

Chapter II

DATA REQUIRED FOR THE BRASS METHOD

At least since the 1940s, demographers working in developing countries have been aware that the proportion of children dead among those ever borne by women in a given age group is an indicator of mortality in childhood. The actual proportion observed is known to be largely determined by two factors: the mortality risks to which children are exposed and the duration of exposure to those risks. In 1964 William Brass proposed a method that permitted the estimation of mortality risks by making allowance for the duration of exposure, and thus it became possible to derive estimates of various values of $q(x)$ —the probability of dying between birth and exact age x —from the observed proportions of children dead.

As suggested above, data on children ever born and children dead were available in some developing countries long before an estimation method was devised. Even today, the power of the Brass method stems not only from its theoretical underpinnings but also from its use of data that are relatively easy to obtain and whose reliability is generally acceptable. As with any other estimation method, the quality of the basic data used as input largely determines the quality of the resulting estimates. It is essential, therefore, to ensure that the highest standards are adhered to at all stages of data-gathering.

Although this *Guide* does not purport to be a manual for data collection, it is important for the analyst to have a clear grasp of what is being measured and of how different questions can be used to best advantage. Not only is such understanding necessary to avoid errors in the application of the estimation method, it is also an asset in evaluating the estimates obtained.

NATURE OF THE DATA REQUIRED

In its simplest variant, the Brass method requires three pieces of information: the number of children ever born, the number of children ever born who have died (children dead) and the total female population of reproductive age.

Children ever born and children dead

The information on children ever born and dead is normally obtained as follows. In a survey or census, women in a given age range (15 to 49, usually) are asked a certain number of questions about their child-bearing experience. The sets of questions that may be used include:

- Set 1. How many children, who were born alive, have you ever had?
How many of those children have died?
- Set 2. How many children, who were born alive, have you ever had?

- How many are still alive?
- Set 3. How many living children do you have?
How many children have you had who were born alive and later died?
- Set 4. How many children do you have who live with you?
How many children do you have who live elsewhere?
How many children have you had who were born alive and later died?

Notice that the answers to each set of questions will yield, in some cases by addition or subtraction, the number of children ever born and the number of children dead that each woman has had. Notice also that only those children who were born alive should be counted as “children ever born”. Abortions and, particularly, stillbirths should not be included.

Among the sets of questions presented, set 4 is generally considered to produce the best results, because, by focusing attention on both the children present and those absent, it leads to a lower level of omission. Set 3 is also recommended because, by avoiding the direct use of the concept of “children ever born”, it may be easier for the respondent to grasp. Sets 1 and 2 may yield imperfect data when respondents fail to understand that children dead should also be reported as ever born. They may also lead to errors in societies where the qualifier “born alive” is construed to mean “still living”. However, in societies where explicit mention of dead children is not acceptable, set 2 may provide the best means of gathering the required information.

In some surveys or censuses, the sets of questions presented here are posed separately with respect to male and female children. Data on children ever born and dead by sex are useful not only because they allow the estimation of mortality by sex, but also because they permit further evaluation of the quality of the data, as will be explained later on.

Certain surveys may produce data on children ever born and dead by gathering information on the fertility history of each woman. Roughly speaking, such information consists of the dates of birth of all children a woman has had and the dates of death of all deceased children. Complete fertility histories allow the calculation of the total number of children ever born and dead for each woman and thus permit the application of the Brass method. They also allow the application of other procedures to estimate child mortality and consequently provide several opportunities to check the internal consistency of the data. However, fertility histories involve con-

siderable data-collection efforts and are very costly. For that reason, they are not considered typical data sources for the information needed to apply the Brass method.

Being aware of the variety of ways in which information on children ever born and dead may be gathered is important because the analyst must be prepared to convert existing tabulations of the actual items of information collected by censuses or surveys into the format required for estimation. Although those data are often tabulated according to such characteristics as labour-force participation or education of women—which may allow the analysis of differentials of mortality in childhood by socio-economic indicators—the Brass method requires only that data on children ever born and dead be classified by age of mother. The traditional five-year age groups—15-19, 20-24, 25-29, 30-34, 35-39, 40-44 and 45-49—are typically used for tabulation purposes and produce the data needed for the estimation method.

