PN-ACB-248

DHS Working Papers
Number 3

Age and Birth Date Reporting in Thailand: Evidence from the 1987 Demographic and Health Survey

Napaporn Chayovan
Institute of Population Studies
Chulalongkorn University

and

John Knodel
Population Studies Center
University of Michigan

Macro International Inc.
Columbia, Maryland, USA

August 1993

Research for this study was funded by the Andrew W. Mellon Fund through the Demographic and Health Surveys Small Grants Program administered by the Macro International Inc. We are grateful to Napaporn Havanon, Chanpen Saengtienchai and Malinee Wongsith who provided helpful information during the course of the investigation.

Introduction

No characteristics are more basic to demographic studies than age and gender. While a person's sex is easily observed and rarely misreported, age reporting is more problematic. The extent and the nature of errors in age reporting are known to vary substantially among different populations. Nevertheless, as Ewbank (1981:1) noted in his extensive review of the subject, despite the importance of age misreporting for demographic research, "studies that document the extent and nature of such reporting problems are few and far between."

In comparison to many other developing countries, age and birth date reporting in Thailand are considered to be relatively accurate and complete. Indeed, within the Thai cultural context, knowing how old you are and when you were born is of considerable importance. Forms of address and kinship terms often depend on the relative ages of the persons involved. Information on birth dates also may be necessary when consulting a fortune teller—a common practice, especially for setting the date for important events such as a wedding or an ordination. The celebration or marking of birthdays, however, has not been a traditional practice among the rural population, although the practice appears to be becoming more common and is not unusual among urban dwellers (probably as a result of cultural diffusion from the West).

Previous research has revealed a systematic bias in age reporting in Thailand: frequently, the age stated is one year greater than the completed age at last birthday, the definition normally used by demographers. One reason suggested for this is that some Thais appear to think of their current age as the age at their next birthday (the "going-on age"). Indeed, they may indicate this explicitly when asked their age (Chamratrithirong et al., 1978).[1] As the present study illustrates, however, there is another, potentially more important reason: Thais may determine their current age by subtracting the year of their birth from the current year without taking into account whether the current year's birthday has yet passed. This practice is likely related to the relative unimportance of the celebration of birthdays as markers of the passage of age (Phongphit and Hewison, 1990:24).

The fact that a traditional system of reckoning month and year, stated in terms of lunar months and a twelve-year cycle of animal years, coexists with a modern system stated in terms of Western months and Buddhist Era (B.E.) years, complicates the determination of birth dates and the calculation of age for the demographic researcher. Both systems have importance for the average Thai, especially with respect to birth dates. For example, when reporting one's birth date in interactions with the official bureaucracy, normally the modern system would be preferred. However, when consulting with a fortune teller, the traditional system is the relevant one. It is noteworthy that birth registration forms have places to record the birth date in terms of both the modern and traditional systems.

---

[1] This is done by prefacing the stated age with the word "yaang" meaning "going on to." Others, who do not initially use this qualifier, often acknowledge that they are stating their age in this manner when directly probed.

Buddhist Era years, together with Western months, permit a direct calculation of age. They also are readily translated into Christian Era (A.D.) years by subtracting the difference of 543 years and allowing for the change in the start of B.E. years from April 1 to January 1 beginning in A.D. 1941.[2] More problematic is the conversion of animal years and lunar months into the modern system, whether in terms of A.D or B.E., because of confusion as to when the animal year changes and because the lunar calendar is not fixed with respect to the Western system of months. In addition, the first lunar month traditionally starts two lunar cycles earlier in the Upper North compared to the rest of the country.[3]

The present study examines age and birth date reporting in Thailand based on the 1987 Thailand Demographic and Health Survey. Following a description of the survey and the data sets used, the results of the analysis are presented in three main sections. First, several aspects of birth date reporting by ever-married women of reproductive age are examined. The analysis of the women's own birth dates focuses on the completeness of the information provided and the extent to which women report their own birth dates in terms of the traditional Thai system of lunar months and animal years as opposed to the modern system of Buddhist Era years and Western style months. The

---

[2] As a result of the change of the start of the B.E. year from April 1 to January 1, the year B.E. 2483 (A.D. 1940) is only nine months long (since the period from January 1 to March 31, which would have been allocated to B.E. 2483 as the final months of the year, is instead treated as the first months of B.E. 2484). The official introduction of solar years of fixed length (as opposed to variable length years based on a lunar calendar) and western months (as defined by the Gregorian calendar system) occurred in Thailand in A.D. 1889 with April 1 marking the start of the year. As part of this new calendar, historical time was designated in terms of the length of the Ratanakosin dynasty (the Raw Saw system). B.E. years as the designation of historical time officially replaced the Raw Saw system in A.D. 1917. April 1 was retained as the start of the year through 1940.

[3] A lunar month is defined by a complete cycle of the phases of the moon. Since this takes 29 days, 12 hours, and 44 minutes, some lunar months have 29 days and some 30 days. In the Thai system, the number of months in each lunar year varies between 12 and 13 in order to keep the lunar and solar years roughly synchronized. Lunar months are referred to by number, in consecutive order, from the start of the lunar year (which occurs sometime during November or December, except in the Upper North where it starts two months earlier). In lunar years with 13 months, two consecutive months are known as month 8. This occurs every two or three years. Within each lunar month, the days are counted in terms of how far into the waxing and waning halves of the lunar cycle they fall.

Given the nature of the Thai lunar month system, there is only a rough correspondence between lunar months and western style months. A precise conversion must take the particular year into account. Moreover, any particular lunar month is likely to straddle two different western months. In the data set used in present study, lunar months were converted into western months in a less precise manner. Since the first lunar month always covers at least part of December (except in the system used in Upper North), it was equated to December; each subsequent lunar month was then matched with its western equivalent. Thus lunar month 2 was equated with January, lunar month 3 with February, and so on. The end of the lunar year, lunar month 12, was equated with November. For the Upper North, the conversion is simply shifted by two months so that the first lunar month is equated with October. Because of differences in when lunar month 1 actually starts during the solar year, differences in the length of lunar and western months, and the fact that some years include two lunar months 8, this simplified method of conversion may be in error by one month in either direction.

In the present study, lunar months stated by respondents in the Upper North were assumed to be based on the traditional system. Since calendars based on the more general lunar system are distributed nationally, however, it is likely that the traditional northern system is being supplanted by the more general system. For example, when government officials record the lunar month and day on birth certificates, presumably they consult a printed calendar that follows the more general system. It is impossible to determine which system a respondent is using based on the stated lunar month, however, because the terms referring to lunar months are the same in the traditional northern system and the more general one. Thus, some respondents in the Upper North may have been using the more general system. This represents yet another potential source of error in the conversion to western months in this sub-region.

women also reported birth dates for their children. These, too, were examined, with the focus on the extent to which the birth dates were verified through documentation and the degree of completeness with which they were reported.

The second section analyzes aggregate age reporting patterns, focusing on the extent of age heaping for all household members as well as for ever-married women and their children. In addition, the analysis looks at the extent to which children's ages are stated in units of less than a year in the birth histories provided by their mothers.

In the third part of the analysis, the stated ages of ever-married women respondents and their living children are compared with their ages as calculated from birth dates. This permits a number of specific issues relevant to age reporting to be addressed. Also, patterns of age reporting are related to the background characteristics of the individual respondents.

Any detailed analysis of age and birth date reporting must take into account the cultural context of the particular population under study. As a result, most findings of the present study are specific to Thailand, although several may be generalizable. Probably the most important general lesson to be learned from the following analysis, however, is that age and birth date reporting are more complex phenomena than might be suspected initially, even in a society where age and birth dates are relatively well known. Comparable investigations of other populations may deal with far different cultural settings, but there is little doubt that they too will come to a similar conclusion.

Source and Nature of Data

The Thailand Demographic and Health Survey (TDHS) was conducted from March through June 1987 by the Institute of Population Studies of Chulalongkorn University. It collected some basic information, including age, for all members of a representative sample of 9045 households. In addition, detailed interviews covering demographic behavior and health were conducted with 6775 ever-married women aged 15-49 who were present in the households (referred to hereafter as eligible women respondents). The sample was designed to provide independent estimates for the four major regions of Thailand and the Bangkok metropolis, as well as for the urban and rural sectors of the population collectively. Nationally representative results can be obtained by applying appropriate weights (Chayovan et al., 1988). Depending on the purpose of the analysis, results in the present study may be weighted or unweighted, as indicated in the table footnotes.[4]

[4] In general, results are unweighted when the primary purpose of a tabulation is to make a methodological point and weighted when the tabulation is intended to provide substantive findings representative of the total population or specific sub-groupings.

Several features of the TDHS make the data particularly suitable for an analysis of age and birth date reporting. The detailed questionnaire administered to eligible women asked them to report both the month and year of their birth and their age. Interviewers were instructed to record responses to these items as actually stated. When the data was processed into computer-readable form, the type of year (animal or B.E.) and type of month (lunar or Western) reported by the woman was recorded.[5] Also, both the originally stated age and the age as calculated from the birth date were entered.

Eligible women were also asked to report the year and month of birth and the age of each of their live-born children as well as the current ages of those still living. Interviewers were instructed to obtain the birth dates of children from documentary evidence such as birth certificates or household registration forms whenever possible and to indicate whether or not they were able to do so for each child recorded. Overall, birth dates were documented for about half (52 percent) of the births recorded. The ages of living children were recorded exactly as stated. Both the recorded age and the age as calculated from the birth date were entered when the questionnaires were processed into a computer-readable form.

In the household schedule administered prior to the detailed interviews with eligible women, ages but not birth dates were solicited. Thus, only stated ages are available for household members other than eligible women and their children. When completing the household schedule, interviewers were instructed to obtain the age of each household member by asking the informant (who might consult that person if he or she were present). In cases where the informant did not know the age, interviewers were told to ask for the birth year and to calculate the age accordingly. Only as a last resort were the interviewers to attempt to determine ages by examining household registration forms or other documents. Indeed, this appears to have occurred only rarely.[6]

When the TDHS data were originally processed, two separate machine-readable data sets were created, one based on the household schedules and the other on the eligible woman questionnaires. It is possible to link, by computer, the information reported for each eligible woman in the household schedule and in the detailed interview. The present study takes advantage of this feature and has added the age of each eligible women as stated in the household schedule to the eligible woman data set. Thus, for each eligible woman, three ages may be compared: her stated

---

[5] Animal years and B.E. years can be unambiguously distinguished from each other. Lunar months also can be distinguished easily from western-style months since the latter are typically referred to by their Thai names (corresponding to January, February, and the like), while lunar months are referred to by their number. It is possible that some respondents confuse the two systems and may occasionally refer to western style months by their ordinal number or may "convert" the month from one system to the other before providing an answer. In the latter case, some respondents might erroneously equate a lunar month with the western month of the same ordinal order (e.g., equating the first lunar month with January).

