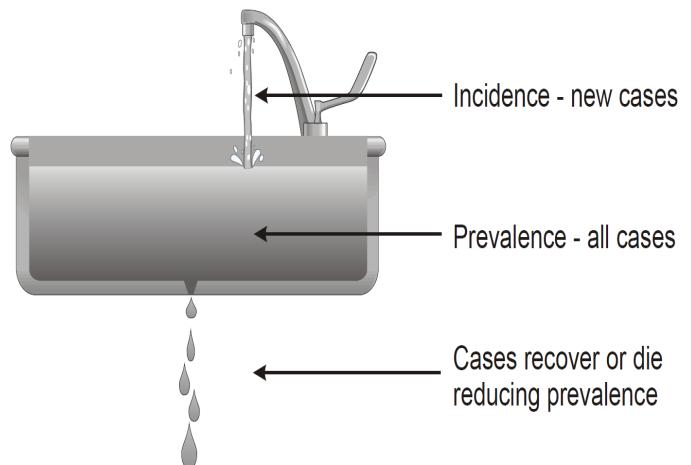
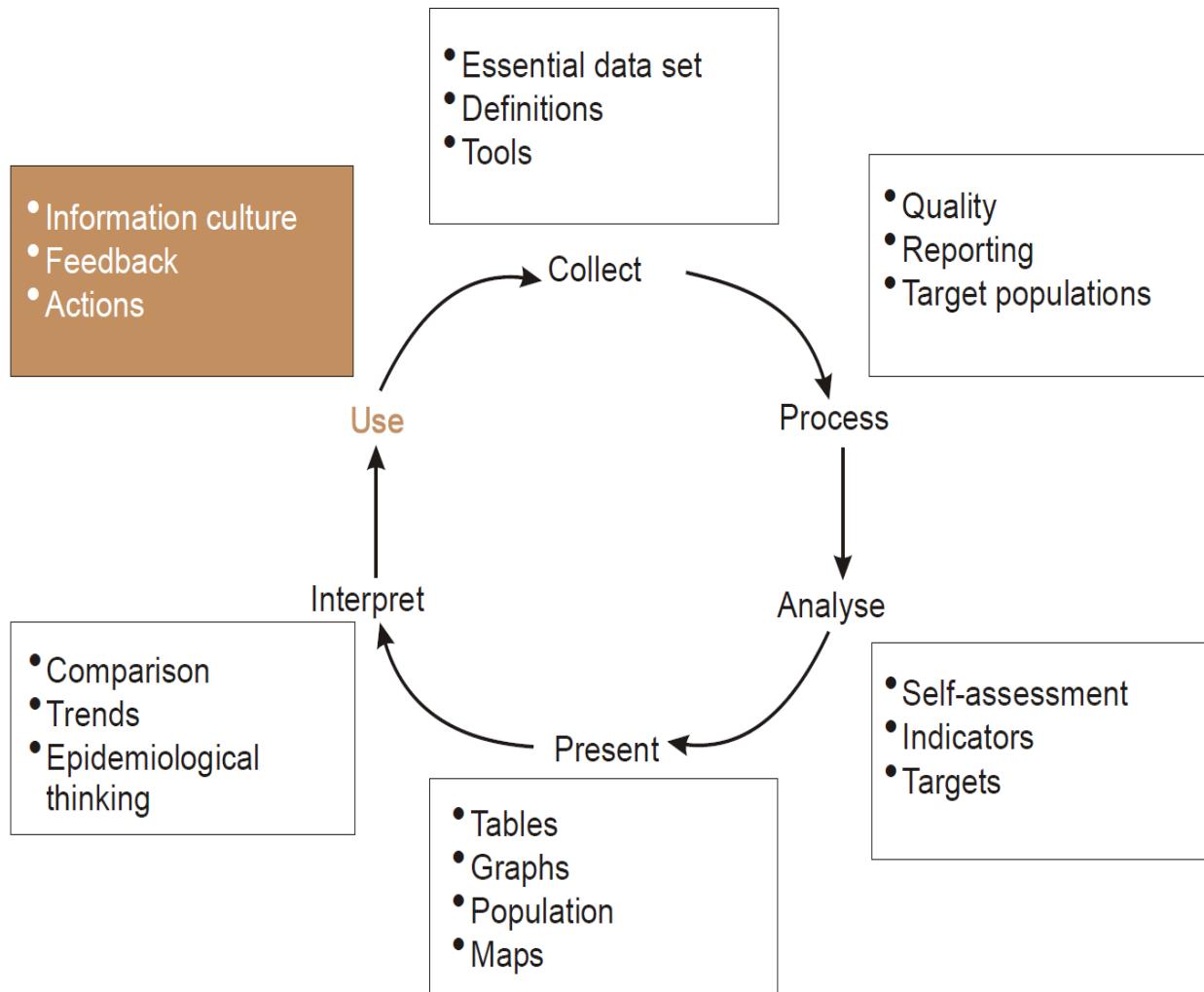