Total female population of reproductive age

Turning now to the third item of information needed for the estimation procedure—the total female population of reproductive age (15-49)—the reader must be warned that it is a source of multiple errors. Problems arise because the method assumes that the data used are representative of all women aged 15 to 49, irrespective of their child-bearing or marital status. In practice, some women fail to provide the information sought, thus becoming cases of “non-response”. More importantly, some women are purposefully excluded from providing information, as in countries where it is considered inappropriate to ask single women about their child-bearing experience. Yet, tabulations of the data on children ever born and dead usually include a column headed “total number of women”, often without explicitly indicating that only women actually providing information are included. Mistakes arise when those numbers of women are used in the application of the method, which requires that all women, irrespective of whether they provided information, be considered.

COMPILATION OF THE DATA REQUIRED

Although, as stated earlier, the Brass method requires a minimum of information—the number of children ever born, the number of children dead and the total female population of reproductive age—that information is collected and published in a variety of ways.² To aid the analyst in compiling and organizing the data required, two worksheets have been prepared (displays 1 and 2). The worksheets show items of information often found in actual tabulations. The analyst can obtain the information necessary to apply the Brass method by addition and subtraction (the appropriate combination or combinations of items are indicated in the heading of each column).

Note that the worksheets make allowance for the availability of information by sex, although data for both sexes combined are all that is needed. As indicated above, when data by sex are available, not only can mortality be estimated for each sex separately, but also the internal consistency of the information can be checked by

calculating the ratios of male to female children ever born. Those ratios are estimates of the sex ratio at birth, that is, the average number of male births per female birth. That number is a biological constant that varies little from population to population and is generally found within the range of 1.03 to 1.08 male births per female birth. As the example in chapter IV will show, values of the sex ratio at birth that deviate markedly from the range of expected values indicate possible deficiencies in the basic data.

THE CASE OF BANGLADESH

The case of Bangladesh will be used as an example in the application of two versions of the Brass method, so it is appropriate to consider here the nature of the data available for that country. In 1974 a Retrospective Survey of Fertility and Mortality conducted in Bangladesh included questions on children ever born and children dead. Display 3 reproduces the tabulation of such information appearing in the published report. From that tabulation it can be inferred that questions such as those constituting set 4 (see p. 13) were used to gather the basic information and that they were posed only to ever-married women (that is, single women were not even asked the questions). Consequently, although the second column is labelled “total women”, those numbers should not be used in applying the estimation method.

Note that even if the table failed to indicate that only ever-married women were involved, the analyst should raise questions about the total female population shown, since, in a country like Bangladesh where fertility has hardly changed, it would not be expected that the number of women aged 15-19 would be smaller than the number of women aged 20-24. The very small size of age group 10-14 would also be highly suspicious and should prompt further clarification of the true meaning of the data presented.

Display 4 presents the published tabulation of the female population by age group and marital status. The numbers of women appearing in the second column, labelled “total”, should be used in applying the Brass method. Note that, as expected, the number of women declines steadily with age, at least until age group 55-59 is reached.

The worksheets (displays 1 and 2) can be used to compile the information necessary for the application of the Brass method. Consider first the data on children ever born and dead. At first sight, it is unclear whether the tabulations in display 3 include the numbers of children ever born needed to apply the Brass method. The required numbers can, however, be calculated from the available data on “children at home”, “children away” and “children dead”. The first step is to copy the available numbers onto a reproduction of the worksheet in display 1, as shown in display 5. The next step is to calculate the missing data, children ever born, as the sum of columns 2, 4 and 5 of the worksheet in display 5. A completed worksheet, containing all the data required, is

Display 1. Possible combinations for the compilation of the data on children ever born and children dead by age of mother required by the Brass method

Age group of mother		Children ever born	Children dead	Children surviving	Children living at home	Children living elsewhere
		(1) = (2) + (3) = (2) + (4) + (5)	(2) = (1) - (3) = (1) - (4) - (5)	(3) = (4) + (5)	(4)	(5)
Both sexes	15-19					
	20-24					
	25-29					
	30-34					
	35-39					
	40-44					
	45-49					
Male	15-19					
	20-24					
	25-29					
	30-34					
	35-39					
	40-44					
	45-49					
Female	15-19					
	20-24					
	25-29					
	30-34					
	35-39					
	40-44					
	45-49					

Display 2. Possible combinations for the compilation of the data on the total number of women of reproductive age required by the Brass method

<i>Age group of women</i>	<i>Total number of women (1) = (2) + (3) = (4) + (5)</i>	<i>Ever-married women (2)</i>	<i>Single women (3)</i>	<i>Women of stated parity (4)</i>	<i>Women of not-stated parity (5)</i>
15-19					
20-24					
25-29					
30-34					
35-39					
40-44					
45-49					

presented in display 6. Note that the computed numbers of children ever born shown in column 1 of display 6 are the same as those appearing in the original table (display 3) under the heading "total births". Although the data on children ever born and dead could have been copied directly from the published tabulation, it is sound practice to check the internal consistency of published data by carrying out calculations such as those illustrated in displays 5 and 6, especially when one is unsure of the meaning of certain labels ("total births" in this instance).

