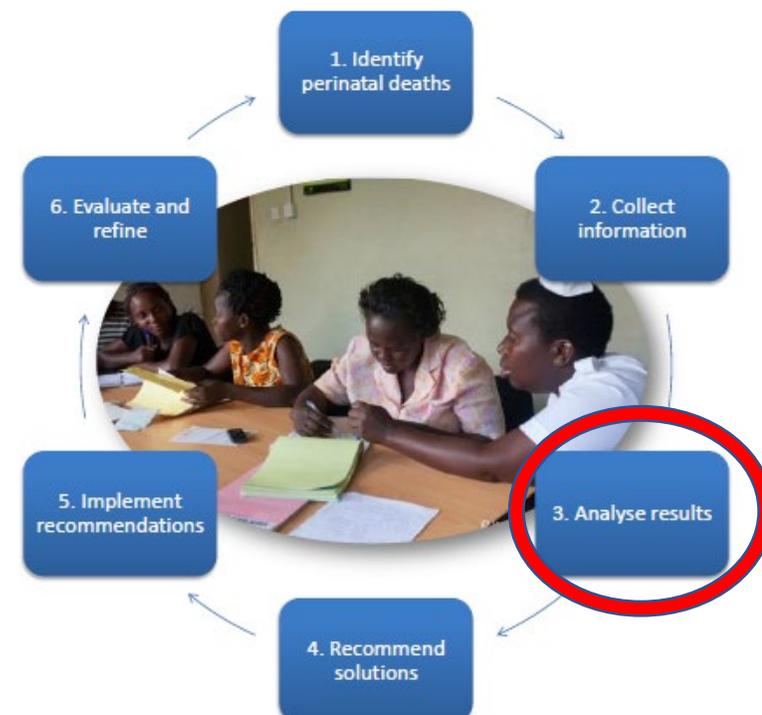


# Monitoring and Analysing Perinatal Data

Day Two Session Three

# Session Objectives

- Learn how to calculate, analyze perinatal mortality indicators
- Practice monitoring and analyzing trends in perinatal death audits at the facility level
- Learn how to identify and classify modifiable factors

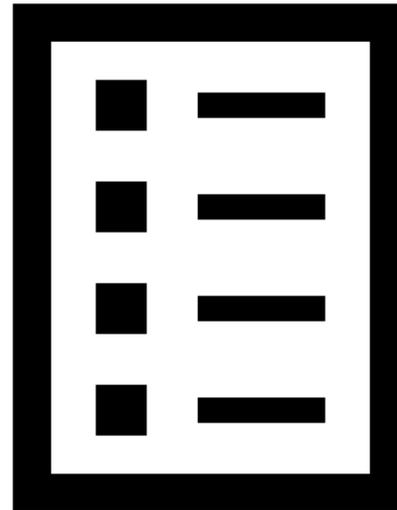


# Minimum Perinatal Data

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The Every Newborn action Plan specifies a minimum set of six essential pieces of information to collect on each birth and death

1. Maternal age
2. Place of delivery
3. Mode of delivery
4. Birth weight
5. Gestational age
6. Birth outcomes



# Suggested Indicators for Review

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- Numbers of normal vaginal, assisted and caesarean deliveries;
- Numbers of maternal deaths
- Numbers of antepartum (or macerated), intrapartum (or fresh) stillbirths
- Number of early neonatal deaths
- Neonatal mortality rates.
- The number of major complications during labour and birth,
- Indications for caesarean section
- Others can be added as per national context for example: birth weight, gestational age, PSBI rates

# Data Analysis- 1

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- Helpful to have an analysis plan for collected perinatal data
- **Goal:** To identify problems that may contribute to stillbirths and neonatal deaths, especially those that could have been prevented modified
- **Use both quantitative and qualitative methods** for data collection
  - Case notes are often limited so interviews will be helpful
  - Provides a comprehensive view
  - Help the review committee identify priorities for action

# Data Analysis- 2

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- **Qualitative and quantitative research methods:** Provides a more comprehensive picture
- **Quantitative:** Geographic location, maternal risk factors, which babies at highest risk, identify trends in mortality rates and medical causes of deaths
- **Qualitative:** contributing factors, barriers to care, insights into context of causes of perinatal deaths. For example:
  - Did the baby die because no one realized how sick the baby was or because the health centre was too far away?
  - Were the right medicines not administered or were they unavailable?

# Data analysis- 3

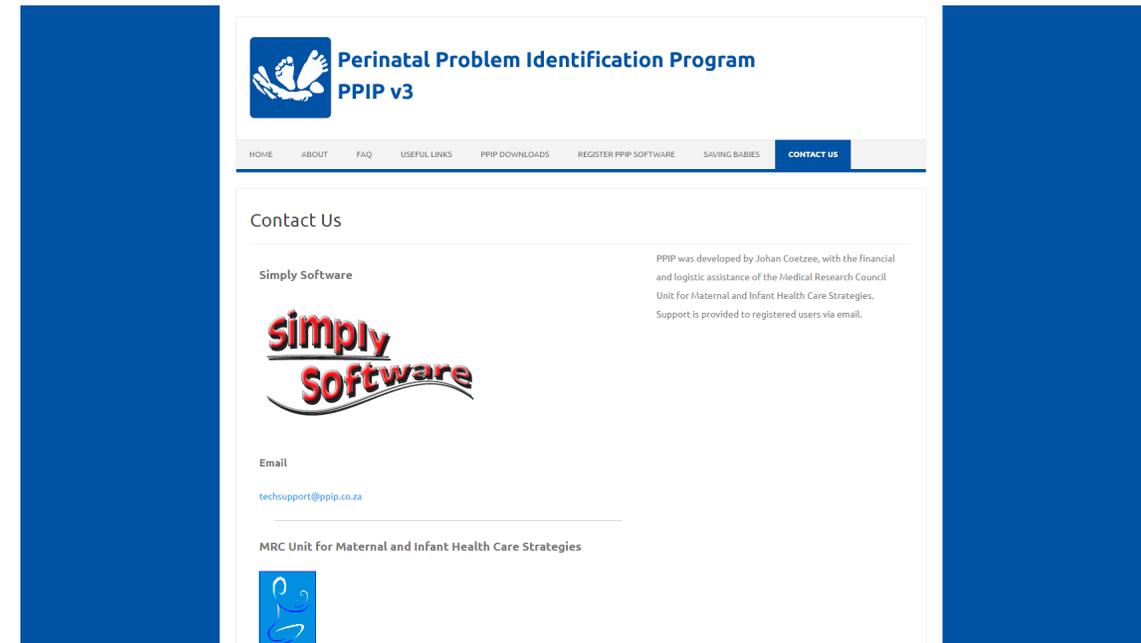
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- **Summary statistics** can be compared against the expected numbers of stillbirths and neonatal deaths
- **Distribution of births and deaths** by their place of occurrence (home, hospital- public or private sector, level or type of hospital)
- **Trends over time**
- **Seasonality of deaths**
- **Clustering of deaths** (at night; week ends; times of holidays; timing of nurse rotation)
- **Geospatial analysis** - access (roads, rivers etc. ) and socio-demographic factors

