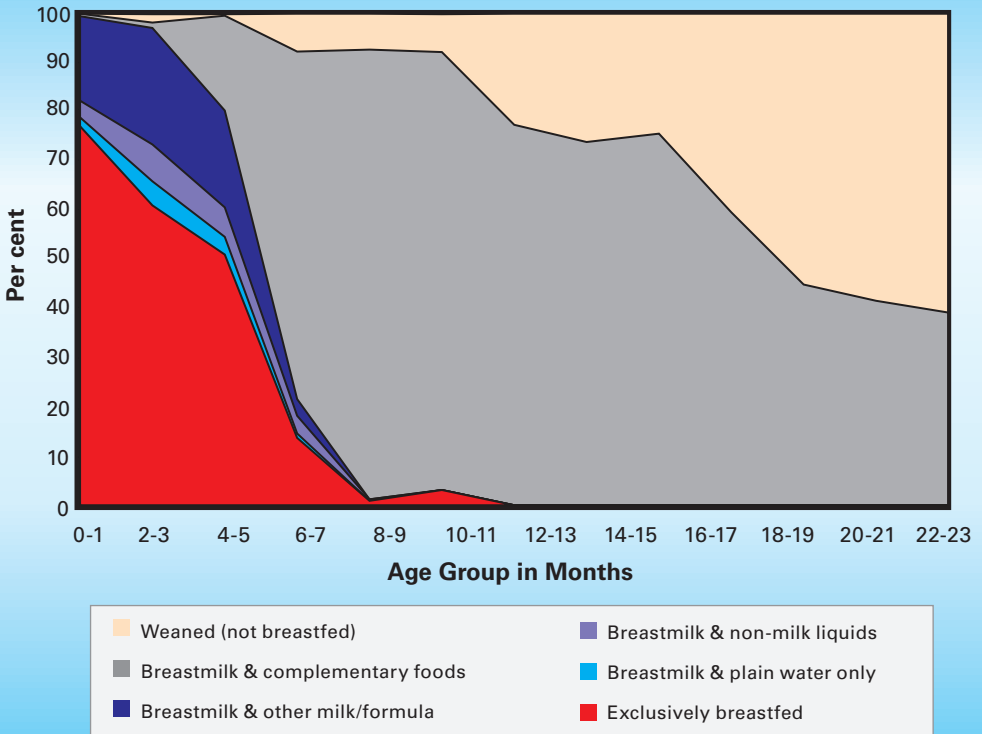


INTRODUCTION TO INTERPRETING AREA GRAPHS

For Infant and Young Child Feeding

Breastfeeding Practices by Age, Peru, 2004-2006



Source: DHS 2006

April 2010

This document was prepared by Nutrition Section with inputs from the Statistics and Monitoring Section, Division of Policy and Practice.

Introduction to Interpreting Area Graphs for Infant and Young Child Feeding

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1. INTRODUCTION

Optimal breastfeeding of children has the greatest potential impact on child survival of all preventive interventions - it could prevent 1.4 million deaths in children under five in the developing world annually.¹ Breastfed children have at least a six times greater chance of survival in the early months than non-breastfed children. Breastfeeding drastically reduces deaths from acute respiratory infection and diarrhoea, two major child killers, as well as from other infectious diseases. As current Infant and Young Child Feeding (IYCF) patterns remain far from recommended levels², their potential to improve child survival remains untapped. Optimal infant feeding, defined by WHO and UNICEF, is presented in the Global Strategy for Infant and Young Child Feeding as follows:

*“As a global public health recommendation, breastfeeding should be initiated **within the first hour** after birth and infants should be **exclusively breastfed for the first six months of life** to achieve optimal growth, development and health. Thereafter, to meet their evolving nutritional requirements, infants should receive **nutritionally adequate, age appropriate and safe complementary foods while breastfeeding continues for up to two years of age or beyond**. Exclusive breastfeeding from birth is possible except for a few medical conditions, and unrestricted exclusive breastfeeding results in ample milk production.”*

1.1 What is the purpose of this document?

This document is an introduction to area graphs for infant feeding. It was developed to serve as a tool to help organizations, including national authorities, to assess country level IYCF patterns and trends and identify priority areas for action. An area graph offers a visual

¹ Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, Mathers C, Rivera J. Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet*. 2008;371(9608): 243-60.

² UNICEF (2010) State of the World's Children

“photo” of data on breastfeeding and infant feeding practices as captured by the DHS, MICS or other surveys. The visual snapshot of the data will help to highlight the status of infant feeding in a country and how close or far it is from the “ideal”; and what some of the major problems may be. It can be used for advocacy purposes, to support the identification of programmatic priorities and for assessing if special targeted information and education interventions would be appropriate to address some of the major barriers to optimal infant and young child feeding. Area graphs may also provide additional insights for monitoring progress.