Turning now to the data on the total number of women by age group, recall that they should be obtained from display 4. Display 7 illustrates the compilation of those data using the worksheet shown in display 2. The worksheets in displays 6 and 7 now contain the basic data required to apply the Brass method. It is of interest, however, to explore here the consistency of the data on total

number of women as derived from information contained in the original tabulations (see displays 3 and 4). Display 8 illustrates how the worksheet in display 2 may be used to compile data on the total number of women by adding the number of ever-married women copied from display 3 to the number of never-married (single) women copied from display 4. Note that the resulting total numbers of women differ, albeit slightly, from those copied directly from display 4 and shown in display 7. Such differences arise because although all ever-married women were asked about their child-bearing experience, some failed to provide the information requested and were therefore excluded from the numbers presented in display 3. Since it is suggested that *all* women, irrespective of reporting status, be used in applying the Brass method, the numbers in display 7 will be used in the examples presented in chapters IV and V.

Display 3. Tabulation of data on children ever born and children surviving as appearing in the report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality

BANGLADESH CENSUS 1974 RETROSPECTIVE SURVEY OF FERTILITY AND MORTALITY						
BANGLADESH DE FACTO						
TABLE 8 : EVER-MARRIED WOMEN BY AGE GROUP, WITH TOTAL CHILDREN EVER BORNE, NUMBER AT HOME, NUMBER ELSEWHERE AND NUMBER DEAD, BY SEX OF CHILDREN						
ALL EVER-MARRIED WOMEN						
AGE GROUP OF WOMEN	TOTAL WOMEN	TOTAL BIRTHS	CHILDREN AT HOME	CHILDREN AWAY	CHILDREN DEAD	
TOTAL						
0-14	259 104	6 677	4 866	0	1 811	
15-19	2 019 436	1 160 919	921 227	24 327	215 365	
20-24	2 521 318	4 901 382	3 820 649	83 349	997 384	
25-29	2 573 496	9 085 852	6 927 908	219 989	1 937 955	
30-34	2 003 082	9 910 256	7 126 473	522 587	2 261 196	
35-39	1 766 100	10 384 001	6 974 267	919 566	2 490 168	
40-44	1 473 382	9 164 329	5 472 460	1 276 846	2 415 023	
45-49	1 128 791	6 905 673	3 664 328	1 281 801	1 959 544	
50-54	1 040 877	5 963 087	2 601 163	1 441 061	1 920 863	
55-59	601 625	3 257 428	1 206 148	913 559	1 137 721	
60+	1 631 217	8 136 608	2 102 978	2 800 615	3 233 015	
N.S.	204	0	0	0	0	
TOTAL	17 018 632	68 876 212	40 822 467	9 483 700	18 570 045	
MALE BIRTHS ONLY						
10-14	4 111	4 112	3 109	0	1 003	
15-19	501 448	597 248	469 036	11 047	117 165	
20-24	1 557 199	2 507 018	1 938 220	38 921	529 877	
25-29	2 106 614	4 675 978	3 545 904	82 780	1 047 294	
30-34	1 792 767	5 109 487	3 780 859	124 046	1 204 582	
35-39	1 635 507	5 435 726	3 925 071	176 698	1 333 957	
40-44	1 369 842	4 883 599	3 323 724	268 130	1 291 745	
45-49	1 047 262	3 714 957	2 393 149	291 071	1 030 737	
50-54	955 899	3 211 030	1 840 032	352 615	1 018 383	
55-59	545 164	1 769 751	914 419	263 461	591 871	
60+	1 468 170	4 410 239	1 743 869	998 608	1 667 762	
N.S.	0	0	0	0	0	
TOTAL	12 983 983	36 319 145	23 877 392	2 607 377	9 834 376	
FEMALE BIRTHS ONLY						
10-14	2 565	2 565	1 757	0	808	
15-19	479 678	563 671	452 191	13 280	98 200	
20-24	1 526 643	2 394 364	1 882 429	44 428	467 507	
25-29	2 063 505	4 409 874	3 382 004	137 209	890 661	
30-34	1 759 823	4 800 769	3 345 614	398 541	1 056 614	
35-39	1 601 696	4 948 275	3 049 196	742 868	1 156 211	
40-44	1 330 442	4 280 730	2 148 736	1 008 716	1 123 278	
45-49	992 793	3 190 716	1 271 179	990 730	928 807	
50-54	888 514	2 752 057	761 131	1 088 446	902 480	
55-59	496 594	1 487 677	291 729	650 098	545 850	
60+	1 303 670	3 726 369	359 109	1 802 007	1 565 253	
N.S.	0	0	0	0	0	
TOTAL	12 445 923	32 557 067	16 945 075	6 876 323	8 735 669	