# Perinatal Problem Identification program (PPIP)

## How does PPIP work in South Africa?

- Clinician driven
- All deaths discussed at review meetings
- Data entered into PPIP software electronically
- Open source software.
- Denominator uses district/geographical specific area information (rates per region and per hospital)
- >85% of total births in South Africa analyzed in PPIP
- Further details @ [www.ppip.co.za](http://www.ppip.co.za)



# PPIP has an Easy interface to build a health pyramid

The screenshot displays the PPIP v3.0 software interface, titled "Analyse Data: SOUTH AFRICA". The main window features a menu bar (File, Manage Data, Analyse Data, Tools, Window, Help) and a toolbar with various icons. A "Data Pyramid Setup" dialog box is open, guiding the user through two steps:

**Step 1: Select the Data Pyramid you want to work with**

Pyramid name	Description
1 SOUTH AFRICA	SA LOC
2 SOUTH AFRICA	by district and province
EKURHULENI	Ekurhuleni District
ESHOWE HOSPITAL	MY HOSPITAL DATA

**Step 2: Use the buttons between the lists to move available Data Sets into and out of the data pyramid, and to change the position of the Data Sets in the data pyramid**

The dialog box contains two lists and a central control panel:

- Data pyramid structure (Left):** A tree view showing the hierarchy of the selected data pyramid. The root is "SOUTH AFRICA", which contains a sub-item "CHC". Under "CHC", there is a list of various health facilities, including Agincourt CHC, Alexandra Community Centre, All Tswaing Clinics, Allemansdrift CHC, Amsterdam CHC, Badplaas CHC, Baziya Health Centre, Beaconsfield Clinic, Bekkersdal West MOU, Bhuga CHC, Bishop Lavis MOU, Boipatong MOU, Botshabelo PHC, Buffelspruit CHC, Bungeni Health Center, Burgersfort CHC, Cassels CHC, Cato Manor CHC MOU, Central MOU [Sandford], Chiawelo MOU, Daggakraal CHC, and Damani clinic.
- Data Sets (Right):** A list of available data sets that can be added to the pyramid. The list includes: George GSA, Ngaka Modiri Molema District, NORTHERN CAPE, S.S. Gida Hospital, Aberdeen Provincial Aided Hospital, Alfred Nzo, Alfred Nzo District, Alfred Nzo Health District, Amajuba, Amathole, Amathole District, B.J.Vorster Hospital, Bill Pickard Prieska Hospital, Bismark Clinic, BJ Kempen, BJ Voster Hospital, Bloemhof Christiana Hospital, Bodibe 1, Bodibe 1 clinic, Boekenhout, and Boitekoppie Clinic.
- Control Panel (Center):** A set of buttons for managing the data sets within the pyramid structure. The buttons include: "Add to highest level", "Add as branch below selected Data Set", "Remove Data Set from data pyramid", "Remove complete branch from data pyramid", "Move Up", "Move Down", "Cut", "Cancel Cut", "Paste to highest level", and "Paste as branch below selected Data Set".

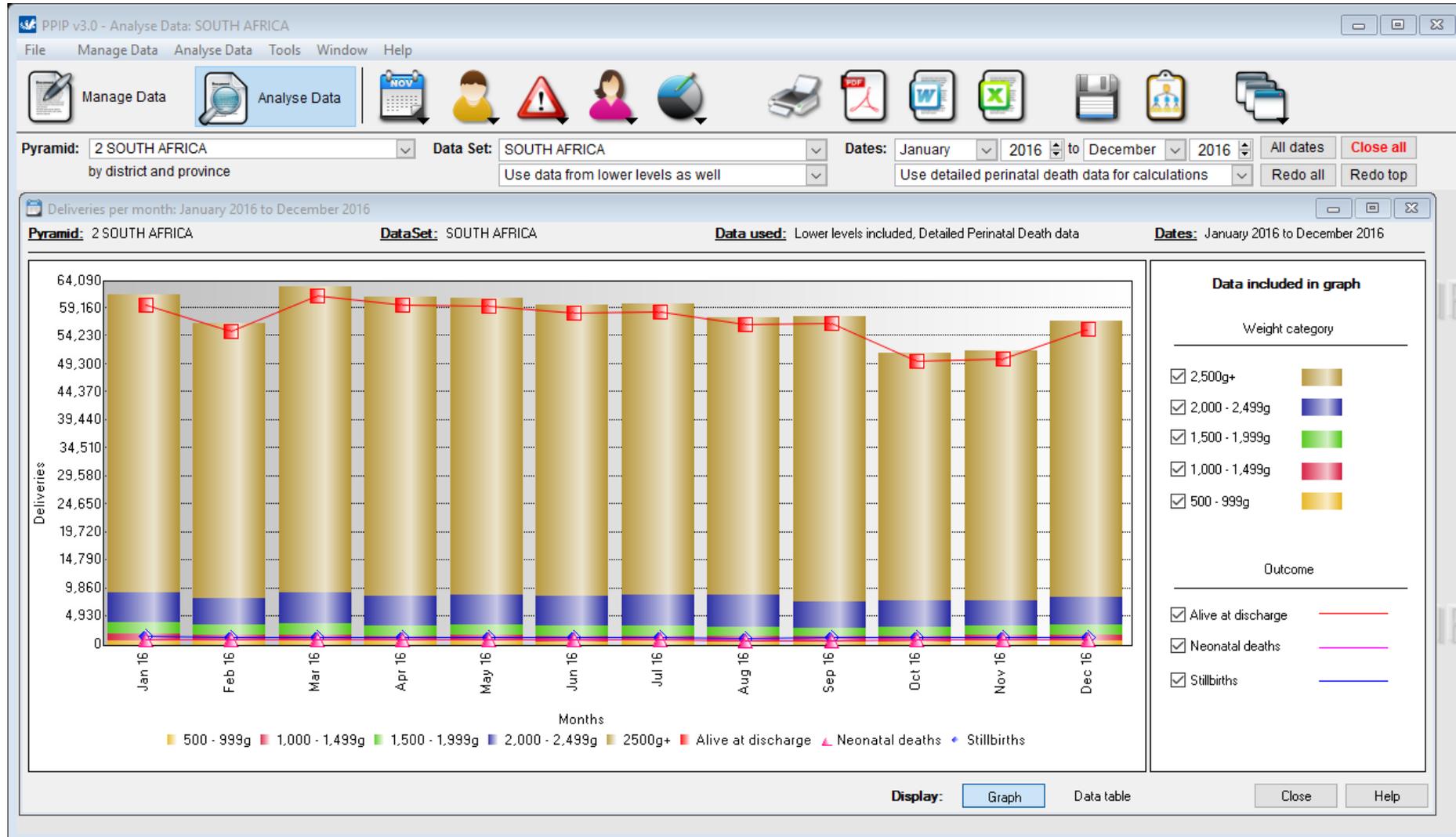
At the bottom of the dialog box, there are checkboxes for "Display: All", "Rural", "Periurban", and "Urban", and a dropdown menu set to "All levels of care". Buttons for "Manage Data Sets", "Close", and "Help" are also present.