1.2 What does this document contain?

The introductory portion of the document contains definitions of the various infant feeding categories, explanations of what the graphs show and the “desirable” and “undesirable” patterns. It contains examples of selected area graphs depicting different feeding patterns of children aged 0 to 23 months and explanations on interpreting the graphs. This is a living document, and your feedback will enhance subsequent editions. Feedback can be sent to the Nutrition Section in New York at the following e-mail address: nutrition@unicef.org

1.3 Where do the data for the area graphs come from?

The data were obtained from standard household surveys (e.g. DHS, MICS, etc.). In these surveys, caregivers were asked what each child under 5 years of age living in their household was fed in the 24 hours prior to being surveyed. Based on the answers provided, the percent of children in a population that were fed in line with each of the feeding categories (Table 1) can be calculated for each age group, and presented in various manners, including as Area Graphs.

1.4 Where can I find area graphs for specific countries?

Area graphs for many countries are available on ChildInfo:
http://www.childinfo.org/patterns_countries.html

If a country's area graph is not on ChildInfo but data from a DHS, MICS or other survey exist, you can easily create the area graph using Excel.

2. INFORMATION CONTAINED IN THE AREA GRAPHS

2.1 What do the feeding categories in the Area Graphs mean?

A total of 6 feeding categories are presented in the Area Graphs. Each of the feeding categories is non-overlapping, that is, each child from the survey is classified into **only one** feeding category. That is why the definitions of the last 4 feeding categories below indicate that some children may have also been given other listed items. Depending on the type (e.g. DHS or MICS) and year of the survey, some graphs only have 5 feeding categories as (1) Breastfed & non-milk liquids and (2) Breastfed & Other Milk/Infant Formula, were combined in some under the category of Breastfed & Liquids Only.

Table 1: Definitions of Feeding Categories

Exclusively breastfed: Includes children that were *only* fed **breastmilk** in the 24 hours prior to being surveyed

Breastfed & plain water only: Includes children that were *only* fed **breastmilk** and **plain water** in the 24 hours prior to being surveyed.

Breastfed & non-milk liquids: Includes children that were fed **breastmilk** and **non milk liquids** (e.g. *juice, herbal tea, sweetened water, flavoured water, etc.*) in the 24 hours prior to being surveyed. *Children in this category may also have been fed plain water (i.e plain water is allowable).*

Breastfed & other milk/infant formula: Includes children that were fed **breastmilk** and **other milk** (e.g. *cow's milk, condensed milk, etc.*) or **infant formula** in the 24 hours prior to being surveyed. *Children in this category may also have been fed plain water and/or non-milk liquids (i.e plain water and non-milk liquids are allowable).*

Breastfed & solid, semi-solid or soft foods: Includes children that were fed **breastmilk** and **solid, semi-solid or soft food made from items such as grains** (e.g. *wheat, maize, rice*), **tubers** (e.g. *cassava, potato, etc.*) **animal products** (e.g. *beef, chicken, fish, eggs, etc.*), etc.) in the 24 hours prior to being surveyed. *Children in this category may also have been fed plain water, non-milk liquids and/or other milks/ infant formula (i.e. plain water, non-milk liquids and/or other milks/ infant formula are allowable).*

Not breastfed: Includes children that were *not* fed breastmilk in the 24 hours prior to being surveyed (i.e. never were or stopped being fed with breastmilk). *Children in this category may also have been fed plain water, non-milk liquids, other milks/infant formula and/or solid, semi-solid and soft foods (i.e. plain water, non-milk liquids, other milks/ infant formula and/or solid, semi-solid and soft foods are allowable).*

Table 2: Summary of items fed in the last 24 hours by feeding category

Feeding Category	Items fed in the last 24 hours					
	Breast milk	Plain Water	Non-Milk Liquids	Other Milk/ Infant Formula	Solid, semi-solid and soft	Vitamins, Minerals, Medicine, ORS
Exclusively Breastfed	Yes	No	No	No	No	Allowable
Breastfed & Plain Water Only	Yes	Yes	No	No	No	Allowable
Breastfed & Non-Milk Liquids	Yes	Allowable	Yes	No	No	Allowable
Breastfed & Other Milk/Infant Formula	Yes	Allowable	Allowable	Yes	No	Allowable
Breastfed & solid, semi-solid and soft foods	Yes	Allowable	Allowable	Allowable	Yes	Allowable
Not breastfed	No	Allowable	Allowable	Allowable	Allowable	Allowable

2.2 What do the graphs show?

The IYCF Area Graphs provide a visual presentation of the overall feeding patterns among children aged 0 to 23 months for a given year in a given country. When data are available for more than one year for a given country, it is possible to assess how the feeding patterns change over time. The x-axis (horizontal) provides the age groups in 2 month intervals and the y-axis (vertical) provides the percentage of children in each feeding pattern. As each child from

the survey is classified into **only one** feeding category, the sum of the percentages for all of the feeding categories at any age interval is 100%. As children age, they shift out of some feeding categories, and move into others. For example, the red area for exclusive breastfeeding is usually greater before 6-7 months than after that age interval, when the grey area for breastfed and solid, semi-solid and soft foods should start to increase. The graph can tell you what feeding categories are highly prevalent at different age groups and which are not. A large area for one colour (feeding category) means that many children fall into that feeding category, a small area that few children were fed in that manner and absence of a colour that no children were fed in that manner at that age interval.