Source: Bangladesh, Census Commission, Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality (Dacca, 1977), p. 37.

Display 4. Tabulation of the female population by age group and marital status as appearing in the report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality

BANGLADESH		BANGLADESH CENSUS 1974 RETROSPECTIVE SURVEY OF FERTILITY AND MORTALITY DE FACTO					
TABLE 3. POPULATION BY SEX, AGE GROUP, MARITAL STATUS AND NUMBER OF MARRIAGES							
F E M A L E S							
TOTAL	AGE GROUP	T O T A L	NEVER MARRIED	MARRIED	WIDOWED	DIVORCED	EVER-MARRIED NOT STATED OR EVER-MARRIED BUT PRESENT MARITAL STATUS NOT STATED
	0-4	5 490 429	5 423 807	3 121	5 961		57 540
	5-9	6 199 640	6 114 626	12 949	5 937		66 128
	10-14	4 675 449	4 353 919	256 611	4 741	15 356	44 822
	15-19	3 014 706	972 730	1 928 736	31 472	68 653	13 115
	20-24	2 653 155	121 364	2 415 049	48 242	62 586	5 914
	25-29	2 607 009	28 426	2 462 803	79 334	33 422	3 024
	30-34	2 015 663	8 365	1 871 682	115 629	15 426	4 561
	35-39	1 771 680	4 049	1 579 475	177 037	8 936	2 183
	40-44	1 479 575	3 511	1 204 957	262 790	6 764	1 553
	45-49	1 135 129	3 555	827 838	296 957	6 196	583
	50-54	1 048 558	4 183	617 085	422 448	3 665	1 177
	55-59	607 412	2 987	288 310	312 740	1 940	1 435
	60-64	697 117	6 674	227 089	460 656	1 917	781
	65-69	325 222	5 008	90 506	227 922	1 192	594
	70-74	329 326	4 156	48 907	273 108	594	2 561
	75-79	122 956	1 579	18 157	103 037	183	
	80-84	113 877	805	10 202	101 696	411	763
	85+	78 411	968	4 943	71 515	207	778
	N.S.	1 410	408	408	411		183
	TOTAL	34 366 724	17 061 120	13 868 828	3 001 633	227 448	207 695
MARRIED ONCE ONLY	0-4	8 875		3 121	5 754		
	5-9	18 132		12 766	5 366		
	10-14	273 551		253 839	4 741	14 971	
	15-19	1 952 378		1 859 246	29 878	62 864	390
	20-24	2 366 653		2 266 382	45 335	54 356	580
	25-29	2 383 749		2 282 639	72 445	28 073	592
	30-34	1 810 194		1 693 882	104 368	11 166	778
	35-39	1 580 278		1 414 313	158 431	6 759	775
	40-44	1 289 195		1 051 554	232 574	4 860	207
	45-49	1 003 347		736 408	262 710	4 229	
	50-54	923 454		547 170	373 598	2 686	
	55-59	538 306		257 196	279 945	766	399
	60-64	621 909		204 649	415 710	1 550	
	65-69	289 210		81 399	207 009	802	
	70-74	293 183		43 514	249 075	594	
	75-79	110 013		16 592	93 421		
	80-84	102 649		9 608	92 630	411	
	85+	71 890		4 736	66 947	207	
	N.S.	819		408	411		
	TOTAL	15 637 785		12 739 422	2 700 348	194 294	3 721

Source: Bangladesh, Census Commission, *Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality* (Dacca, 1977), p. 28.