[6] Interviewers were instructed to note if they used the household registration form to complete the household schedule. Although this information was not entered into the original household data set, it was coded in connection with a special subsample of children under age 10 created specifically for the present study (see main text below). Based on this subsample, it appears that interviewers referred to household registers for only about 1 percent of households when obtaining age data for household members.

age in the household schedule, her stated age in the detailed questionnaire, and her calculated age based on the birth date recorded in the detailed questionnaire. It is important to note, however, that in a majority of households in which an eligible woman resided, the informant for the household schedule was the eligible woman herself.[7]

Direct computer linkage between information recorded in the household schedules and the eligible woman questionnaires is not possible for the children of eligible women. In order to compare their ages as reported in the household schedules with their ages and birth dates as reported in the interviews with their mothers, a probability subsample of children was selected and specially coded for this purpose. In addition to the stated age in the household schedule, several other items were coded for the subsample, including information on who served as the informant for the household schedule and details about the way in which the age of the child was stated in both the household schedule and the birth history.

The subsample was chosen by randomly selecting records of children in different age groups under age 10 from the birth histories in the eligible woman data set. Information on the age of the child as stated in the household schedule was added through manual matching.[8] Age data from the household schedule was successfully matched for a total of 547 of the 550 children originally selected from the birth histories. Younger age groups are deliberately over-represented to permit more detailed analysis of several features of age reporting specific to younger children. Thus, of the original 550 children selected, two-fifths are less than 1 year old, and one-fifth each consists of children aged 1, aged 2-4, and aged 5-9 (based on age as determined from year and month of birth).

A major concern in the present study is the extent to which stated ages in Thailand correspond to "correct" ages as defined by demographers, namely completed age in years as of the last birthday. Because the TDHS recorded both stated ages and birth date information, the extent of errors in age reporting can be directly assessed by comparing an individual's stated age with their age as calculated from year and month of birth. This assumes that the birth dates themselves are accurate. While there is no independent proof that the information on year and month of birth is correct, it is reasonable to assume so given the importance of knowing this information within the Thai

---

[7] The identity of the respondent for the household schedule was noted on the questionnaire forms but not entered into the original household data set. However, the identity of the household informant was coded in connection with the same subsample of children under age 10 referred to in the previous footnote and described in the main text below. According to this subsample, for approximately two-thirds of the household schedules associated with eligible women questionnaires, the eligible woman herself served as the informant. Since having a young child present in the household may increase the chance that the child's mother is home, this sample may overstate the proportion of cases in which the eligible woman herself is the informant for the household. On the other hand, even in cases where the eligible woman is not the primary respondent for the household schedule, she may have been consulted at the time her age was being recorded in the schedule. Thus the true proportion of times someone other than the eligible woman reported her age in connection with the household schedule may be lower or higher than the one-third suggested by the subsample check.

[8] Given the purpose of this analysis, the children selected were limited to those for whom both a birth year and month were provided. Furthermore, since data on reported age in the household schedule was to be matched to the information from the eligible woman questionnaire, only children in the birth history who were reported by the mother as residing in the household were selected.

cultural context. Moreover, in the case of the children of eligible women, the information was often based on documentary evidence.[9] Undoubtedly some of the information provided on birth year and month is in error, and some additional errors were introduced in the course of data entry. Thus, not all of the calculated ages are correct. Nevertheless, the extent to which calculated ages are in error is probably quite minor compared to the extent to which stated age deviates from the true completed age.

Birth Date Reporting

As indicated above, the TDHS solicited the month and year of birth for both eligible women respondents and their children. This section examines the reporting of these birth dates in the eligible woman questionnaires, starting first with the woman's own birth date and then the birth dates of her children derived from the birth history.

Eligible Women

All women present in a household on the night prior to the interview, who had ever been married, and who were between the ages of 15 and 49 were defined as eligible for a detailed interview about various demographic and health matters. Of the eligible woman identified, 94 percent were successfully interviewed. In the course of the interview, each woman was asked her month and year of birth and then her current age. Interviewers were instructed not to obtain a woman's birth date from a documentary source, such as the household registration form or the woman's personal identity card, unless she could not remember it. Although interviewers noted on the questionnaire when documentary evidence was consulted, this information was not coded into the data set. Thus, in the results presented below, the percentages "reporting" birth dates includes both cases in which birth dates literally were reported as well as those in which some form of documentation was consulted. To the extent that documentation was consulted, results will be biased towards the reporting of modern style dates (B.E. years and Western months), since this is the form in which birth dates are usually recorded in official documents. A spot check of questionnaires reveals that the number of women for whom births dates were derived from documentation is relatively small.

---

[9] As noted, documentation of birth dates of the children was usually based on the household registration form or on a birth certificate. In a small number of cases, the birth dates of eligible women were also based on documents, primarily the household registration form or a personal identity card. Although the official status of these documents does not "guarantee" that they are correct, they undoubtedly are in the large majority of cases. The official who issues a household registration form may have to estimate the birth date if the person registering cannot provide it. However, once a birth date is recorded in the household registration, in effect it is transferred directly from that form to any subsequent official documents issued (such as the identity card currently issued at age 15 or subsequent household registration forms if the person changes households). For recent generations, the birth date recorded in the household registration form usually has been based on the birth registration form, so it is likely to be accurate. For older people, especially the current elderly, birth dates in the household registration form often are less precise and are based on a verbal account when originally entered.

As Table 1 indicates, birth years were obtained for almost all women (98 percent), and both a month and a year were given for the vast majority (87 percent). Also shown are several background variables that might be associated with birth date reporting. There is little variation in the percentage for whom a birth year was recorded according to age, rural-urban residence, region, or exposure to mass media. Several ethnic groups (defined in terms of language and religion), in particular Malay Moslems and hill tribes, are characterized by distinctly lower proportions for whom the year of birth is available. In addition, women with three or fewer years of education are somewhat less likely to have reported a birth year.[10]

Differentials in background variables are somewhat more pronounced when examining the percentage for whom both a birth year and month are available. Educational attainment, urban residence, and exposure to mass media are positively associated with the completeness of birth date reporting, although both a birth year and month are available even for the large majority of the deep rural population (85 percent), women with less than four years of primary school (72 percent), and women who are not regularly exposed to either TV or radio (79 percent). In several ethnic minority groups, in particular, Thai and Malay Moslems, Cambodians, and hill tribes, the percentage of eligible women with complete birth date reporting is also distinctly lower. Even among the hill tribes, however, which shows the lowest percentage of all groups, more than half the eligible women (55 percent) reported both the month and year of their birth.

Table 1 also indicates the type of year (animal or B.E.) and month (lunar or Western) employed by women who reported both a month and year of birth. While four combinations are possible, the results make clear the type of year and type of month reported are strongly associated: animal years are typically combined with lunar months,

---

[10] In Table 1 and subsequent tables that include background variables, urban refers to the population residing in officially defined municipal areas, including the Bangkok metropolis; semi-urban refers to the population residing in officially designated sanitary districts; and deep rural includes the population residing outside municipal areas and sanitary districts. When only rural and urban populations are distinguished, sanitary districts are categorized as rural.

Ethnicity is defined in terms of both language and religion. Among Buddhists, the four major regional dialects are distinguished (with sub-dialects subsumed under them). Together, Thai-speaking Buddhists make up the vast majority of the population and comprise 88 percent of the weighted TDHS sample of eligible women. Moslems are divided into those who speak Malay and those who are native speakers of a Thai dialect. The former almost all live in three southern provinces on or near the Malaysian border, while the latter are divided largely between the other southern provinces and the central region, including Bangkok. Other minority groups include hill tribes, residing mainly in the north, and Cambodians located primarily in the northeastern provinces bordering Cambodia.

Educational attainment is divided into three categories: less than four years of schooling (including no formal schooling); 4-7 years of primary schooling; and secondary schooling or beyond. The distinction between the first two categories is meaningful because four years of primary schooling was the compulsory level that prevailed when most of the women included in the sample were of school age. For a discussion of changes in the education system over the last several decades, see Knodel and Wongsith, 1989.

Exposure to mass media is based on the responses to two questions: one asking if the respondent usually watches TV every week, and another asking if the respondent listens to the radio every day or regularly.

Table 1 Percentage of ever-married women aged 15-49 able to report birth year and birth year and month and percent distribution of type of birth year and month reported, by selected characteristics

Characteristic	Percentage reporting		Percent distribution of women reporting birth year and month by type of year and month reported				
			Animal year with:		B.E. year with:		
	Birth year	Birth year and month	Lunar month	Western month	Lunar month	Western month	Total percent
AGE OF WOMEN							
15-19	97	88	12	21	3	64	100
20-24	98	90	17	20	3	61	100
25-29	98	90	25	18	4	53	100
30-34	99	87	35	17	4	44	100
35-39	98	87	46	13	5	36	100
40-44	99	86	56	10	4	29	100
45-49	99	83	60	12	4	25	100
RESIDENCE							
Deep rural	98	85	43	15	4	38	100
Semi-urban	99	92	36	17	4	43	100
Urban	99	93	12	18	2	68	100
REGION							
Bangkok	99	92	11	16	2	71	100
Central, excluding Bangkok	100	88	41	14	4	41	100
Northeast	99	88	42	14	5	39	100
North	97	84	32	20	4	44	100
South	97	84	41	17	3	39	100
RELIGIO-LINGUISTIC ETHNICITY							
Central Thai Buddhists	99	90	34	14	4	47	100
Northeastern Thai Buddhist	99	89	44	14	5	37	100
Northern Thai Buddhists	99	85	17	28	2	52	100
Southern Thai Buddhists	100	91	48	19	3	31	100
Thai Moslems	98	78	34	12	3	52	100
Malay Moslems	84	62	0	3	5	91	100
Cambodians	99	77	18	25	0	57	100
Hill Tribes	75	55	33	12	1	54	100
Others	97	91	9	12	0	79	100
EDUCATION							
0-3 years	94	72	56	8	4	32	100
4-7 years	99	88	39	17	4	39	100
Secondary or more	100	99	3	13	1	83	100
EXPOSURE TO MASS MEDIA							
TV and radio regularly	99	91	27	16	3	53	100
Only TV regularly	99	90	35	18	4	43	100
Only radio regularly	98	84	45	15	5	35	100
Neither TV nor radio	97	79	46	12	4	39	100
TOTAL	98	87	36	16	4	44	100

Note: Results in this table are based on weighted tabulations.

while B.E. years are typically combined with Western months. Nevertheless, a substantial minority of those reporting an animal year reported a Western month. Only a small minority combined a lunar month with a B.E. year.