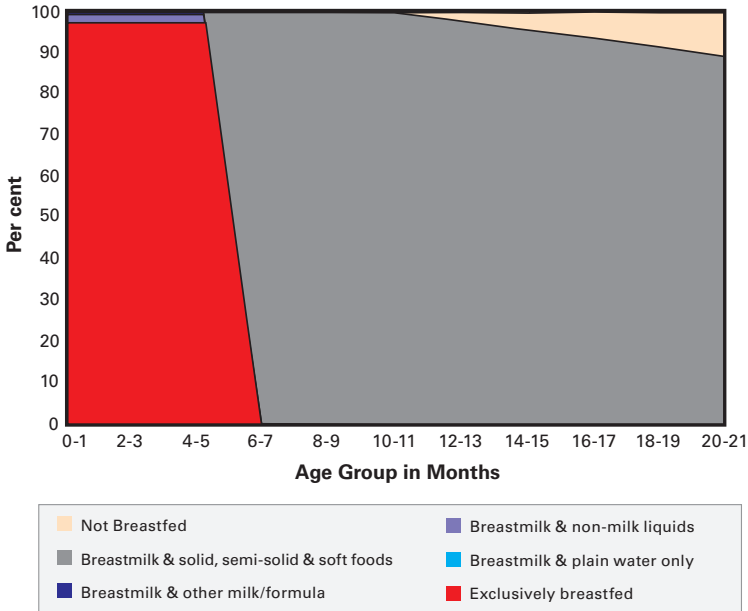
It should be noted that the x-axis of the area graphs represents point estimates for the age intervals indicated. In other words, the line connecting two age groups is artificial: the space between any two age intervals does not represent an age range or any data in particular; it simply is a line between two point estimates and fills the space between estimates for one age group and the next. If more complicated data analysis and graphing methods were used, it would be possible to present continuous feeding patterns rather than point estimates. A more accurate method of presenting these data would be a stacked bar graph with a bar representing each age interval. A stacked bar graph is more accurate because it keeps the discreet nature of data points reported in the result table based on which the graph is generated. The area graph gives the false impression that these data points are continuous. However, as a stacked bar graph is not as visually compelling as an area graph, it would not be as striking for use in advocacy (refer to Annex 2).

3. INTERPRETING THE AREA GRAPHS

3.1 What colour pattern is desirable?

As the optimal feeding practice for all children between 0 and 6 months is exclusive breast feeding, in an ideal country, the red area would be constant and large between 0-1 and 4-5 months and the slope would be near 0 with a constant value close to 100% (Figure 1). Given that the optimal feeding practice after 6 months is to continue breastfeeding and give solid/semi-solid/soft foods, in this same ideal country, you would expect to see a sharp decrease in the red area representing exclusive breastfeeding between 4-5 and 6-7 months and a simultaneous increase in the grey area for the category of breastfeeding and solid, semi-solid and soft foods (Figure 1), lasting until the 22-23 month age interval. The other colours (blues and beige) would be small in an ideal country.

Figure 1: an “ideal” area graph



3.2 What colours are not desirable?

Any colour other than red is not desirable before the 6-7 month age interval, as children should be fed only with breast milk until 6 months. Other colours with large areas before the 6-7 month age interval indicate feeding patterns that need to be changed for optimal child survival and development.

Starting at the 6-7 month age interval, any colour other than grey is not desirable, as children should be fed with breastmilk and solid, semi solid and soft foods at this age interval. Other colours with large areas between the 6-7 and 22-23 month age intervals, including a red area for exclusive breastfeeding, indicate feeding patterns that need to be changed for optimal child survival and development.

Feeding children of any age as per the “breastfed and plain water only”, “breastfed and non-milk liquids” or “breastfed and other milk/formula” categories is never desirable. An infant less than six months should receive only breast milk, while feeding a child older than six months in line with any of these three categories is not sufficient to ensure good nutritional status as they also require solid, semi-solid and soft foods starting at 6 months.

With regard to the latest HIV and infant feeding recommendations, UNICEF and other UN agencies recommend exclusive breastfeeding for children of HIV-infected women for the first six months of life together with ARVs. A few countries recommend that HIV-infected women avoid breastfeeding. Mixed feeding of the infant less than six months, which is represented by the feeding categories of “breastfed and plain water only”, “breastfed and non-milk liquids”, “breastfed and other milk/formula” or “breastfed and solid, semi-solid and soft foods” results in a much higher rate of post-natal mother-to-child transmission of HIV than exclusive breastfeeding or

exclusive replacement feeding. When the corresponding colours for these four mixed feeding categories are large before the 6-7 month interval in the graph, especially in a country with a high burden of HIV, there is a problem in that country that needs to be addressed. The latest WHO guidance (2009) no longer recommends abrupt cessation of breastfeeding at six months and a switch to exclusive replacement feeding, as in the earlier guidance. Instead, it states that after 6 months, continuation of breastfeeding with additional solid, semi-solid and soft foods is recommended along with regular assessment of both mother and baby. Breastfeeding should stop as soon as a nutritionally adequate and safe diet without breast milk can be provided after 12 months.