# PPIP Example of results

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- Can be visualized in tables or graphs within PPIP
- Or exported as PDF, Word or Excel files
- Raw data can be exported in Excel
- Generate reports from templates

# Example: Total deliveries per weight category



# Example: Mortality rates in SA

PPIP v3.0 - Analyse Data: SOUTH AFRICA

File Manage Data Analyse Data Tools Window Help

Manage Data Analyse Data

Pyramid: 2 SOUTH AFRICA by district and province Data Set: SOUTH AFRICA Use data from lower levels as well Dates: January 2016 to December 2016 All dates Close all Use detailed perinatal death data for calculations Redo all Redo top

Perinatal care indicators: January 2016 to December 2016

Pyramid: 2 SOUTH AFRICA DataSet: SOUTH AFRICA Data used: Lower levels included, Detailed Perinatal Death data Dates: January 2016 to December 2016

	Perinatal Mortality Rate	Neonatal Mortality Rate	Early Neonatal Mortality Rate	Late Neonatal Mortality Rate	Stillbirth Rate
<b>All deliveries</b>	28.4 / 1,000	11.4 / 1,000	9.8 / 1,000	1.6 / 1,000	18.8 / 1,000
<b>All 1,000g+</b>	20.3 / 1,000	7.7 / 1,000	6.5 / 1,000	1.2 / 1,000	13.9 / 1,000
<b>500 - 999g</b>	663.5 / 1,000	491.2 / 1,000	438.3 / 1,000	52.9 / 1,000	401.0 / 1,000
<b>1,000 - 1,499g</b>	308.2 / 1,000	176.2 / 1,000	135.5 / 1,000	40.7 / 1,000	199.7 / 1,000
<b>1,500 - 1,999g</b>	132.4 / 1,000	41.3 / 1,000	34.7 / 1,000	6.7 / 1,000	101.3 / 1,000
<b>2,000 - 2,499g</b>	39.7 / 1,000	11.4 / 1,000	9.8 / 1,000	1.6 / 1,000	30.1 / 1,000
<b>2,500g+</b>	8.5 / 1,000	3.4 / 1,000	3.1 / 1,000	0.3 / 1,000	5.3 / 1,000
<b>Multiple pregnancies</b>	85.3 / 1,000	55.6 / 1,000	47.6 / 1,000	8.0 / 1,000	39.6 / 1,000

**Selected birth weight categories**

500 - 999g Perinatal Mortality Rate: 0.0 / 1,000

1,000 - 1,499g Neonatal Mortality Rate: 0.0 / 1,000

1,500 - 1,999g Early Neonatal Mortality Rate: 0.0 / 1,000

2,000 - 2,499g Late Neonatal Mortality Rate: 0.0 / 1,000

2,500g+ Stillbirth Rate: 0.0 / 1,000

Stillbirth / Neonatal death ratio:

**Other indicators**

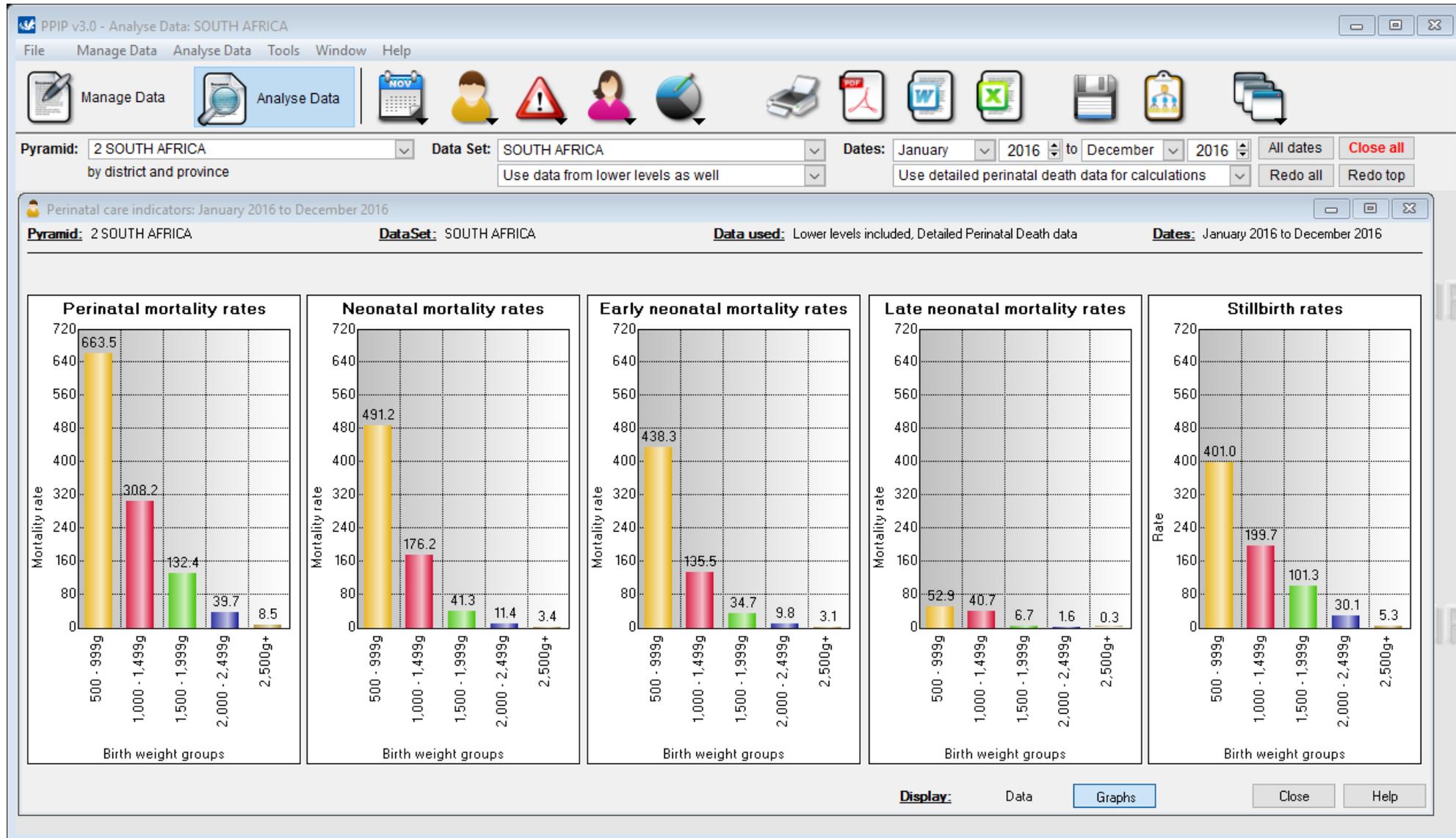
Stillbirth / Neonatal death ratio - all birth weights: 1.7 : 1

Perinatal Care Index - all birth weights: 1.94

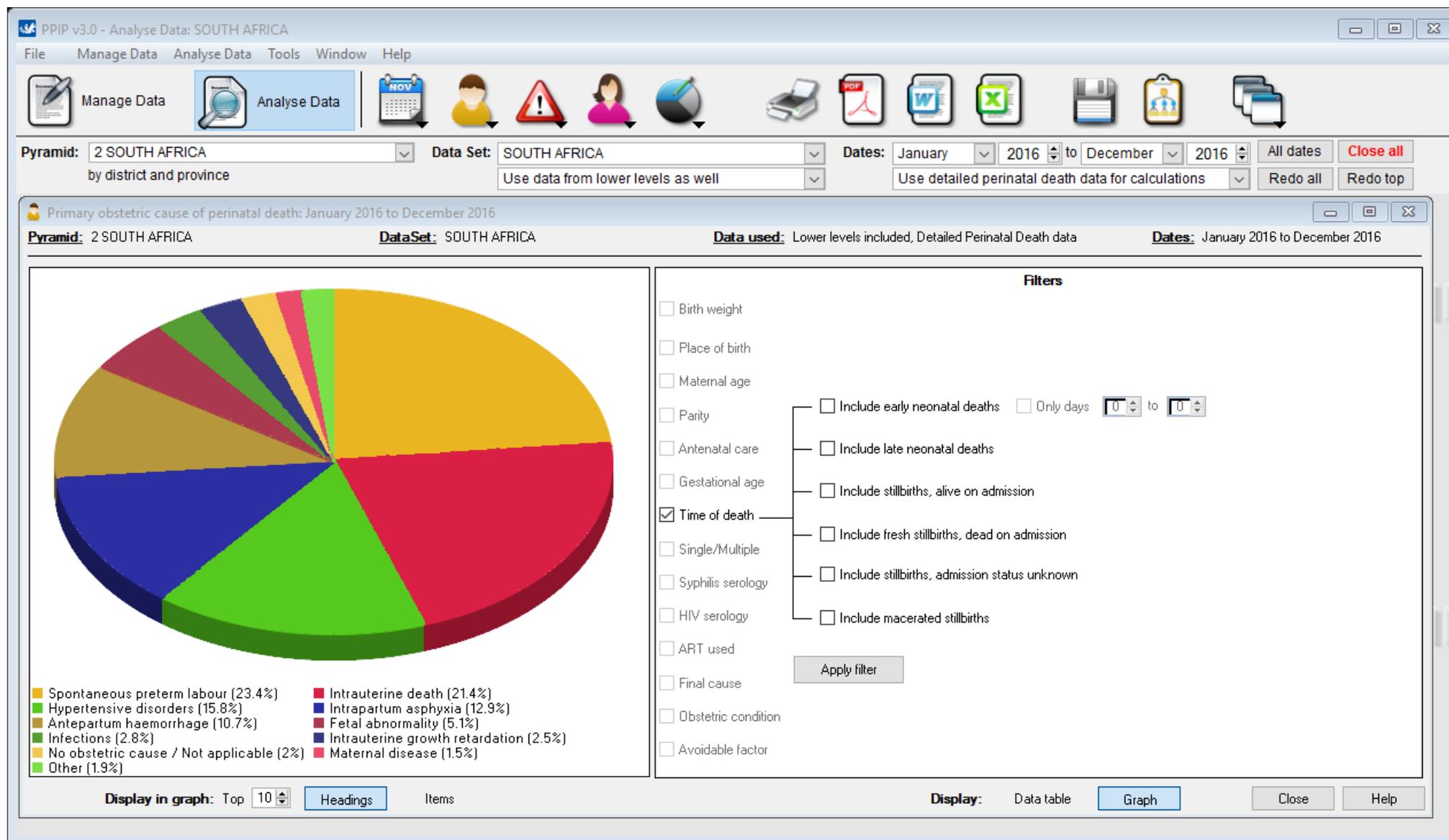
Perinatal Care Index - 1,000g+: 1.50

Display: Data Graphs Close Help

# Example: Mortality rates- graphic



# Example: Primary obstetric cause of deaths



# Example: Modifiable factors

PPIP v3.0 - Analyse Data: SOUTH AFRICA

File Manage Data Analyse Data Tools Window Help

Manage Data Analyse Data

Pyramid: 2 SOUTH AFRICA by district and province Data Set: SOUTH AFRICA Use data from lower levels as well Dates: January 2016 to December 2016 All dates Close all Redo all Redo top