Many background variables show strong associations with the way in which birth dates were expressed. The percentage of women reporting their birth date in traditional terms (animal years and lunar months) is highest for women in deep rural areas and lowest in urban areas—and lower still in Bangkok than in urban areas collectively. The reverse is true for the percentage reporting birth dates in modern terms (B.E. years and Western style months). Likewise, the least educated women were the most likely to report traditional-style birth dates, while the most educated women tended to use modern-style birth dates. Women who regularly watch TV and listen to the radio are most likely to report birth dates in terms of the modern system, followed by women who are regularly exposed only to TV. Regular exposure to the radio alone, however, does not increase the likelihood of using the modern calendar.

The strong negative association between age and the reporting of a birth date in modern terms undoubtedly reflects a trend over time for Thais to think of birth dates in those terms. Such a trend likely reflects the impact of increasing education, urbanization, and exposure to mass media as well as increased interactions with the state bureaucracy and other modern organizations that require dates to be reported in modern terms.[11]

Some regional differences are also apparent. With the exception of Bangkok women, who follow the urban pattern, northern women are less likely to report their birth date in traditional terms than women living elsewhere. This is due in part to a greater tendency of northern women to mix the traditional and modern system, combining Western style months and animal years. The reasons underlying the regional differences, however, are unclear.[12]

Ethnic differentials are also apparent but may be misleading with respect to non-Thai-speaking minorities. As noted above, substantial proportions did not report both a birth year and month and thus can not be included in this part of the analysis. In addition, those for whom a determination of both birth year and month could be made may be disproportionately based on documentation, if interviewers were more prone to turn to documentation in these cases (which is likely given difficulties in communicating) or if there was a tendency for minority respondents to be less

[11] Increasing familiarity with and usage of the modern system of date reporting will not necessarily lead to the disappearance of knowledge of the traditional system, at least in connection with birth dates, given that the animal year and lunar month of birth continue to retain their importance for astrological purposes.

[12] Since different interview teams were responsible for the different regions, it is possible that somewhat different procedures were followed despite their initial common training. For example, in cases where women who reported their birth year in animal year style could not remember their month of birth, the team operating in the north might have been more likely to consult a document to obtain the month (which would have been recorded in the western style). If this is the case, the regional differences would be artifactual. Without further information, no firm conclusions about the source of the regional pattern can be reached.

able to remember their birth dates on their own. Since birth dates in documents such as household registration forms or identity cards are likely to be in terms of modern dates, the results for these minorities could be biased towards modern date reporting. In the case of Malay Moslems, however, the high proportion reporting modern-style birth dates undoubtedly reflects the absence of a traditional calendar based on Thai-style animal years and lunar months. The fact that the percentages of Cambodians and hill tribe women for whom complete birth dates are reported in modern terms are above average, however, may be largely artifactual.

There are undoubtedly strong associations among many of the background variables examined. For example, age and education, residence and education, and residence and mass media exposure are all closely linked. Thus it is of interest to determine the extent to which these interrelated characteristics exert independent influences on the type of birth year and month reported. Multiple Classification Analysis (MCA) is used to make this assessment. Table 2 presents the results in terms of the percentage of respondents who report their birth year in the modern (B.E.) style, their birth month in the modern (Western) style, and both year and month in a modern style. Results are shown in relation to each background variable, both unadjusted and adjusted for the effects of the other background variables included in the analysis. Given the likelihood discussed above that results for non-Thai speakers are biased towards use of the modern system, Table 2 is restricted to the Thai-speaking population only.[13]

The adjusted results show clearly that age, education and residence all retain clear unidirectional associations with modern birth date reporting, although in each case the strength of the association weakens to some extent (as evident from a comparison of the eta and beta statistics). The persistently strong inverse relationship with age suggests that a substantial time trend is underway towards more awareness of the modern system of reporting birth dates, independent of compositional changes in the population with respect to educational attainment and urbanization. The association with mass media exposure is less clear than with the other background characteristics and is weakened substantially once the other characteristics are taken into account. Nevertheless some impact of mass media appears to remain, particularly for those who are exposed regularly to both TV and radio.

Children

Each eligible woman respondent was asked to report a complete history of all the live births she had experienced, including the month and year of each birth, whether or not the child had survived, and, if alive, the current age of

[13] The unadjusted results in Table 2 are not directly comparable to those presented in Table 1 for several reasons. As noted, Table 2 relates only to Thai-speaking respondents. In addition, Table 1 is limited to respondents for whom a complete birth date (both a year and month) is available, while the base population in Table 2 depends on the particular dependent variable. For example, when examining the percentage reporting a B.E. birth year, all Thai speakers for whom a birth year is reported are included (whether or not a birth month is reported), but when examining the percentage reporting a western birth month, all Thai speakers for whom a birth month is reported are included (whether or not a birth year is reported). Only when examining the percentage reporting both a B.E. year and a western month is the analysis limited to those with a complete birth date.

Table 2 Percentage of ever-married Thai speaking women aged 15-45 reporting a B.E. year, a Western month, and both a B.E. year and Western month, unadjusted and adjusted by multiple classification analysis, by selected characteristics

Characteristic	Percentage reporting a B.E. year		Percentage reporting a Western month		Percentage reporting both a B.E. year and a Western month	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
AGE OF WOMEN						
15-19	63	65	83	85	63	65
20-24	61	59	80	78	60	58
25-29	55	52	70	67	53	50
30-34	44	44	60	59	43	43
35-39	38	38	48	47	34	34
40-44	33	34	38	41	28	30
45-49	26	30	35	41	24	29
Eta/Beta	.24	.21	.33	.29	.26	.23
RESIDENCE						
Deep rural	39	41	50	53	36	39
Semi-urban	45	43	60	58	43	42
Provincial urban	63	53	84	75	63	52
Bangkok	71	62	87	78	71	62
Eta/beta	.23	.14	.28	.19	.25	.16
EDUCATION						
0-3 years	28	35	32	42	24	32
4-7 years	41	42	55	56	38	39
Secondary or more	840	74	96	83	83	72
Eta/beta	.31	.24	.34	.22	.33	.24
MASS MEDIA EXPOSURE						
TV and radio regularly	54	49	69	63	53	48
Only TV regularly	45	44	60	60	43	42
Only radio regularly	37	40	46	50	32	36
No TV or radio	36	43	47	55	34	42
Eta/Beta	.15	.06	.19	.09	.16	.08
TOTAL	45	45	59	59	43	43

Note: Results in this table are based on weighted calculations.

the child. In contrast to efforts to obtain the woman's own birth date, the respondent was specifically requested to show documentary evidence (either the birth certificate or household registration) to verify the birth date for each child if possible. Interviewers were also instructed to indicate whether each child's birth date was based on documentary evidence or on the mother's report alone. As noted above, respondents were able to show some form of documentation for 52 percent of the live births reported.

As the unweighted results in Table 3 make clear, the completeness of the dates reported for the births varies according to whether the child is still living and whether the mother was able to provide documentation to verify the birth date.[14] Complete birth dates, including both a year and month, are available for the vast majority of living children (94 percent) but for less than half (43 percent) of the children who died prior to the time of the survey. If documentation was shown, birth dates are almost 100 percent complete for surviving children and are complete in the large majority of cases (93 percent) even if the child died. If the birth date was based only on the mother's report, it was likely to be complete for most living children (88 percent) but for just over one in three of the children who died (37 percent). Note that birth date documentation was provided for only one in ten children who died, as compared to more than half of those who survived (as evident from the unweighted number of cases shown in Table 3). Even in cases where the birth date was incomplete, the mother was often able to provide the year of birth. Among children whose birth date was incomplete, in almost 60 percent of cases of those still living and in over 40 percent of cases of those who died, the birth year was provided.

Table 4 shows the weighted percentages of births for which dates were verified through documentation and for which the birth date was not complete according to various background characteristics of the child and the mother. Since birth dates are almost universally complete if taken from documentation, results regarding the percentage of children with incomplete birth dates is shown both for children whose source of birth date information was only the mother's report as well as for all children. Note that the latter will be very strongly influenced by the percentage that were documented since in virtually all such cases the birth date is complete. Given the focus of the present study on age reporting, the results in Table 4 are limited to living children except for the initial comparison between living and dead children.

The percentage of children for whom the birth date could be verified through documentation varies only modestly with current age of the child and virtually not at all by gender. The fact that the percentage is lowest for the children over 20 is likely influenced by the greater chance that a child of this age will have moved out of the

[14] The term "reported" is used to refer to the provision of information on the birth date regardless of whether the respondent verbally reported the birth date. In cases where documentation was provided, the interviewers often simply copied the birth year and month directly from the document without necessarily having the respondent orally confirm the date.

Table 3 Percent distribution of children by completeness of birth dates (as reported in birth histories) according to the source of information and whether children were living or dead

Status and compieteness of recorded birth date	Total	Source of recorded birth date		
		Mother's report	Documen-tation	Source not indicated
CHILD LIVING				
Date complete	94.4	88.1	99.5	88.5
Year only	3.3	6.9	0.4	2.6
Month only	0.4	0.8	0.0	1.0
No year or month	1.9	4.2	0.0	7.9
Total Percent	100	100	100	100
Number	16497	7209	9097	191
CHILD DEAD				
Date complete	42.6	36.5	92.9	90.9
Year only	24.7	27.2	3.9	0.0
Month only	8.0	8.9	0.0	0.0
No year or month	24.8	27.3	3.1	9.1
Total percent	100	100	100	100
Number	1283	1145	127	11

Note: Results in this table are unweighted and are based on children of women who have at least one living child.

household and not be listed in the household register which typically was the main source of documentation of birth dates.[15] The likelihood of a child's birth date being documented is inversely related to how urban an area is, with by far lower percentages of children being documented in the strictly urban areas than in either semi-urban or strictly rural areas. Note that the percentage showing documentation in Bangkok (as shown under the comparisons by region) is even lower than urban areas generally. This pattern probably reflects both a greater hesitancy for urban residents to show documentation than their rural counterparts and the substantially greater tendency for urban residents to live in residences in which they are not registered (and thus not to have the relevant household registration form available to show the interviewer).

The main regional differences in the percentage of children for whom the birth date was documented, other than the low percentage for Bangkok, are the lower levels found for the central and southern regions compared to the northern and northeastern regions. Ethnic differences for Thai-speaking Buddhists follow these regional differences.

[15] In practice, it is not unusual for an adult child to move out of the parental household but still remain in the household registration. Thus, this effect on birth date documentation is less severe than it might otherwise be.