The category “Not Breastfed” is not desirable before 24 months of age. When the corresponding colour for this feeding category is large at any point in the graph, there is a problem in that country that needs to be addressed – i.e. continued breastfeeding needs to be encouraged. When the area is large before 6-7 month age interval, the problem needs to be addressed differently than after that age interval.

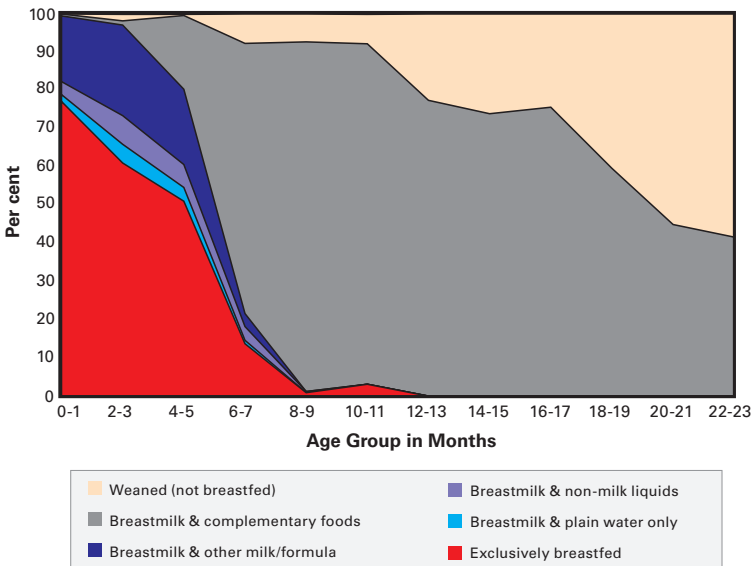
4. EXAMPLE INTERPRETATIONS OF COUNTRY AREA GRAPHS

4.1 Between Country Comparison of Exclusive Breastfeeding for the First 6 Months of Life

4.1.1 Example of a Country with High Exclusive Breastfeeding for the First 6 Months of Life

The 2004-2006 graph for Peru (Figure 2) has a very large red area between the 0-1 and 4-5 month age intervals, indicating that a large proportion of children were exclusively breastfed for the first 6 months of life in this country at that time. The exclusive breastfeeding rate was highest (~77%) at the 0-1 month age interval, decreasing to about 51% at the 4-5 month age interval. As exclusive breastfeeding is not the recommended practice after 6 months, a sharp decrease is seen with only about 14% at the 6-7 month age interval. To further increase the exclusive breastfeeding rate, 2 programmatic priorities can be inferred from the area graph: (1) to discourage feeding of other milks/formula starting at age 0-5 months (to decrease the dark blue area); (2) to discourage introduction of solid, semi-solid and soft foods before 6 months of age (to decrease the grey area) and (3) encourage continued breastfeeding up to 24 months and beyond.