Use detailed perinatal death data for calculations

Avoidable factors identified: January 2016 to December 2016

Pyramid: 2 SOUTH AFRICA DataSet: SOUTH AFRICA Data used: Lower levels included, Detailed Perinatal Death data Dates: January 2016 to December 2016

Description	Number	Percentage	
		of group	of total
<b>Patient associated</b>	<b>15,158</b>		<b>54.7</b>
Inappropriate response to poor fetal movements	3,944	26.0	14.2
Booked late in pregnancy	2,667	17.6	9.6
Never initiated antenatal care	2,599	17.1	9.4
Delay in seeking medical attention during labour	2,350	15.5	8.5
Failed to return on the prescribed date	620	4.1	2.2
Other patient associated factors	529	3.5	1.9
Infrequent visits to antenatal clinic	528	3.5	1.9
Inappropriate response to antepartum haemorrhage	482	3.2	1.7
Smoking	351	2.3	1.3
Inappropriate response to rupture of membranes	222	1.5	0.8
Declines admission/treatment for personal/social reasons	211	1.4	0.8
Alcohol abuse	209	1.4	0.8
Attempted termination of pregnancy	146	1.0	0.5
Delay in seeking help when baby ill	134	0.9	0.5
Illegal drug use	103	0.7	0.4
Partner/Family declines admission/treatment	26	0.2	0.1
Assault	22	0.1	0.1
Abandoned baby	9	0.1	
Infanticide	6		
<b>Medical personnel associated</b>	<b>8,280</b>		<b>29.9</b>
No response to maternal hypertension	676	8.2	2.4
Other medical personnel associated factors	568	6.9	2.0
Delay in referring patient for secondary/tertiary treatment	558	6.7	2.0
Fetal distress not detected intrapartum; fetus monitored	454	5.5	1.6
Nosocomial infection	415	5.0	1.5
Incorrect management of hypertensive disease	364	4.4	1.3
Antenatal steroids not given	357	4.3	1.3
Physical examination of patient at clinic incomplete	325	3.9	1.2
Delay in medical personnel calling for expert assistance	265	3.2	1.0

Total deaths: Unfiltered: 20,991 Filtered:

Filters

- Birth weight
- Place of birth
- Maternal age
- Parity
- Antenatal care
- Gestational age
- Time of death
- Single/Multiple
- Syphilis serology
- HIV serology
- ART used
- Primary cause
- Final cause
- Obstetric condition

Include in table: % of Codes Headings Items All grades

Display: Data table Graph Close Help

# Indicators Definitions

Indicator	Numerator	Denominator	Unit
Stillbirth rate	number of stillbirths	Total births (stillbirths +livebirths)	1000
Percentage of stillbirths that are antepartum	Number of ante-partum stillbirths	Total number of stillbirths	100
Early neonatal mortality rate	Early neonatal deaths (1-7 days)	Number of live births	1000
Perinatal mortality rate	Number of stillbirths +early neonatal deaths (1-7 days)	Total births (stillbirths +livebirths)	1000
Neonatal Mortality Rate	Neonatal deaths (1-28 days)	number of live births	1000

# Indicators Definitions-2

Indicator	Numerator	Denominator	Unit
Maternal mortality ratio	Maternal deaths	Number of live births	100,000
Caesarean section rate (all births)	Number of caesarean section deliveries	Total births (stillbirths +livebirths)	100
assisted deliveries rate (all births)	Number of assisted deliveries	Total births (stillbirths +livebirths)	100
Low birth weight rate	Number of babies being born weighing < 2500 grams	Number of live births	1000
Preterm rate (live births)	Number of babies born before 37 weeks gestational age	Number of livebirths	100

# Identifying and classifying modifiable factors-1

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- **Modifiable factor is something that may have prevented the death if a different course of action had been taken**
- Can be missed opportunities within the health system
- They represent potential for positive change
- Documenting and analyze these modifiable factors
- Highlight critical delays and modifiable factors, that can be targeted with appropriate interventions

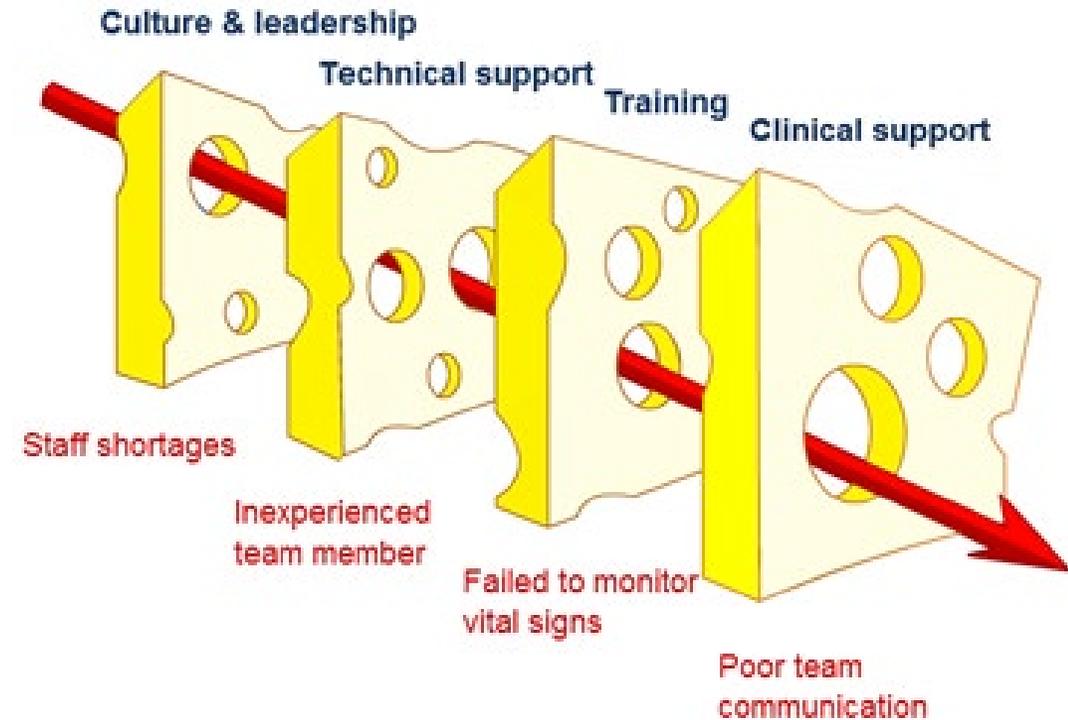
# Identifying and classifying modifiable factors-2