Table 4 Percentage of children for whom birth dates (as reported in birth histories)were verified through documentation and percentage with incomplete birth dates, by selected characteristics of the child and the mother

Characteristic	Percentage of births with verified birth dates	Percentage of births with incomplete birth dates	
		All births[1]	Date reported by mother
ALL BIRTHS			
Child living	62	5	12
Child dead	10	57	63
LIVING CHILDREN			
Age of Child			
0-4	60	2	3
5-9	65	4	10
10-14	66	4	13
15-19	61	6	15
≥20	55	10	21
Sex of child			
Male	62	5	12
Female	61	5	12
Residence			
Deep rural	69	5	13
Semi-urban	60	5	12
Urban	31	7	10
Region			
Bangkok	28	8	11
Central, excluding Bangkok	56	6	12
Northeast	69	2	7
North	73	6	21
South	58	7	17
Religio-linguistic ethnicity			
Central Thai Buddhists	50	6	11
Northeastern Thai Buddhists	69	2	7
Northern Thai Buddhists	79	3	14
Southern Thai Buddhists	56	5	11
Thai Moslems	64	8	20
Malay Moslems	62	22	57
Cambodians	76	4	18
Hill Tribes	73	21	61
Others	38	2	3
Education of mother			
0-3 years	65	11	28
4-7 years	64	4	10
Secondary or more	30	1	1

Note: Results in this table are weighted and are based on children of women with at least one living child.
[1] Includes births for whom source of recorded birth date is unknown.

Among the remaining ethnic groups the percentage of children with documented birth dates tends to be average or above, except for the small residual category of "other" ethnic groups. The main educational differential evident is the far lower percentage of children of mothers with at least secondary schooling for whom birth date documentation was shown.

The percentage of children with incomplete birth dates depends both on the percentage for whom documentation was shown (of which virtually all are complete) and the ability of mothers who did not produce documentation for the child in question to remember both a month and year of birth for the child. As the results in Table 4 show, the percentage of undocumented birth dates of children that were incompletely reported has little relation to the sex of the child or to rural-urban residence. In contrast, the percentage of undocumented birth dates of children that were incompletely reported increases steadily with the age of the child, undoubtedly reflecting the greater difficulty of remembering events that occurred further in the past. Among ethnic groups, Malay Moslems and hill tribe women were far less likely than others to be able to recall both a month and year of birth when documentation was unavailable. Education is clearly related to the reporting of children's birth dates, with the percentage of undocumented dates that are incompletely reported declining sharply as education increases. Thus, despite the fact that women with at least secondary education were particularly unlikely to show documentation, very few of their children's birth dates were incomplete overall.

Given the strong influence of residence on the likelihood of a child's birth date being documented and the fact that mother's education is strongly associated with type of residence, it is of interest to examine the extent to which the observed educational differentials persist once residence is controlled. Table 5 indicates the percentage of children for whom the birth date could be verified through documentation according to the mother's education within the various residence categories. With only minor exceptions, the likelihood that documentation of children's birth dates was provided declines with the extent to which an area is urban, regardless of education. However, the relatively small minority of women with a secondary education living in deep rural and semi-urban areas were much less likely to show documentation than lesser educated women living in those same areas. In both provincial urban centers and in Bangkok, all educational groups show relatively low percentages of documented birth dates, although even in these areas, children of mothers with secondary or higher education are the least likely to have had their birth dates documented.

Table 5 Percentage of children whose birth dates (as reported in birth histories) were verified through documentation, by residence and education of mother

Education of mother	Deep rural	Semi-urban	Provincial urban	Bangkok
0-3 years	70	59	31	33
4-7 years	69	63	38	29
Secondary or more	36	40	29	19

Note: Results in this table are weighted and are based on children of women with at least one living child.

There is little reason to assume that better educated women are less likely than lesser educated women to have documentation in their possession in either rural or urban areas. Thus, the negative effect of secondary education (in both rural and urban settings) and of urban residence on providing documentation to the interviewer probably reflects differences in the attitudes of respondents towards the interview and interviewer. Women who are both rural and lack education beyond the primary level are likely to feel socially inferior to well-educated, urban interviewers (all of whom were currently enrolled in or had graduated from university) and hence to be more respectful and submissive. For them, the interview may have resembled encounters with the government bureaucracy in which they typically feel they have little option other than to comply with requests made of them. Moreover, in rural areas village headmen typically notified villagers of the impending visit of the interview team and requested them to cooperate. Women in rural areas who have a secondary or higher education, however, are likely to be from locally prominent families and, by virtue of both their education and their local standing, are less likely to feel at a social status disadvantage vis-a-vis the interviewer or to feel the need to comply with requests that may be a nuisance or seem unduly intrusive.

In urban areas, the general conditions of life probably instill a greater distrust of strangers which pervades respondents at all levels of education. Encounters with outsiders of higher status are also less unusual in an urban setting. Thus, urban residents are less likely to be submissive in survey interviews, especially if they feel a request is being made to examine some official document which may or may not be entirely in order. The lower rates of providing documentation in urban areas are quite consistent with the substantially higher refusal rates for the overall interview that the TDHS experienced (Chayovan et al., 1988).

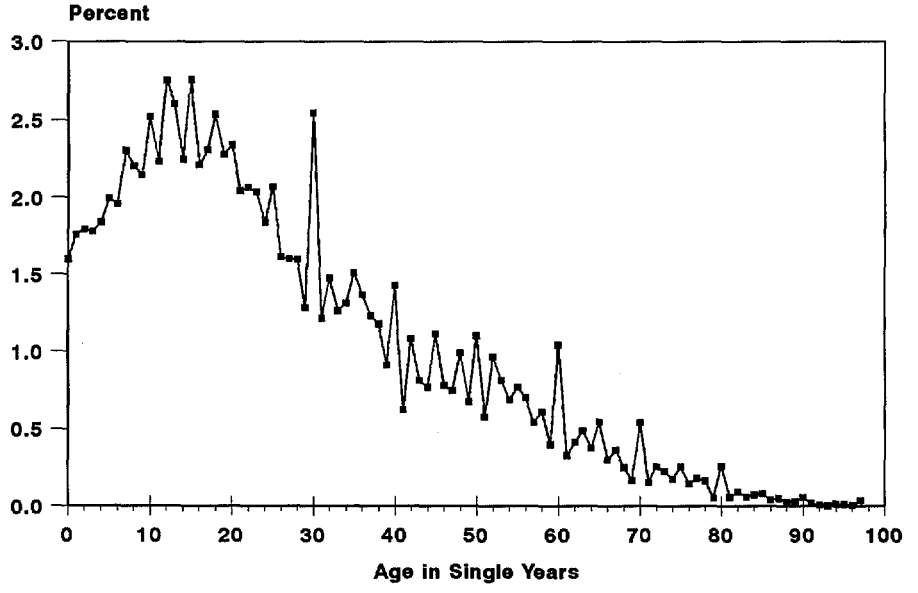
Aggregate Age Distributions

One of the best known features of age-misreporting is the tendency to round stated ages, typically to numbers terminating in the digits zero and five. Such "age heaping" is clearly evident in Thai census data prior to 1970, when the census changed the basis for tabulating age from ages as directly stated to ages as calculated from reported birth dates. The extent and nature of age heaping can be examined from TDHS data on the ages of all household members recorded in the household schedule, on the ages of ever-married women self-reported in the eligible woman interview, and on the ages of children of eligible women recorded in the birth histories that were part of the eligible woman questionnaire.

All Household Members

Figure 1 shows the percentage distribution according to stated age of all persons enumerated in the household; this includes both usual household members who were temporarily absent and temporary visitors who spent the previous night in the household. Obvious heaping is evident at ages 30, 40, 60, 70, and 80. A close examination also

Figure 1
Percent Distribution of the Household Population by Single Years of Stated Age, Thailand Demographic and Health Survey, 1987



Note: Results are based on weighted tabulations.

reveals less pronounced, but likely heaping at ages 10 and 50 (but not at 20) and at most ages terminating in the digit five.[16]

In addition to age heaping, the graph shows a generally increasing percentage of the population from age 0 through the mid-teens followed by a generally decreasing percentage at subsequent ages. The increase prior to the mid-teens undoubtedly reflects the recent rapid decline in fertility which has caused the size of birth cohorts to decrease. Nevertheless, it appears that there is an unusually low number at age zero. As revealed below, when stated and calculated ages for children are compared, this is a result of the misreporting of some children under the age of one as being one year old in the absence of compensatory misreporting in the opposite direction.

There are various ways to measure the degree of digit preference. The degree of preference (or avoidance) for individual terminal digits can be determined from the percent distribution of the "blended" population according to the terminal digit of stated ages. Blending the population is a technique designed to compensate for the effect mortality might have on the association between the size of a population at a terminal digit and the ordinal rank of

[16] One factor that can contribute to the age heaping at terminal digits ending in zero is the practice of stating approximate ages combined with a qualifier indicating that a person is less than or more than that age, since the approximate age stated in such cases often is some multiple of ten.

the digit. In a blended population, the percentage found at each terminal digit is expected to be 10 percent. Deviations from 10 percent indicate that the particular terminal digit is either over- or underrepresented. A summary measure of the extent of age heaping based on the blended population, known as the Myers index, has also been developed.[17]

Table 6 shows both the percent distribution of terminal digits in the blended population and the Myers summary index by selected background characteristics based on persons aged 10—89 who were enumerated in the household schedule. For the blended population as a whole, as well as for every subgroup shown except the small group of usual members who did not sleep on the premises the prior night, the highest proportion of persons enumerated have ages stated as terminating in zero and the second highest proportion have ages stated as terminating in five, thus confirming the tendency for ages to heap on these two terminal digits.

The values of the Myers blended index, which can range from 0 if no age heaping is present to 90 if all ages were reported at a single digit, suggest that age heaping is relatively mild compared to many other developing country populations or historical Western populations. The results also show that there is little difference in the degree of age heaping between the two sexes or between rural and urban populations. Regionally, age heaping is greatest in the south and least in the northeast. The largest difference in the Myers index is found between usual residents of the household and visitors, with greater heaping apparent for the latter. While such a difference might be expected given that the informant for the household may be less likely to know precise ages of persons who are not regular household members, the relatively small size of the sample of visitors may also account in part for this finding.

Eligible Women

Figure 2 compares the percent distribution of eligible women according to age as stated in the eligible woman questionnaire and as stated in the household questionnaire. There is very close correspondence between the two. This is not surprising given that the eligible woman was also the informant for the household schedule in the majority of cases.[18] Unfortunately, it is not possible to distinguish cases in which the woman is reporting her own age in the household schedule and cases in which someone else is reporting her age in the household schedule, since the identity of the household informant was not entered into the original computerized data set. Both distributions show a rapid increase in the number of ever-married women at consecutive ages up to age 25 reflecting the fact that in Thailand most women do not marry until they reach their late teens or early twenties or even later in the case

[17] For a fuller description of the blended method of determining digit preference and the calculation of the Myers summary index, see Shryock and Siegel, 1976.