Figure 2: Breastfeeding Practices by Age in Peru, 2004-2006

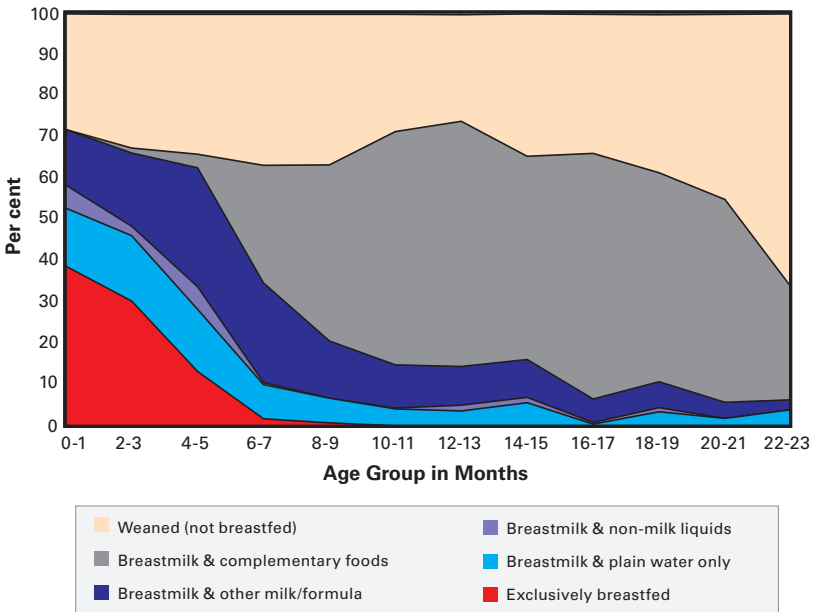


Source: DHS

4.1.2 Example of a Country with Low Breastfeeding but Relatively High Exclusive Breastfeeding Rate

The large beige area between 0 and 5 months in the 2006 graph for Togo (Figure 3) indicates that many young infants were not fed any breast milk in the first 6 months of life. Although breastfeeding was relatively low in comparison to other countries, the largest area for a feeding category that included breast milk between these age intervals was the red area for exclusive breastfeeding. Based on the IYCF pattern depicted by the area graph for the period between 0 and 5 months, two programmatic priorities that could help to increase the exclusive breastfeeding rate are (1) to encourage early initiation of breastfeeding and to discourage early cessation of breastfeeding (to decrease the beige area); and (2) to discourage introduction of other milk/formula (to decrease the dark blue area) before 6 months of age.

Figure 3: Breastfeeding Practices by Age, Togo, 2006

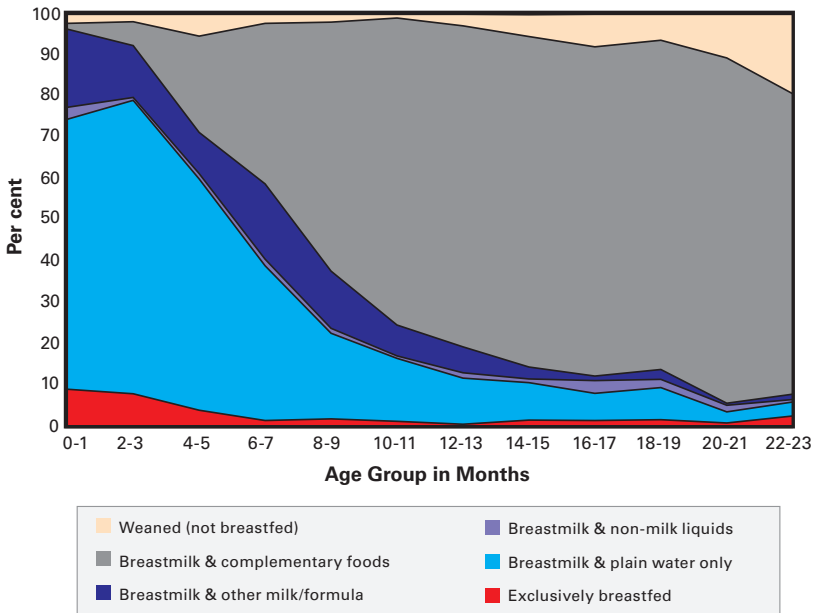


Source: MICS

4.1.3 Example of a Country with High Overall Breastfeeding but Low Exclusive Breastfeeding Rate

The 2006 graph for Burkina Faso (Figure 4) indicates that most children receive breastmilk in the first 6 months (i.e. the beige area is negligible) but that very few are breastfeeding exclusively (the red area is also small). The predominant feeding patterns indicated by this graph during the first 6 months of life are (i) breastfed and plain water only; and (ii) breastfed and other milk/formula. To increase the exclusive breastfeeding rate, 2 programmatic priorities can be inferred from the area graph: (1) discourage feeding of plain water to children under 6 months of age; and (2) discourage introduction of other milk/formula before 6 months of age. The feeding pattern depicted by this graph is common to many West African countries, where the early introduction of plain water is a barrier to high exclusive breastfeeding rates.

Figure 4: Breastfeeding Practices by Age, Burkina Faso 2006



Source: MICS

4.1.4 Example of area graphs from 3 countries with the same exclusive breastfeeding rate (<6 mos)

The three area graphs in [Figure 5](#) indicate that countries with the same exclusive breastfeeding rate (0-5 mos) of 60% can have very different rates for each sub age group, and thus, very different area graphs.

Figure 5:

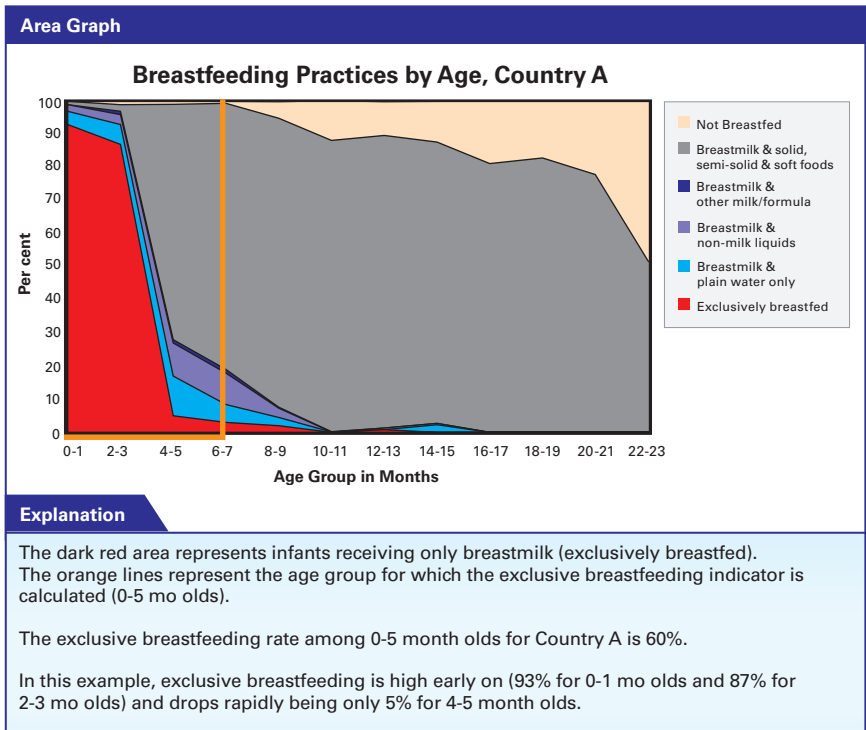
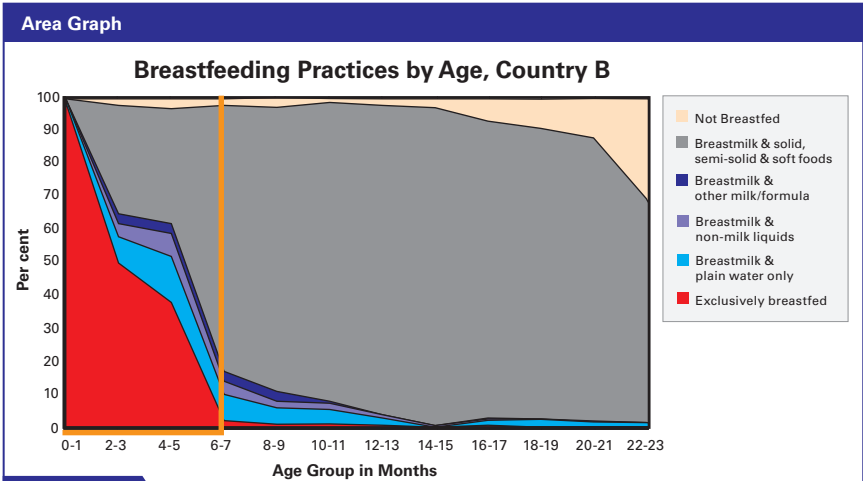


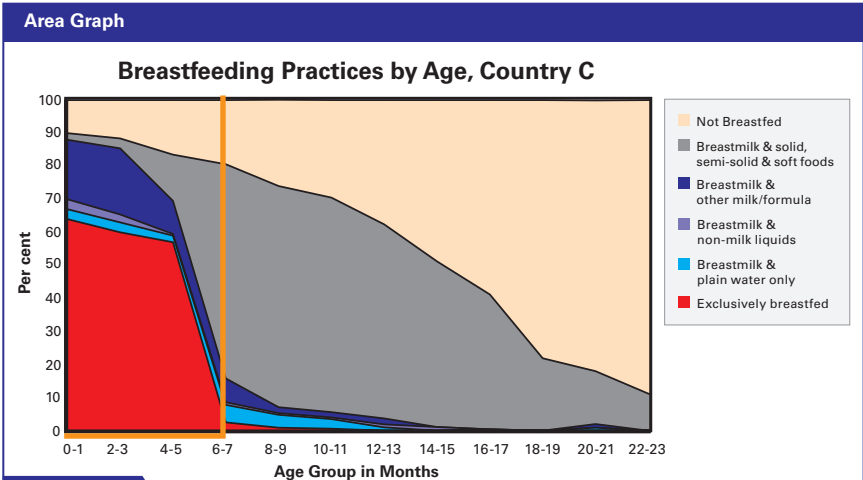
Figure 5: (cont'd)



Explanation

The exclusive breastfeeding rate among 0-5 month olds for Country B is also 60%.

In this example, exclusive breastfeeding is high in the very beginning (99% for 0-1 mo olds) then drops to 50% for 2-3 mo olds and 38% for 4-5 months.



Explanation

The exclusive breastfeeding rate among 0-5 month olds for Country C is also 60%.