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- **What could actually be done to prevent a critical delay or avoidable factor?**
- Discussed in terms of delays in care and in levels of system failure.
- Many ways to identify modifiable factors
- Often analysed using a root cause analysis
- Fishbone diagrams (different levels of the health system, health system building blocks, People, Place, procedure, policy and NHS template )

# The Swiss Cheese Model

- Constant tension of defenses versus failures
- What is our standard care and did we achieve that?
- Latent failures versus active failures
- Was our case based on national guidelines?
- Resist jumping to conclusions?
- Question how things are supposed to work versus how they actually worked?
- Reveal vulnerabilities



Ref: Reason JT (1990)

# Three delays model

## Delay 1: Delay in the decision to seek care.

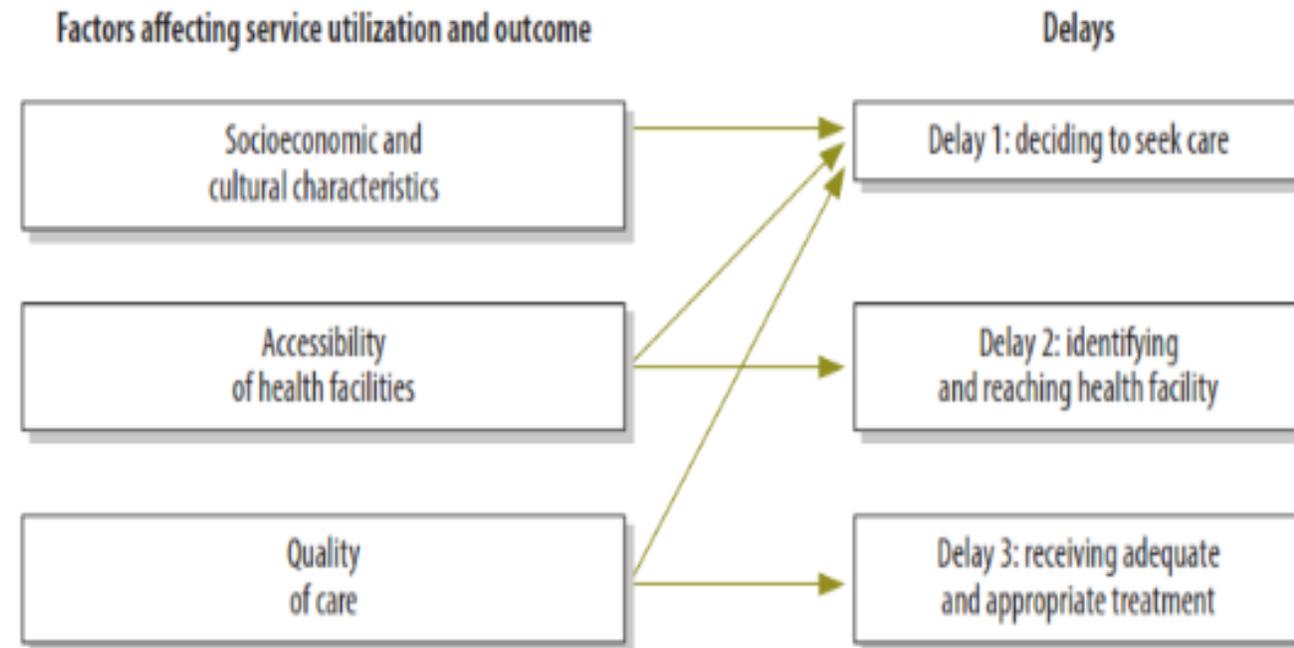
- For e.g.: a woman may labour at home for too long because she and/or her family are afraid to come for care, are concerned about the cost of care, or do not recognize developing problems.

## Delay 2: Delay in reaching care.

- For e.g.: a labouring woman may not be able to find or afford expedient transportation to a health-care facility.

## Delay 3: Delay in receiving adequate care.

- For e.g.: a labouring woman may arrive at a hospital without any clinicians available to provide care to her, or transfer between lower and higher-level facilities may take too long to provide effective care and prevent stillbirth.



# Patient–Provider–System Model

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## Family level:

- Did the family of a victim of neonatal death not understand when to seek care for their infant? Should families in their community be targeted with an educational campaign or provided with resources to help them get to care sooner?

## System level:

- Was transfer between lower- and higher-level facilities inhibited by administrative barriers? Was there a stock-out of any needed medicines or equipment?

## Provider level:

- Was a health-care provider unable to give adequate resuscitation? Are there needs for additional training or resources for providers?