Display 5. First step in the compilation of data on children ever born and children dead for Bangladesh

Age group of mother		Children ever born (1) = (2) + (3) = (2) + (4) + (5)	Children dead (2) = (1) - (3) = (1) - (4) - (5)	Children surviving (3) = (4) + (5)	Children living at home (4)	Children living elsewhere (5)
Both sexes	15-19		215 365		921 227	24 327
	20-24		997 384		3 820 649	83 349
	25-29		1 937 955		6 927 908	219 989
	30-34		2 261 196		7 126 473	522 587
	35-39		2 490 168		6 974 267	919 566
	40-44		2 415 023		5 472 460	1 276 846
	45-49		1 959 544		3 664 328	1 281 801
Male	15-19		117 165		469 036	11 047
	20-24		529 877		1 938 220	38 921
	25-29		1 047 294		3 545 904	82 780
	30-34		1 204 582		3 780 859	124 046
	35-39		1 333 957		3 925 071	176 698
	40-44		1 291 745		3 323 724	268 130
	45-49		1 030 737		2 393 149	291 071
Female	15-19		98 200		452 191	13 280
	20-24		467 507		1 882 429	44 428
	25-29		890 661		3 382 004	137 209
	30-34		1 056 614		3 345 614	398 541
	35-39		1 156 211		3 049 196	742 868
	40-44		1 123 278		2 148 736	1 008 716
	45-49		928 807		1 271 179	990 730

Source: Bangladesh, Census Commission, *Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality* (Dacca, 1977), table 8, p. 37 (reproduced in display 3 above).

Display 6. Second step in the compilation of data on children ever born and children dead for Bangladesh

Age group of mother	Children ever born (1) = (2) + (3) = (2) + (4) + (5)	Children dead (2) = (1) - (3) = (1) - (4) - (5)	Children surviving (3) = (4) + (5)	Children living at home (4)	Children living elsewhere (5)
	Both sexes				
15-19	1 160 919	215 365		921 227	24 327
20-24	4 901 382	997 384		3 820 649	83 349
25-29	9 085 852	1 937 955		6 927 908	219 989
30-34	9 910 256	2 261 196		7 126 473	522 587
35-39	10 384 001	2 490 168		6 974 267	919 566
40-44	9 164 329	2 415 023		5 472 460	1 276 846
45-49	6 905 673	1 959 544		3 664 328	1 281 801
Male					
15-19	597 248	117 165		469 036	11 047
20-24	2 507 018	529 877		1 938 220	38 921
25-29	4 675 978	1 047 294		3 545 904	82 780
30-34	5 109 487	1 204 582		3 780 859	124 046
35-39	5 435 726	1 333 957		3 925 071	176 698
40-44	4 883 599	1 291 745		3 323 724	268 130
45-49	3 714 957	1 030 737		2 393 149	291 071
Female					
15-19	563 671	98 200		452 191	13 280
20-24	2 394 364	467 507		1 882 429	44 428
25-29	4 409 874	890 661		3 382 004	137 209
30-34	4 800 769	1 056 614		3 345 614	398 541
35-39	4 948 275	1 156 211		3 049 196	742 868
40-44	4 280 780	1 123 278		2 148 736	1 008 716
45-49	3 190 716	928 807		1 271 179	990 730

Source: Bangladesh, Census Commission, *Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality* (Dacca, 1977), table 8, p. 37 (reproduced in display 3 above).

Display 7. Compilation of data on the total number of women by age group for Bangladesh

Age group of women	Total number of women (1) = (2) + (3) = (4) + (5)	Ever-married women (2)	Single women (3)	Women of stated parity (4)	Women of not-stated parity (5)
15-19	3 014 706				
20-24	2 653 155				
25-29	2 607 009				
30-34	2 015 663				
35-39	1 771 680				
40-44	1 479 575				
45-49	1 135 129				

Source: Bangladesh, Census Commission, *Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality* (Dacca, 1977), table 3, p. 28 (reproduced in display 4 above).

Display 8. Alternative compilation of data on the total number of women by age group for Bangladesh (data rejected in the application of the Brass method)

Age group of women	Total number of women (1) = (2) + (3) = (4) + (5)	Ever-married women (2)	Single women (3)	Women of stated parity (4)	Women of not-stated parity (5)
15-19	2 992 166	2 019 436	972 730		
20-24	2 642 682	2 521 318	121 364		
25-29	2 601 922	2 573 496	28 426		
30-34	2 011 447	2 003 082	8 365		
35-39	1 770 149	1 766 100	4 049		
40-44	1 476 893	1 473 382	3 511		
45-49	1 132 346	1 128 791	3 555		

Source: Bangladesh, Census Commission, *Report on the 1974 Bangladesh Retrospective Survey of Fertility and Mortality* (Dacca, 1977), tables 3 and 8, pp. 28 and 37 (reproduced in display 4 above). Total number of women calculated as (2) + (3).