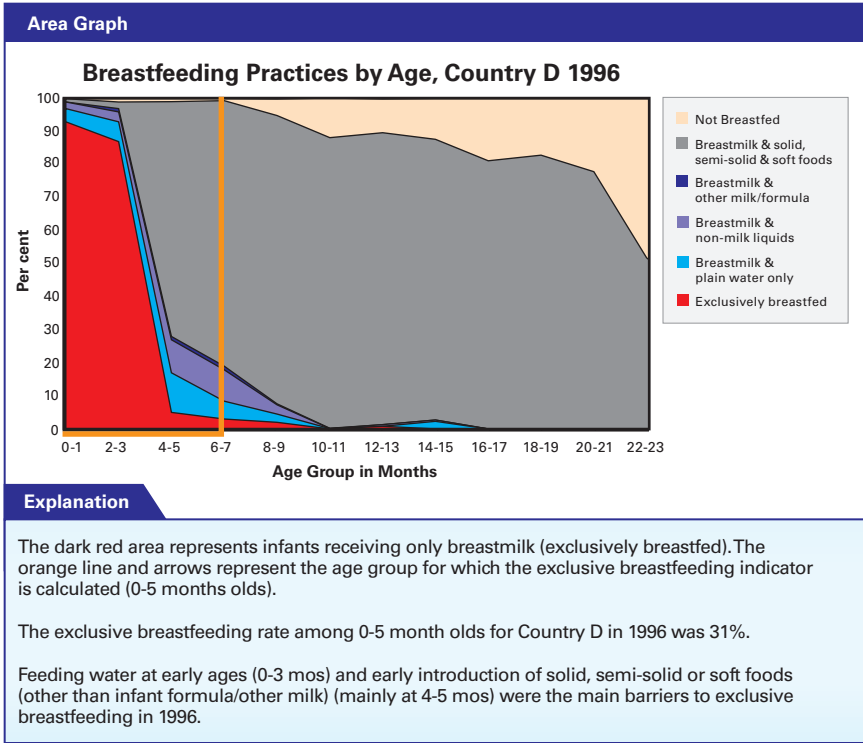
In this example, exclusive breastfeeding is steady at about 60% throughout the period (64% for 0-1 mo olds, 60% for 2-3 mo olds and 57% for 4-5 mo olds).

The three area graphs in [Figure 5](#) indicate that even though a country may have the same exclusive breastfeeding rate in children < 6 months of age (in this example, 60%) as another country, the actual breastfeeding practices at different ages can vary greatly. They also illustrate which factors are hindering an increase in exclusive breastfeeding practices in each country. In country A, introduction of solid, semi-solid or soft foods at too early an age (grey area) is the main constraint, while in Country C, feeding of infant formula/other milk (dark blue area) as well as early termination of breastfeeding (beige area) are the main constraints. The area graphs thus provide important information about breastfeeding practices among those less than six months of age as well as information on the introduction of solid, semi-solid or soft foods.

4.1.5 Example of area graphs the same country with the same exclusive breastfeeding rate (<6 mos)

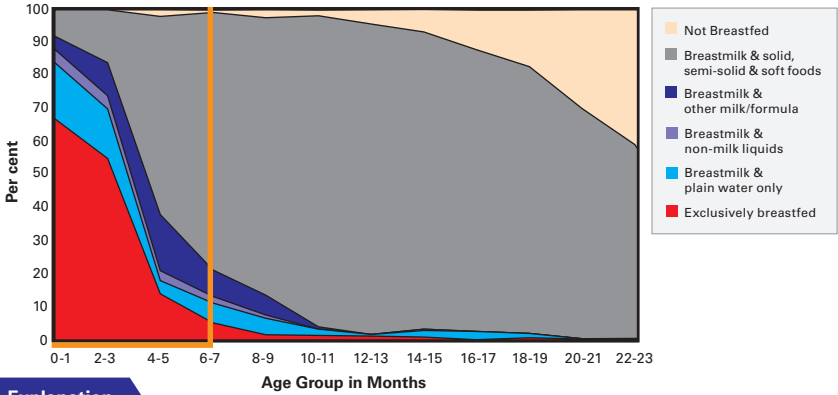
The three area graphs in Figure 6 represent changes in infant feeding patterns in one country over time.

Figure 6:



Area Graph

Breastfeeding Practices by Age, Country D 2005



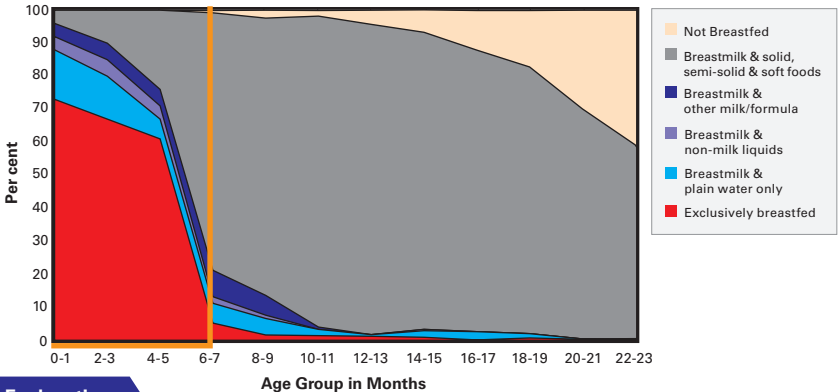
Explanation

By the year 2000, the exclusive breastfeeding rate among 0-5 month olds in Country D rose to 45% (dark red area increased).