Figure 42: Schematic presentation of incidence and prevalence

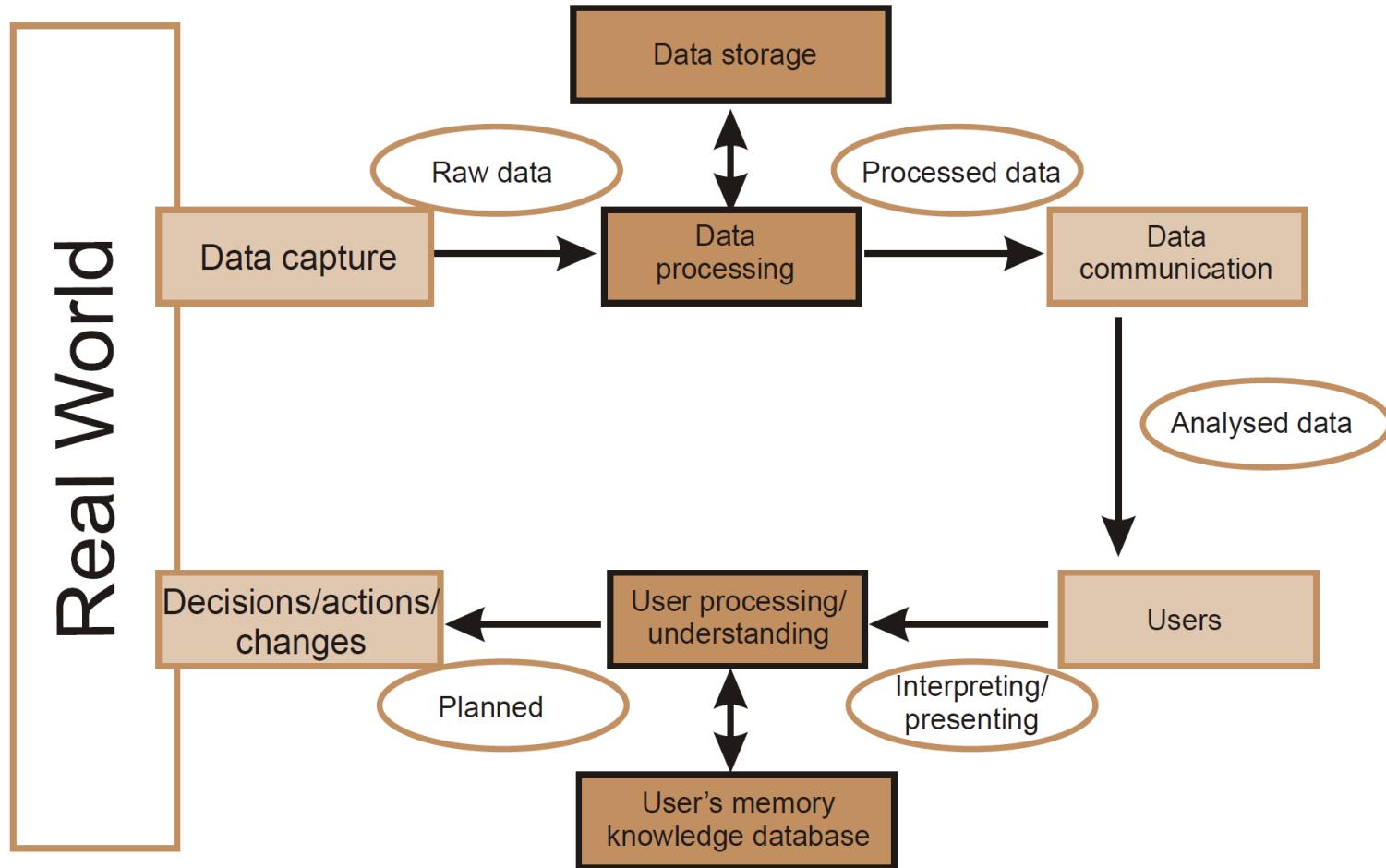
The Information Cycle



INFORMATION CULTURE, FEEDBACK, ACTIONS

- Information culture
 - Decisions based on information
 - Timeliness of information to inform decisions
- Feedback
 - Written (monthly and quarterly reports)
 - Verbal
 - Staff meetings
 - Community and other sectors
- Actions

MANAGEMENT INFORMATION CYCLE



MANAGING THE INFORMATION SYSTEM

- Information teams
- Information audit
- Set objectives, indicators and targets
- Strengthen information systems and structure
- Develop staff skills and understanding
- Create a district information culture

INFORMATION TEAMS

- **Facility information co-ordinator**
 - Ensure staff understand importance of information and are collecting accurately
 - Collect and collate monthly
 - Enter and prepare reports, provide feedback
- **Programme teams**
 - Actively involved in the programme
 - Important in understanding the data
- **Facility teams**
 - Joint presentation by all programme heads
- **Area teams**
 - Sharing information between facilities
- **District information team**
 - Monthly meetings of the facility reps and DHMT

INFORMATION AUDIT

- All data collected in the facility
 - Who
 - What
 - When
 - Where
 - Why
 - How

OBJECTIVES INDICATORS TARGETS

- Very important for each facility and programme
- Monitor progress
- Use common definitions
- Use indicators effectively

STRENGTHEN SYSTEMS AND STRUCTURES

- Important for feedback and routine reporting

STAFF SKILLS

- In-service training
 - Formal vs informal
 - In-depth
- Meetings
 - Sensitisation workshops
 - Repeated emphasis at all meetings

DISTRICT INFORMATION CULTURE

- Use data regularly at meetings
- Dissemination to the community
- Staff use collect and use indicators in work

LEARNING OUTCOMES

- Be able to define a health information system
- Be able to explain the information cycle
- Be able to explain the tools needed for effect use of health information
- Be able to describe the management of health information

REFERENCES

- The Equity Project. **Using information for action – A manual for health workers at facility level.** [Online].
- Jon E Rohde, Vincent Shaw, Calle Hedberg, Norah Stoops, Sonja Venter, Kobie Venter, Langa Matshisi (2008) Information for Primary Health Care. Chapter 13 **In South African Health Review 2008.** Health Systems Trust. [Online] Available from:
http://www.hst.org.za/uploads/files/chap13_08.pdf