[18] As discussed in a previous footnote, based on the special subsample of children coded for the present study, it appears that in roughly a third of the households with eligible women, someone other than the eligible woman herself served as the informant for the household schedule.

Table 6 Percentage of blended population aged 10-89 enumerated in the household schedule with stated ages ending in each digit 0 to 9 and Myers summary index of digit preference, by background variables

Variable	Terminal digit of age										Myers summary index
	0	1	2	3	4	5	6	7	8	9	
SEX											
Male	13.40	7.83	10.56	9.21	9.11	11.68	9.42	9.69	10.25	8.65	6.09
Female	14.05	7.91	10.02	10.25	9.28	11.44	9.37	9.28	10.28	8.12	6.04
RESIDENTIAL AREA											
Urban	13.78	8.18	10.08	9.71	8.42	11.58	9.42	9.52	10.89	8.44	6.32
Rural	13.73	7.81	10.43	9.75	9.34	11.55	9.39	9.47	10.15	8.36	5.87
REGION											
Bangkok	13.73	7.44	9.94	9.91	8.59	11.78	9.44	9.57	10.94	8.67	6.45
Central	13.23	8.81	10.18	8.89	9.65	11.59	9.58	9.44	10.39	8.24	5.39
Northeast	13.01	7.62	10.57	10.26	9.90	10.83	9.57	9.52	10.00	8.72	4.67
North	14.35	7.62	9.99	9.66	8.47	12.06	9.43	9.53	10.41	8.48	6.82
South	15.32	7.84	10.99	9.69	9.38	12.34	8.69	9.33	9.95	7.46	8.66
WHETHER USUAL RESIDENT											
Yes	13.73	7.83	10.35	9.78	9.26	11.55	9.43	9.51	10.25	8.31	5.70
No	13.99	9.50	11.20	8.55	6.74	11.93	7.90	8.32	10.97	10.91	9.00
WHETHER SLEPT ON PREMISES LAST NIGHT											
Yes	13.64	7.84	10.27	9.79	9.20	11.73	9.45	9.51	10.25	8.32	5.89
No	14.83	8.18	11.53	9.25	9.17	9.66	8.77	9.13	10.47	9.01	6.83
TOTAL	13.74	7.87	10.38	9.75	9.19	11.56	9.39	9.48	10.27	8.38	5.95

Note: The percentages are based on the blended population (using the Myers method of blending). They thus represent indexes of preference for each individual digit.

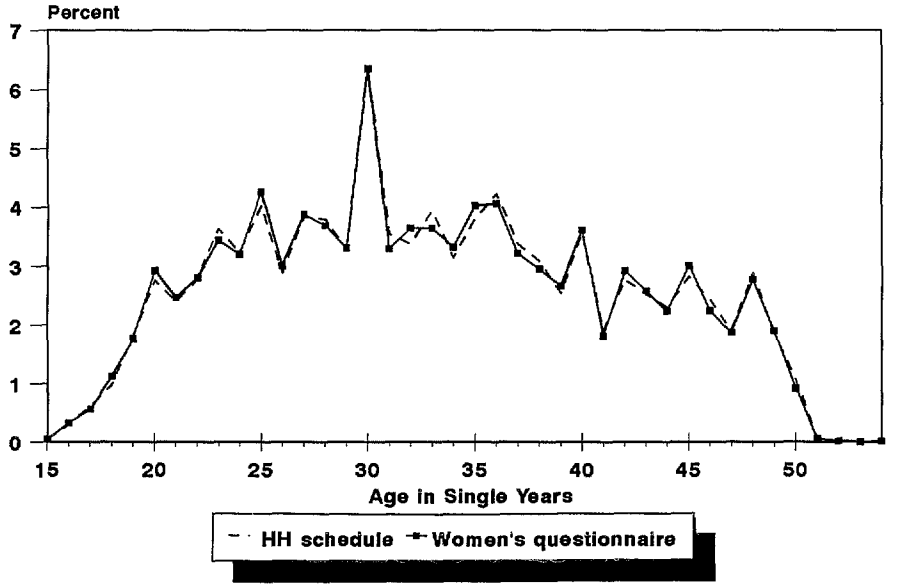
of urban women. Nevertheless, it is relatively clear that heaping on digits ending in zero and five, and especially on age 30, characterizes the stated ages of ever-married women in both sources of age data.

Figure 3 compares the percent distribution of eligible women according to age as stated in the eligible woman questionnaire and as calculated from their year and month of birth.[19] It is clear that there is virtually no age

[19] Calculated ages in the TDHS are based on the difference between the year and month of interview and the year and month of birth without taking the day of the month into account. This is true for the calculated ages of both eligible women and their children as stated in the birth histories. In cases where the month of interview was the same as the month of birth, the person in question was assumed to be the completed age that would have been reached as of the birthday that month.

Figure 2

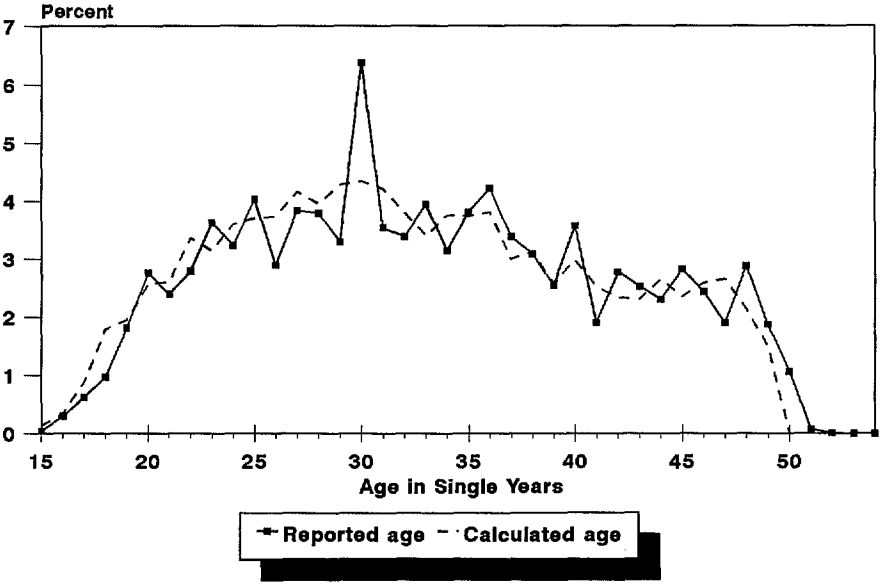
Percent Distribution of Ever-Married Women According to Single Years of Age as Stated in Household Questionnaire (HH) and Women's Questionnaire, Thailand Demographic and Health Survey, 1987



Note: Results are based on weighted tabulations.

Figure 3

Percent Distribution of Ever-Married Women According To Single Years of Stated Age and Calculated Age Thailand Demographic and Health Survey, 1987



Note: Results are based on weighted tabulations.

heaping evident in the distribution of calculated ages. If the calculated age is assumed to be largely accurate (see below), the discrepancies between the proportions of women with a particular calculated and stated age indicates the extent of preference (or avoidance) for each particular age. Clearly most of the irregularities in the distribution of stated ages are due to age misreporting rather than to genuine fluctuations in numbers of persons at particular actual ages. Given the close correspondence between stated ages of eligible women in the household schedule and the eligible woman's questionnaire, only a comparison between stated ages from the eligible woman questionnaire with ages calculated from birth dates is presented. Comparisons between stated ages in the household schedule and calculated ages yields very similar patterns of differences.

Children of Eligible Women

Figure 4 compares the percent distribution of children of eligible women according to their stated age and their age as calculated from their year and month of birth based on information provided by the eligible woman when reporting her birth history. As in the case of eligible women, there is no apparent heaping evident in the distribution of calculated ages although there are some irregularities, especially in the distribution of children under 12. The slight peaks at ages 1, 5, and 7 in the calculated ages might reflect genuine fluctuations in births over time. The quality of birth registration in Thailand, however, is not sufficient to determine if the pattern observed in calculated ages corresponds to genuine fluctuations in registered births.[20] Some slight heaping of stated ages, however, is apparent at ages ending in terminal digits of 0 or 5 starting at age 10 but with the exception of age 25.

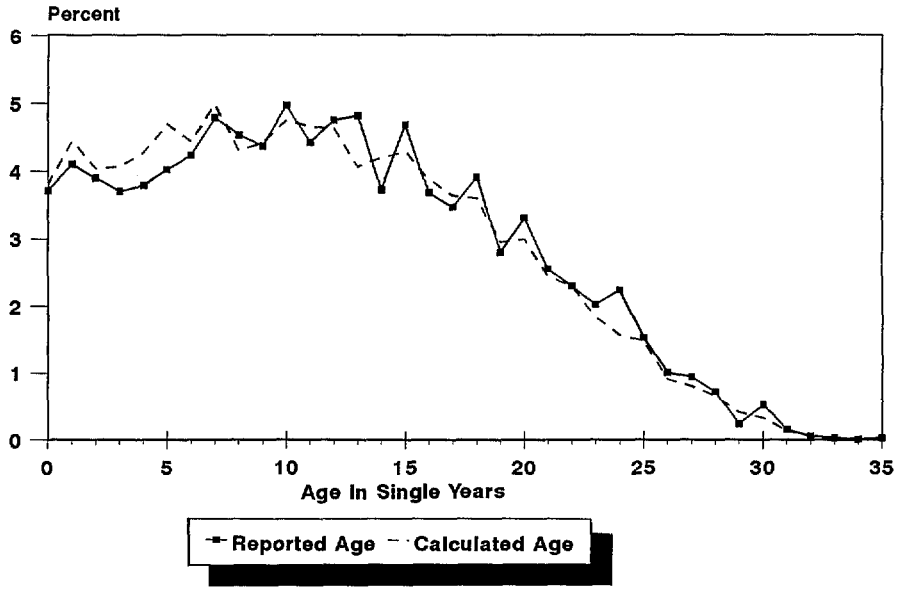
The number of children whose calculated age is 0 is likely to be slightly underestimated, given that any child whose birth month is the same as the interview month is treated as having reached his or her birthday. As a result, even children whose birthday is later in the month than when the interview took place will be attributed the completed age associated with the impending birthday. Thus, at each calculated age except age 0, there will be some children who are actually one year younger than the given calculated age according to a strict definition of completed age. At the same time, some number who in actuality are of that completed age will be attributed to the next calculated age. The gain and loss at any given calculated age except 0 tend to cancel each other out. In the case of age 0, however, only a loss can occur since some children will be falsely attributed to age 1 in this manner but none can be gained from younger ages.