By the year 2000, exclusive breastfeeding among 0-5 mo olds went up mainly due to reduction in feeding of plain water to 0-3 month olds (reduction in turquoise area). Not much changed in feeding practices of 4-5 mo olds between 1996 and 2000, as early introduction of solid, semi-solid or soft foods continued in this age-group (grey area).

Area Graph

Breastfeeding Practices by Age, Country D 2005



Explanation

By the year 2005, the exclusive breastfeeding rate among 0-5 month olds in Country D rose to 66%. (dark red area increased further).

By the year 2005, exclusive breastfeeding among 0-5 mo olds went up mainly due to reduction in early introduction of solid, semi-solid or soft foods at too early an age (reduction in grey area). Given that this practice was most prevalent among 4-5 month olds in 1996 and 2000, the overall increase for 0-5 mo olds which occurred by 2005 was most influenced by changes in the older age group.

The three area graphs in [Figure 6](#) demonstrate how the exclusive breastfeeding rate captures current practices as well as changes within the entire population of children — all of those less than six months of age — who should be exclusively breastfed. The exclusive breastfeeding rate is sensitive to changes in breastfeeding practices among all children under 6 months of age and thus provides a key measure of programmatic success. The second series of graphs in particular indicates how a change in exclusive breastfeeding (0-5 mos) rate can occur even if no changes in feeding practices occur among older children - the rate increased from 31% to 45% between 1996 and 2000, while exclusive breastfeeding remained at 14% for 4-5 mo olds. The graphs however do illustrate that changes in infants in older age groups are also necessary to influence the overall rate. When inappropriate feeding practices mainly pertinent to 4-5 mo olds (introduction of solid, semi-solid or soft foods) were tackled by 2005, the overall exclusive breastfeeding rate went up again, even though the changes among younger age groups (0-3 mo olds), were small.

As countries move closer to high levels of coverage of exclusive breastfeeding in children less than 6 months of age, the likelihood of differences between sub age groups decreases. This further supports the notion that the indicator of exclusive breastfeeding (0-5 mos) is responsive to changes in feeding practices among all children in the age group being measured, thereby giving a good indication of programmatic performance in relation to public health recommendations.

4.1.6 Example of same data set in bar graph versus area graph

The 2 figures in this annex present the same data set for Country E. The stacked bar graph is actually a more accurate method of presenting these data than is the area graph. In the stacked bar graph, each bar represents the feeding patterns for all children in a 2 month age interval. In the area graph, it is the points above the age intervals that represent the actual data, with the space between the age intervals simply being lines connecting data points between them. A stacked bar graph is more accurate because it keeps the discreet nature of data points reported in the result table based on which the graph is generated. The area graph gives the false impression that these data points are continuous. Despite the stacked bar graph being more accurate, it is not as visually compelling as the area graph and would not be as striking for use in advocacy. Therefore, the area graphs are the medium of choice for presentation of these data.

Figure 7: Stacked bar graph depicting infant and young child feeding patterns

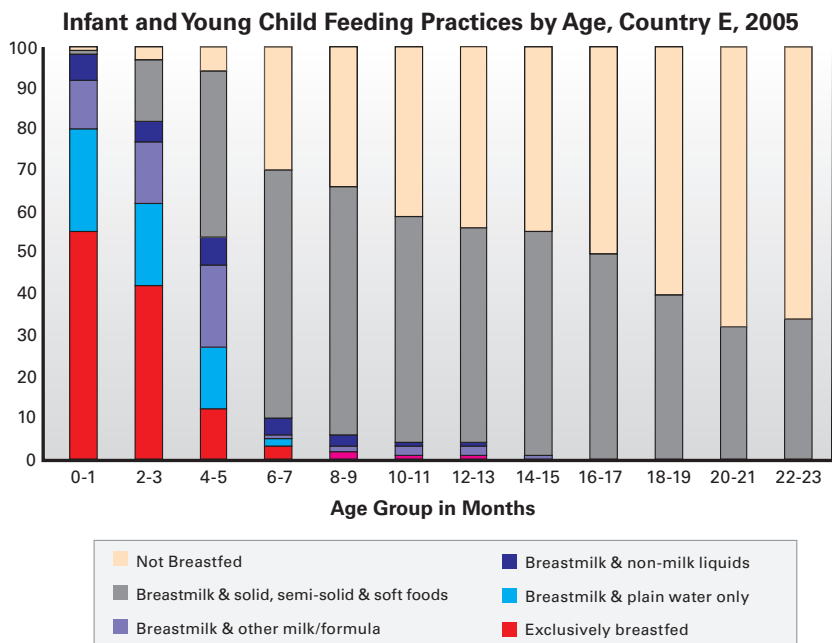


Figure 8: Area graph depicting infant and young child feeding patterns