# Examples: Patient–Provider–System model

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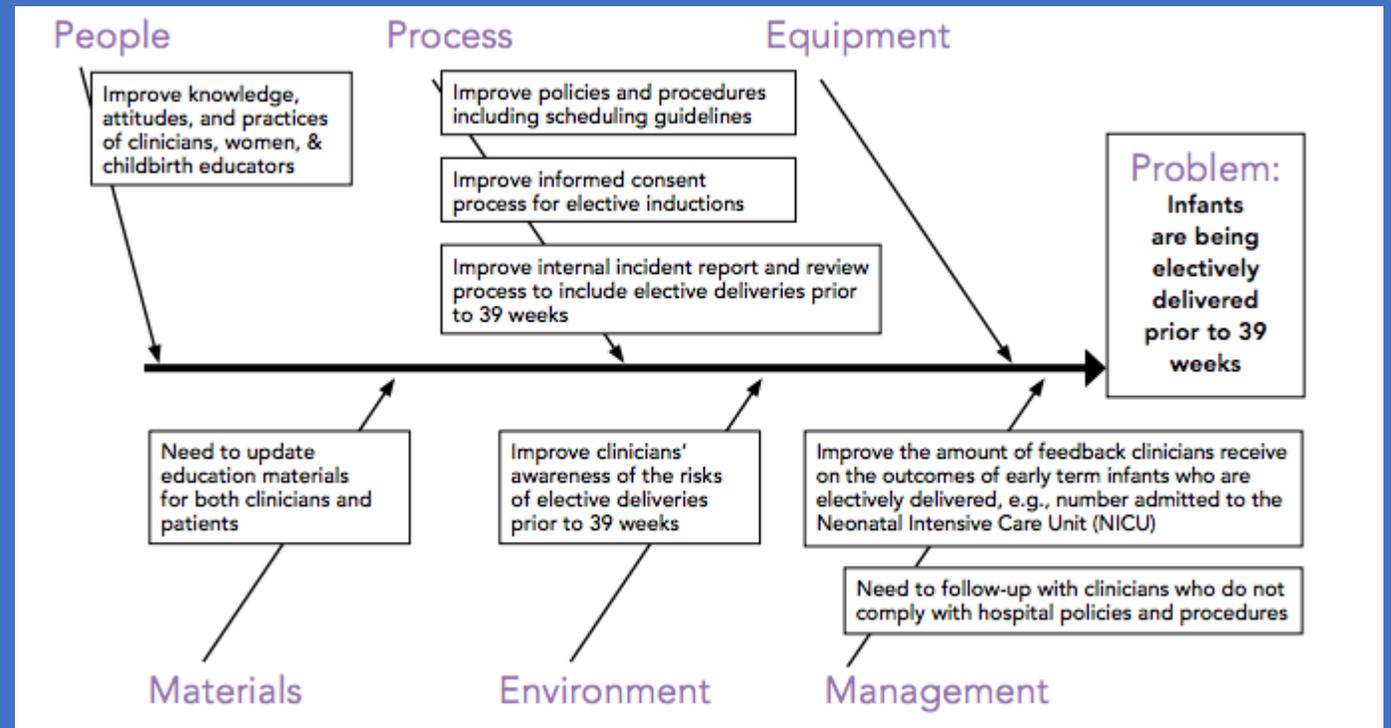
If a baby dies of congenital syphilis, and the mother did not attend antenatal care, then the modifiable factor would most likely have been related to family- or **patient level factors**

However, if the mother attended the antenatal clinic but the health worker failed to screen her for syphilis or failed to collect the result and treat her, then the avoidable factor would have been **provider-related**

Finally, if the mother attended antenatal clinic, and the health worker wanted to screen her for syphilis but either transport or the facilities to perform the test were not available, then the modifiable factor would have been **system-related**

# Root cause analysis

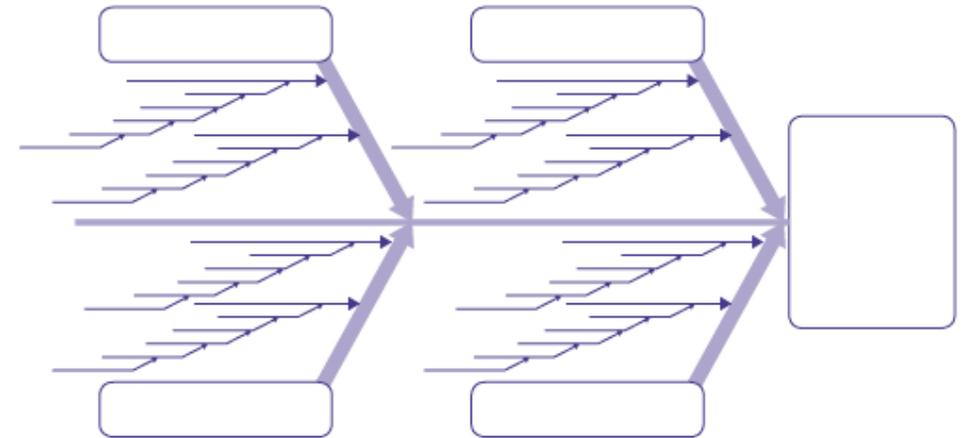
- Define the event
- Identify contributing factors
- Consider each contributing factor
- If contributing factor large or too complex sub-categories are needed
- Create an action plan