Perhaps the most striking feature of the comparison of the calculated and stated single year age distributions of children as presented in Figure 4 is the consistently higher proportion of children at each calculated age up to age 7 compared to the proportion at each equivalent stated age. There are at least two interrelated practices that contribute to this pattern: the tendency to state ages in decreasing detail as a child gets older and the tendency to state ages that are one year older than the actual completed age when ages are stated in terms of whole years.

---

[20] Since the TDHS took place over a period of several months starting in late March, to determine the number of registered births corresponding to children of particular calculated single years of age would be quite complicated and require taking the month of birth into account.

Figure 4
Percent Distribution of Children According to Single Years of Stated Age and Calculated Age Thailand Demoghaphic and Health Survey, 1987



Note: Results are based on weighted tabulations.

Table 7 shows the percentage of children under age 10 whose ages were stated in terms of whole years by their mother when reporting her birth history. The results are shown by age of the child and have been tabulated both for all children under age 10 mentioned in the birth histories and for the special subsample of children under age 10 discussed above, in which ages were coded in somewhat greater detail. Both sets of results agree quite closely with each other and clearly indicate that children's ages are rarely stated in units of a whole year for infants under a year old and in less than half the cases for children of completed age one. The tendency to state ages in whole years, however, increases rapidly with the age of the children and by the time a child is five, only rarely is the child's age stated in more detail than whole years.

Table 8 examines in greater detail the way infants' ages are reported based on the special subsample of children. The results show that mothers typically state the ages of infants who are less than a few months old in terms of days and/or weeks and ages of older infants in terms of months. Not until a child is only a month or two from its first birthday do any appreciable proportion of mothers refer to the age of their infant in terms of whole years. Note that whenever a child's age is stated in terms which include units less than a year, the stated age is very likely to correspond to the calculated completed age in years. This is true not just for infants but for older children as well (e.g., a child of two years and three months is very likely to be truly two years old in terms of completed age). Only when age is stated in units of whole years is there a substantial chance that the stated age will be off by a full year or more. Thus the practice of reporting ages of young children in units of less than whole years, which is

probably common not only in Thailand but elsewhere as well, reduces substantially the chance that an infant under age one will be "transferred" to age one as a result of age misreporting. Likewise the misreporting of ages (with respect to years of age) of young children who have passed their first year of life is moderated by the fact that some of these children's ages are also reported in terms including units smaller than a year although the impact of this practice declines rapidly with increasing age of the children.

Table 7 Percentage of children (reported in birth histories) whose age is stated in terms of whole years, by age of child as calculated from year and month of birth, for total sample and for a specially coded subsample

Calculated age (in completed years)	Total sample		Specially coded subsample	
	Percent	Number of cases	Percent	Number of cases
0	4	665	4	219
1	48	737	47	109
2	74	679	79	33
3	79	668	86	37
4	91	693	90	35
5-9	98	3547	97	110

Note: Results in this table are unweighted.

Table 8 Percent distribution of children under age one by lowest unit in which age of child is stated (as reported in birth histories), according to age as calculated from the month and year of birth

Calculated age (in months)	Lowest unit in which age is reported				Total	Number of cases
	Days	Weeks	Months[1]	Years		
0	73	27	0	0	100	11
1	28	22	50	0	100	18
2	17	8	75	0	100	24
3	17	0	83	0	100	12
4	9	14	77	0	100	22
5	6	6	88	0	100	16
6-8	2	0	98	0	100	54
9-11	0	0	85	15	100	61

Note: Results in this table are unweighted and are based on a specially coded subsample of children reported in the birth histories and living in the sample household.
[1] Includes ages reported in half years.

With respect to understanding the implications of this practice for accounting for the observed differences in the number of young children at a particular stated age in relation to the number at the equivalent calculated age, it is important to note (as shown below) that at any stated age, children recorded in the TDHS tend to be made up primarily of two groups: those whose calculated age is the same as the stated age and those whose calculated age is one year less that the stated age. Thus children at stated age S_x can be viewed as gaining some children from the previous calculated age C_{x-1}, but losing some children from the equivalent calculated age C_x to the next stated age S_{x+1}. In the early ages, the proportion of children at any stated age x that are gained from the previous calculated age C_{x-1} tends to be lower than the proportion of children that are lost from calculated age C_x to the next stated age S_{x+1}. This is because a higher proportion of children in the previous calculated age C_{x-1} will have their ages stated in a way that involves units of age smaller than a year than in the case of the equivalent calculated age C_x. Note that the calculated age is unaffected by the type of age units used to state the child's age since it is based only on the month and year of birth relative to the time of interview.[21]

In addition to the practices discussed above, if fertility decline is sufficiently sharp to result in successively smaller birth cohorts each year, this will also contribute to the deficit of the number of young children at a particular stated age relative to the equivalent calculated age. This is so because declines in successive single year cohort sizes will decrease the gains to stated age S_x from children at calculated age C_{x-1} relative to the loss from age C_x to S_{x+1}, thus reducing the numbers (and proportions) at the stated age relative to the number at the equivalent calculated age.

Individual-Level Differences Between Reported and Calculated Ages

The forgoing analyses of age distributions examined differences between the aggregated distributions of proportions of persons according to stated and calculated age. The TDHS data also enable direct comparisons to be made between the stated and calculated ages for individual eligible women respondents and their living children (the two categories of persons for whom information on birth dates was recorded). By taking advantage of this feature of the TDHS data and assuming that the calculated age in most cases represents the true completed age, it is possible to examine the patterns of age misreporting at the individual level in some detail and to address a number of issues that require such data.

---

[21] For example imagine that there are 100 children each at calculated ages 1, 2, and 3, and that the proportion of children at each of these ages for whom age is stated in terms that involve units of less than whole years is 50, 30, and 20 percent respectively. Furthermore, assume that for all of the children whose age is stated in terms that involve units of age less than whole years, stated age is correct in terms of completed years (or can be easily converted into the correct completed age, e.g., 18 months would mean the child is one year old in completed age). Finally, assume that for half of the children whose ages are stated in terms of whole years, the stated age is the same as the calculated completed age, but that for the remainder it is stated as one year older. Under these circumstances, stated age 2 would gain 25 from calculated age 1, but lose 35 from calculated age 2 to stated age 3; while stated age 3 would gain 35 from calculated age 2 and lose 40 of calculated age 3 to stated age 4. Thus the number of children whose stated age is 2 would be 90 and the number of children whose stated age is 3 would be 95, in both cases less than the number at the equivalent calculated age.

As noted in the introduction and verified below, Thais tend to calculate ages by simply subtracting their year of birth from the current year—without regard to when during the year their birthday occurs. This is one of the most common sources of age misreporting in Thailand, and it means that the extent and specific pattern of misreporting will vary depending on when during the year a study is conducted. The TDHS took place between late March and June. Had the fieldwork taken place later in the year, more of the respondents would have been passed their birthday at the time of the interview; thus, their stated ages would have been more likely to equal their actual completed ages. In contrast, had the fieldwork occurred earlier in the year, before most respondents had their birthdays, a greater proportion of the women would have misreported their age as a year older than actual completed age. Thus, any assessment of the extent of age misreporting in Thailand depends on the time of year in which the data are collected. This point should be borne in mind when considering results in this section.

Eligible Women

As shown in Table 9, only 37 percent (unweighted) of the eligible women stated ages in their detailed interview that were identical to their completed age as calculated from their year and month of birth. The largest group of women (43 percent, unweighted) stated their age to be one year older than their actual completed age at last birthday. Only relatively small proportions reported ages younger than their calculated age or two or more years older.

Probably the most important factor underlying this pattern is a tendency for Thais to determine their age by subtracting their birth year from the current year without concern for whether the month (and day) of birth has been passed in the current year. This is equivalent to augmenting one's age when the calendar year changes at New Year's Day.[22] In addition, some Thais consciously think of their current age as the age they are "going-to-be" at their next birthday. This would also lead to stated ages that are one year greater than actual completed ages.[23]

---

[22] Thais refer to this practice as "counting the whole year" (*nap thang pi*) when figuring their age, meaning that they consider their ages to be a function of the current calendar year as a whole. Although it is unlikely that a Thai actively makes a calculation subtracting the year of birth from the current year each time age is asked, such a determination made at some earlier point probably serves as the basis for subsequent determinations made by augmenting age by one year each time the calendar year changes. Note that the tendency to augment age at the passing of the New Year is followed as a way to simplify age determination. It is not culturally defined as *the* correct method of age determination in the same sense that it is in Chinese or Korean cultures (where traditionally a new born infant is considered to be age 1 and becomes one year older at each successive New Year).

[23] The questions on age in the TDHS questionnaire did not explicitly ask for completed age, but simply asked about age. However, interviewers were instructed that completed age was being sought, and this might have reduced the extent to which "going-to-be" ages are recorded in the TDHS data set. For example, if an eligible woman respondent reported her age as "going-to-be" 28, the interviewer, knowing that completed age was being sought, may have simply recorded the age as 27 despite instructions to record the age exactly as stated. It is noteworthy that only very rarely are ages recorded in the TDHS explicitly preceded by the qualifier "going-to-be." The fact that the analysis discussed in the text below indicates that a non-negligible proportion of eligible women appear to follow the practice of considering their age at next birthday as current age suggests that they do not necessarily mention the qualifier when stating their age.

Table 9 Percent distribution of ever-married women aged 15-49 by differences between age as calculated from birth year and month and age as stated in the women's questionnaire, according to timing of interview relative to birth month and type of birth year and month

Timing of interview and type of birth year/month	Difference between stated and calculated age					Total percent
	Calculated greater by:		Both equal	Stated greater by:		
	≥2 years	1 year		1 year	≥2 years	
TIMING OF INTERVIEW RELATIVE TO BIRTH MONTH						
≥3 months later	4	8	52	29	7	100
2 months later	4	11	46	33	7	100
1 month later	4	17	51	23	5	100
Same month	5	19	57	15	4	100
1 month earlier	2	4	24	58	13	100
2 months earlier	3	2	23	60	12	100
≥3 months earlier	2	5	29	54	10	100
TYPE OF BIRTH YEAR AND MONTH						
Animal year, lunar month	4	8	33	43	12	100
Animal year, Western month	3	8	33	46	10	100
B.E. year, lunar month	5	9	38	39	9	100
B.E. year, Western month	3	8	41	43	6	100
TOTAL	3	8	37	43	9	100

Note: Results in this table are unweighted and are restricted to women for whom both a birth year and month were reported.

To assess the importance of this source of error in age reporting, the timing of the interview relative to the respondent's birth month is examined. When respondents augment their age at the New Year rather than at their birthday, their stated age will be the same as their actual completed age if they are interviewed after their birth month has already passed; stated age will be one year older than completed age, however, if they are interviewed before their birth month. When the interview is held during the month of birth, stated and calculated ages will be the same, because no account was taken of the specific day of birth within the month when ages were calculated (in effect, assuming the birthday had already passed).

The results presented in Table 9 indicate that respondents are far more likely to state their age as one year older than their completed age if the interview took place before their birth month than if it occurred during or later than their month of birth. Thus, the practice of determining age by simply adding one to the current age with the change of the calendar year rather than at the passing of a birthday appears to be relatively common.

Note that if the tendency to overstate one's age by a year was due only to the practice of reporting one's "going-to-be" age, stated ages would still increase at the passage of the birthday, not the New Year, and would exceed actual completed ages by one year regardless of the timing of the interview relative to the birth month. Thus, in contrast to the observed pattern, there would be little association between this type of age misreporting and the timing of the interview. Nevertheless, among those respondents interviewed after their birth month and whose stated age differed from their calculated age, the most common mistake was to state their age as one year older than their actual completed age. This suggests that thinking of age in terms of the "going-to-be" age probably exerts some influence on age misreporting as well.

It is also noteworthy that even when the interview preceded the month of birth, approximately a fourth of respondents stated their age correctly in terms of completed years (i.e., their stated and calculated ages are equal). This suggests that a substantial minority of respondents do take the time of year when they were born into account when determining their own age, rather than simply basing their age on the difference between the current year and the year of birth.

The results thus suggest that the overall pattern of age reporting is the outcome of multiple, different, coexisting practices in how Thais subjectively determine their age. The most common practice, however, appears to be to equate one's age with the difference between the current calendar year and the birth year regardless of the birth month. This implies that the extent to which stated ages will be equal to completed age in any cross-sectional survey will depend on the time of year in which the fieldwork takes place. Presumably, had the TDHS taken place toward the end of the calendar year, stated ages would have agreed with calculated ages for a considerably higher percentage of respondents.

Table 9 also shows how differences between stated and calculated ages for eligible women are distributed according to the type of birth date reported. Women who reported both their birth year and month in modern terms were the most likely to state an age equal to their actual completed age and were the least likely to be off by two or more years. Nevertheless, even among this group, the most common pattern is to state one's age to be a year older than the calculated age. Indeed, the percentage of respondents stating their age to be one year greater than their actual completed age varied only modestly by the type of birth date reported.

In order to calculate a respondent's age based on the year and month of birth as provided in the TDHS, it was necessary to convert animal years (which repeat in 12 year cycles) and lunar months into the modern system of B.E. years and Western months. As noted above, the conversion of lunar months into Western months involved some minor imprecision leading in some cases to an error of one month in either direction. A more serious problem is involved in the conversion of animal years into B.E. (or A.D.) years because differing definitions coexist as to when the animal year changes.

Traditionally, animal years are defined in terms of the lunar rather than the solar calendar. When the solar calendar was officially adopted in A.D. 1889 (B.E. 2432), the start of the animal year continued to be defined as the 1st (waxing) day of the 5th lunar month, which typically fell close to the beginning of April, the official start of the solar year at that time. Thus animal years defined in lunar calendar terms more or less coincided with the officially defined solar years. Moreover, the start of both the solar and lunar year during this time was relatively close to the Songkran festival which begins on April 13 and marks the beginning of the yearly cycle of festivals in Thailand.[24] Indeed the Songkran holiday is typically thought of as a celebration of the Thai New Year. However, once the beginning of the official solar year was moved to January 1 in A.D. 1941 (B.E. 2484) to conform to international practice, the official (solar) New Year was separated from the traditional start of the animal year and the Songkran festival.

At present, guidelines for the Royal Calendar recommend that the animal year be considered for convenience to start on the 1st of January along with the B.E. year (The Royal Institute, 1987:10782-84). Printed wall and desk calendars tend to follow this rule, but the largest circulation newspaper, *Thai Rath*, which indicates the current animal year on the top of every page, changes the animal year on Songkran. In addition, astrologers typically still follow a traditional definition when determining the start of the new animal year.[25] Yet another possible complication is created by the fact that Chinese New Year, which typically falls in late January to mid February and is stated in terms of essentially the same 12 year cycle as Thai animal years, is currently widely publicized and celebrated as an unofficial holiday in Thailand. At a minimum, ethnic Chinese who retain a strong Chinese self-identity are likely to consider Chinese New Year as signifying the start of the new animal year.

In any event, there is no clear popular consensus as to when the new animal year changes. Perceptions differ mainly as to whether the animal year coincides with the B.E. year (and thus starts in January) or whether it begins around April, coinciding with an earlier traditional date determined by the lunar calendar or with the Songkran festival. The lack of a clear popular consensus is likely to continue given the absence of any official status for animal years in governmental or commercial dealings and thus the lack of any urgent need to clarify the situation

---

[24] Note that the Songkran holiday has always been defined in terms of the solar calendar, representing the time when the sun moves into Aires (Sindhusarn, 1973:4171-74; Sathirakoses, 1986:1-10). This is contrary to statements made in several ethnographic monographs (deYoung, 1958:135; Phongphit and Hewison, 1990:24).

[25] This is evident from the astrology columns in Thai newspapers, which typically indicate the date in terms of various systems including the day of the lunar month and the animal year. Curiously there appears to be some confusion even among astrologers with respect to when the animal year changes, perhaps reflecting different astrology schools. Of three newspapers monitored in 1991, one (*Matichon*) changed the animal year in its astrology column from the horse to the goat year on March 16, which corresponded to the 1st (waxing day) of the 5th lunar month, but then one day later changed it back to the horse year until April 12, the day before Songkran, when the goat year was started again. In *Thai Rath*, which indicates the current animal year on the top of every page as well as in the daily astrology column, the horse year changed to the goat year on April 13 (Songkran Day) on the page heading but waited until April 14 to do so in the astrology column. In the *Daily News*, the change of animal years occurred in the daily astrology column on April 13. While there seems to be more or less a consensus among newspaper astrologers that the animal year changes in connection with Songkran, an astrologer recently writing for a religious magazine clearly states that the animal year changes on the 1st (waxing day) of the 5th lunar month (Taetomsab, 1990).

to the public.[26] It seems likely, however, that the trend will be to increasingly equate animal years and B.E. years, especially as the international New Year receives more attention in the media and printed calendars circulate more widely.

Whether the animal year should be considered to change in January or April has implications for converting animal years into B.E. years and can affect the calculation of a person's age based on the year and month of birth. For people born from January through March, the B.E. year of birth corresponding to their animal year of birth would be one year later (and hence the person's age would be one year younger) if the animal year starts in April than if it starts in January.[27] For people whose birth month is after this period, there is no ambiguity to which B.E. year it refers (provided the right 12-year cycle can be identified). It is likely that different definitions of when the animal year starts were used in determining the animal year of birth reported by eligible women respondents in the TDHS whose birth month occurs early in the B.E. year. However, there is no way to know from the simple statement of the animal year which system applied.[28]

When animal years were converted to B.E. years during the initial processing of the TDHS, the animal year was assumed to begin in April. To test the correctness of the conversion and to further probe the effect of the type of birth year reported on calculated ages, Table 10 compares the distribution of differences between the stated and calculated ages of eligible women according to the month of birth, type of birth year stated, and timing of the interview relative to the month of birth. Note that the survey took place from late March through June, so that the interview month could not precede the birth month for all respondents who were born from January through March. Likewise, for respondents who were born from July through December, the interview necessarily preceded the birth month. For respondents born from April through June, however, the timing of the interview relative to the birth month could be either way. When interpreting the results, it is important to treat cases in which the interview

---

[26] Although a place for the animal year to be entered is included on the governmental birth registration form, there does not appear to be a centrally issued directive as to the system that the registrar should use when determining the current animal year. One official at the registration section in the Ministry of Interior told us that local officials are expected to refer to whatever calendar they have handy for making this determination. Since nowadays calendars typically equate the start of the animal year with the start of the new B.E. year, this would mean that for the purpose of birth registration the animal year changes as of the first of January. However, when we inquired of the Bangkok Metropolitan Authority official (who is under the Ministry of Interior) in charge of filling out birth registration forms at Chulalongkorn Hospital, she indicated that she changed the animal year as of the first (waxing) day of the fifth lunar month, stressing that this was the traditional definition.

[27] Take, for example, someone who reports she is approximately 30 at the time of the survey (April through June 1987) and who reports their birth year as the year of the monkey (*pi wok*) and their birth month as the third lunar month (approximately February). Her A.D. birth year would be 1956 if the animal year started in January (and hence ran from January 1956 to December 1956), but would be 1957 if the animal year started in April (and hence ran from April 1956 to March 1957). Thus, her calculated completed age could be either 31 or 30 at the time of the survey, depending on when the animal year started.

[28] Indeed, the respondent is unlikely to know which definition was used, both because she herself did not make the determination and because most Thais are unaware that varying definitions exist. This latter fact makes it very difficult to get respondents to articulate when they believe the animal year changes. Most likely they assume that if they need to know what the current animal year is, they can always ask someone else who will know.

Table 10 Percent distribution of ever-married women aged 15-49 by difference between age as calculated from birth year and month and age as stated in the women's questionnaire, according to the month of birth, type of birth year stated, and timing of the interview relative to the month of birth

Timing of interview, month of birth, type of birth year	Difference between stated and calculated age					
	Calculated greater by:		Both equal	Stated greater by:		Total percent
	≥2 years	1 year		1 year	≥2 years	
INTERVIEW DURING OR AFTER BIRTH MONTH						
Birth month January-March						
Birth month reported as B.E. year	5	13	64	15	3	100
Birth year reported as animal year						
Assuming year starts in April	3	6	32	47	11	100
Assuming year starts in January	10	32	47	10	1	100
Birth month April-June						
Birth year reported as B.E. year	3	19	63	13	2	100
Birth year reported as animal year	7	24	52	14	3	100
INTERVIEW PRECEDED BIRTH MONTH (AND BIRTH MONTH APRIL-DECEMBER)						
Birth year reported as B.E. year	2	3	25	62	9	100
Birth year reported as animal year	3	6	30	49	13	100

Note: Results in this table are unweighted and are restricted to women for whom both a birth year and month were reported.

occurred during or after the birth month separately from cases in which the interview preceded the birth month, because of the strong influence of the timing of the interview on the pattern of differences between stated and calculated ages.