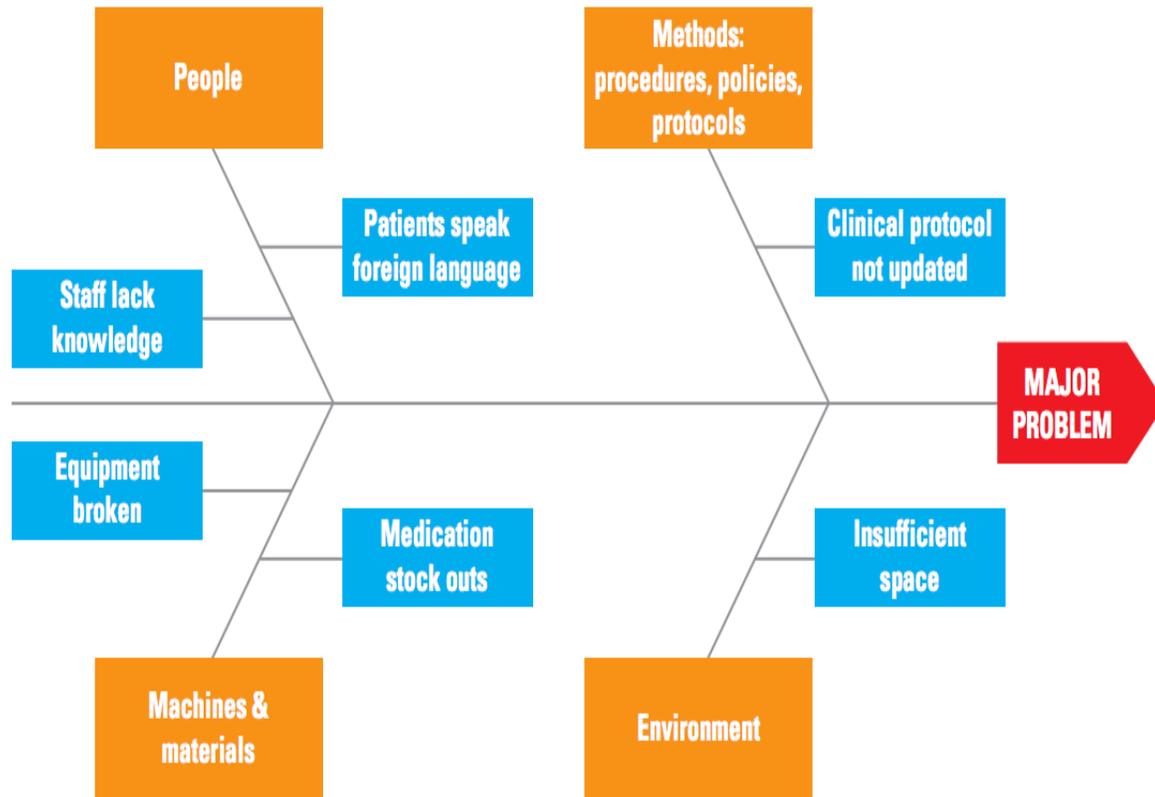
# Root Cause Analysis: Fishbone Diagram

Follow these steps:

1. Record the event at the head
2. Brainstorm contributing factors
3. Record the contributing factors at the end of the bones in a box
4. Brainstorm contributing causes within each contributing factor
5. Record contributing causes on the veins
6. Brainstorm contributing sub-causes on the sub-veins (break down larger contributory causes into sub-causes)
7. Create action targets and develop actionable solutions (circle factors are within their sphere of influence-action targets)
8. Create action spears (who, what, when action)

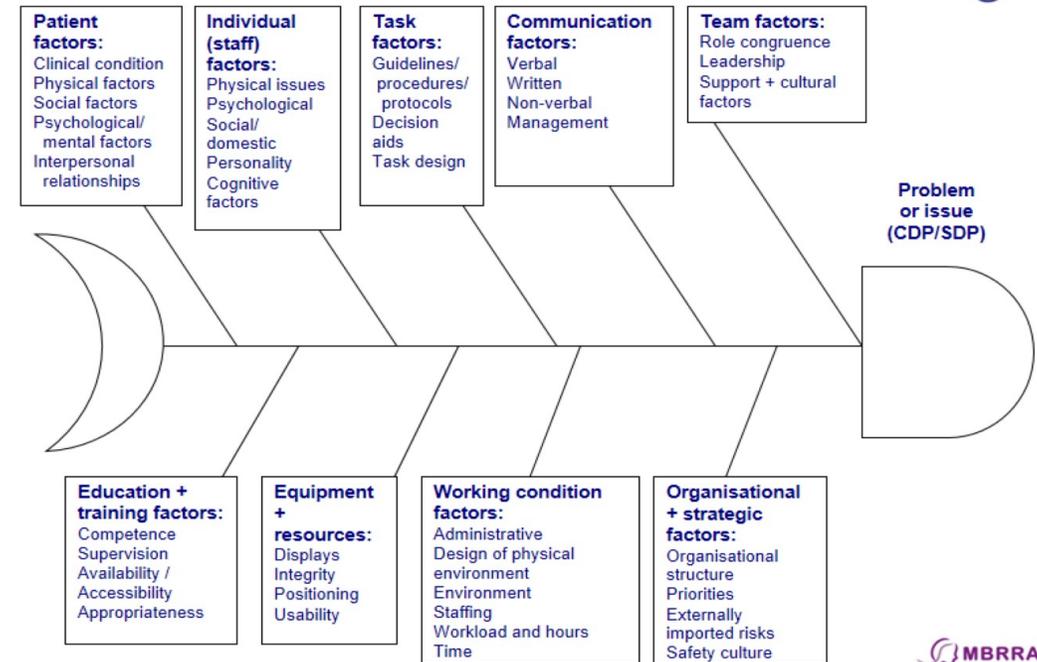


# Examples: Fishbone Diagrams



## Fish Bone – Identify Contributory Factors

NHS National Patient Safety Agency



Also available in a grid format: <http://www.nrls.npsa.nhs.uk/resources/?entryid45=75605>



# 5 “Why’s” Approach

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Simple brainstorming approach that can help QI teams identify the root cause(s) of a problem

Once a general problem has been recognized, use the Fishbone Diagram to ask ‘why’ questions to drill down to the root causes

Allows teams to move beyond obvious answers and reflect on less obvious explanations

For example: A woman undergoing a caesarean-section did not receive antibiotic prophylaxis

- **WHY?** The antibiotic was not available in the theatre
- **WHY?** The physician did not write a prescription
- **WHY?** The physician was unaware of the current protocol
- **WHY?** The physician was new and had not been oriented to the clinical protocols
- **WHY?** The facility does not have an orientation programme for new physicians

# Dummy Data for Group Work

		Numbers
A	Number of deliveries	1000
B	Number of live births	880
C	Number of stillbirths	20
D	Number of intrapartum stillbirths	12
E	Number of antepartum stillbirths	8
F	Early neonatal deaths (0–7 days)	14
G	Neonatal deaths (0–28 days)	18
H	Maternal deaths	2
I	Number of caesarean section deliveries	150
J	Number of assisted deliveries	100
K	Number of babies born weighing < 2500 g	200
L	Number of babies born < 37 weeks gestational age	140

# Group work

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Please calculate the following

1. Stillbirth rate
2. Percentage of antepartum stillbirths
3. Early neonatal mortality rate
4. Perinatal mortality rate
5. Neonatal mortality rate
6. Maternal mortality ratio
7. Caesarean section rate (for all births)
8. Assisted delivery rate (for all births)
9. Low birth weight (live births)
10. Preterm rate (live births)

# Answer key- Group work

Stillbirth rate	$(C/A)*1000$	20.0
Percentage of stillbirths that are antepartum	$(D/C)*100$	60%
Early neonatal mortality rate	$(F/B)*1000$	15.9
Perinatal mortality rate	$((C+F)/A)*1000$	34.0
Neonatal mortality rate	$(G/B)*1000$	20.5
Maternal mortality ratio	$(H/B)*100,000$	227.3
Caesarean section rate (all births)	$(I/A)*100$	15%
Assisted delivery rate (all births)	$(J/A)*100$	10%
Low birth weight rate (live births)	$(K/B)*1000$	23%
Preterm rate (live births)	$(L/B)*100$	16%