The results indicate that for respondents born after the first three months of the calendar year, the pattern of differences between stated and calculated ages is relatively similar for those who reported their birth year in B.E. terms and those who reported their birth year in terms of an animal year, with the pattern depending mainly on whether or not the interview preceded the birth month. Thus, among respondents born in April through June who were interviewed during or after their birth month, only a small minority stated their age as one year older than the calculated age (13 and 14 percent, respectively) regardless of whether their birth year was given in B.E. or animal year terms. Likewise, for respondents born in April through December who were interviewed before their birth month, the most common pattern (62 and 49 percent, respectively) was to state their age as one year older than the calculated age, regardless of whether the birth year was in B.E. or animal year terms.

These comparisons are more complicated when the month of birth falls during January through March, as the results depend on when the animal year is assumed to change. Two sets of results are presented for respondents born during these months who reported their birth year in terms of animal years. One set assumes the animal year changes as of April, while the other assumes the animal year changes in January. As explained above, the calculated age will be one year older for respondents born during this period under the assumption that the animal year starts in January.

Presumably, if the conversion of animal years into B.E. years was consistent with the way in which each respondent's animal year of birth had in actuality been determined, a similar pattern of differences between stated and calculated ages should characterize respondents reporting an animal year of birth and those who reported a B.E. birth year. However, neither assumption produces a pattern that closely agrees with that found for respondents born during the same months who reported a B.E. birth year. When the animal year is assumed to start in April, respondents who reported their birth year in terms of animal years were much more likely to state an age one year older than their calculated age than women who reported their birth year in B.E. terms (47 versus 15 percent). In contrast, when the animal year is assumed to start in January, respondents who reported their birth year in terms of animal years were much more likely to state an age one year younger than their calculated age than women who reported their birth year in B.E. terms (32 versus 13 percent).

These findings suggest that the assumption of an April start to the animal year probably underestimates the calculated age of a perceptible share of respondents, while the assumption of a January start overestimates the age of many. Thus, it appears that each definition of the start of the animal year has been used to determine the year of birth of some respondents. Any uniform assumption about when the animal year starts must therefore lead to some error when calculating age from birth dates for respondents who were born in the first few months of the year and who reported their birth year in animal year terms. Given that it is not possible to know how the animal year was determined for any individual respondent, some error in calculating ages from birth dates is inevitable. However, respondents affected by this type of error represent only a small proportion of all respondents, since the error only applies to some unknown portion of respondents who were born in the first few months of the year and who reported their birth year in animal year terms.[29]

Table 10 also shows findings of interest among respondents who were interviewed during or after their birth month. In the case of women who reported their birth year in B.E. terms, the pattern of differences between stated and calculated ages is quite similar between those born in January through March and those born in April through June. In the case of women who reported their birth year in animal year terms, the pattern of differences between stated and calculated ages shows greater similarity between those born in January through March and those born in April

[29] There may be other, more serious inaccuracies of unknown origin introduced by the conversion of animal to B.E. years when calculating ages, but any assessment must await concrete hypotheses as to how they arise.

through June under the assumption that the animal year starts in January than under the assumption that the animal year starts in April. Assuming that there is less ambiguity in the conversion of animal years to B.E. years for respondents born in April through June than for those born during the first three months of the year, this suggests that an assumption of a January start to the animal year probably reflects actual practice better than does an assumption of an April start. Despite this evidence, the present analysis incorporates the assumption of an April start to the animal year to maintain consistency with the original coding of the TDHS. As pointed out above, the amount of error introduced is like to be relatively minor. To the extent that error is introduced, it will lead to a one-year underestimate of the calculated age for respondents who reported their birth year in animal year terms.[30]

By treating the ages of eligible women calculated from the reported birth year and month as their actual age in completed years, it is possible to examine the relationship between preferences for stating ages terminating in particular digits and the accuracy of age reporting. Table 11 compares the stated and calculated ages of eligible women respondents according to the last digit of their stated ages, using data from the eligible woman questionnaire. The analysis is restricted to women whose stated age ranged from 18-47 in order to minimize biases that would result from the fact that the TDHS only interviewed women whose calculated age was between 15 and 49.[31] In

---

[30] Note that if the effect of this bias were eliminated, the pattern of differences between stated and calculated ages in relation to the timing of the interview relative to the birth month that is presented in Table 9 would provide even stronger evidence that the most common way to determine one's age among respondents is to simply equate one's age with the difference between one's year of birth and the current year without consideration to when during the year one was born. Note that the cases affected by the bias involve only respondents who were born during January through March and thus were necessarily interviewed during or after their birth month. Since the bias results in underestimating the calculated age by one year, the proportion of cases in which the stated age exceeded the calculated age by one year when the interview was later than or during the birth month is thus overstated in Table 9. At the same, the proportion of cases in which the stated age exceeded the calculated age by one year when the interview followed the birth month is unaffected.

Some idea of how much the bias affects the results in Table 9 can be gained by comparing the results as presented with those that would have ensued had the animal year been assumed to start in January. For summary purposes, results can be combined for all women who were interviewed after or during their birth month, and these women can be compared to all women who were interviewed before their birth month. Assuming an April start of the animal year, as did Table 9, 25 percent of all women who were interviewed after or during their birth month stated their age as one year older than their calculated completed age. If a January start to the animal year were assumed, this would be reduced to 13 percent, providing an even more striking contrast to the 56 percent of women who stated their age as one year older than their calculated age among all women who were interviewed before their birth month. In reality, the percentage who stated their age as one year older than their calculated age among women who were interviewed after or during their birth month should lie somewhere between 13 and 25 percent, since it is likely that in reality both definitions of the start of the animal year coexist in some unknown mix.

[31] Given that only ever-married women aged 15-49 (as defined by calculated age) were interviewed in the TDHS, women whose stated age was at or close to either extreme of this age range are limited in the direction and extent their calculated age could deviate from their stated age. For example, any included respondent who stated her age as 15 could not be younger than 15 according to her calculated age and any included respondent who stated her age as 49 could not be over 49 with respect to her calculated age. In the same vein, respondents who stated their age as 16 or 17 could be at most only 1 or 2 years younger than their stated age while respondents who stated their age as 48 or 47 could be at most only 1 or 2 years older than their stated age. Since in practice, few respondents stated an age that deviated more than 2 years from their calculated ages, the direction and extent of differences between stated and calculated ages for women whose stated age was in the 18-47 range are little affected by the age limitations imposed on the initial selection of respondents in the TDHS.

Table 11 Comparison of stated and calculated ages by last digit of stated age, among ever-married women aged 18-47

Terminal digit of age as stated in the women's questionnaire	Percentage for which stated and calculated ages:		Mean difference (in years) between stated and calculated ages			
			Ignoring direction of difference		Considering direction of difference	
	Are equal	Differ by ≥2 years	Including values of zero	Excluding values of zero	Including values of zero	Excluding values of zero
0	38	13	.82	1.32	.28	.46
1	41	7	.73	1.23	.36	.61
2	39	11	.76	1.24	.39	.64
3	36	13	.82	1.27	.43	.66
4	39	12	.77	1.25	.37	.60
5	35	14	.86	1.36	.47	.72
6	39	13	.78	1.28	.47	.77
7	38	9	.74	1.19	.47	.76
8	36	11	.80	1.25	.52	.80
9	34	9	.76	1.16	.61	.94
All ages	37	11	.79	1.26	.42	.69

Note: Results in this table are unweighted.

addition, limiting the analysis to women with stated ages of 18-47 ensures that each terminal digit is represented by the same number of stated ages (three) within the selected age span.[32]

A number of different measures comparing the stated and calculated ages are presented. The percentage of women whose stated and calculated ages are equal does not vary greatly according to the terminal digit of their stated age, although an above analysis revealed age heaping to be particularly pronounced for ages ending in 0 and 5. A slightly above average proportion of women with stated ages ending in 0 have stated ages equal to their calculated ages, and the proportion of women with stated ages terminating in 5 who did so is only slightly below average. However, if the percentage of women whose stated age deviates from their calculated age by at least two years is considered, above average percentages are associated with ages terminating in 0 and 5. In both cases, though, the percentages indicate that age misreporting of this magnitude involves only a small minority of respondents.

The mean difference between the stated and calculated ages has been computed in four different ways in Table 11, depending on whether or not the direction of the difference is taken into account and whether or not the calculation

[32] Thus, terminal digit 0 is represented by stated ages 20, 30, and 40; terminal digit 1 is represented by stated ages 21, 31, and 41; and so on.

is based on all cases or only on those in which a difference exists. The fact that eligible women were more likely to overstate than understate their age is reflected in the fact that the mean net differences (whether for all cases or for only those were a difference exists) are positive regardless of the terminal digit of the stated age. This reflects the fact that the most common misreporting involves stating one's age as one year in excess of the correct completed age.

There is some tendency for persons who state their age as terminating in 0 or 5 but whose actual age does not end in these digits to misstate their age by a greater extent than persons who incorrectly state their age as ending in other digits. This is apparent from the larger mean absolute differences associated with stated ages terminating in 0 and 5 when cases where no difference exists are excluded from the calculation. Persons who incorrectly state their age as terminating in 0, however, are apparently drawn relatively equally from those whose calculated ages are above and below the stated age. Thus, the mean net difference between the stated and calculated ages for cases where the two are unequal is lower for persons who misstate their age as ending in 0 than for those who misstate their age as ending in any other digit. In addition, the lowest mean net difference between stated and calculated ages based on all cases (including those where the two are equal) is also found to be associated with stated ages terminating in 0.

For most purposes, analyses involving age in demographic research studies tabulate data by age groups, typically of five years, rather than by single years. By doing so, the effects of age misreporting can be substantially reduced. Results presented in Table 12 provide an indication of the extent to which grouped age data are affected by the patterns of age reporting observed in the TDHS data. The first three columns compare the mean calculated age of eligible women in each five-year age group when ages are grouped according to age as calculated from birth year and month, according to age as stated in the eligible women's questionnaire, and according to age as stated in the household schedule.

Note that age is recorded in the data set in terms of whole years rather than in terms of "exact" age which would incorporate fractions of years. Thus women who have just reached age 23 and those who are 23 years and 11 months old would both be coded as age 23. As a result, the mean "exact" age of each age group is approximately half a year older than that shown. If allowance is made for this, it is clear that the mean age of most age groups when women are grouped according to their calculated age is very close to the mid-point of the age interval spanned by the age group. For example, the mean calculated age of 27.1 found for women in the calculated age group of 25-29 corresponds to a mean "exact age" of approximately 27.6 and is quite close to mid-point (27.5) of the age group. The main exception is found for the youngest age group, 15-19, and reflects the fact that only ever-married women were included in the eligible woman sample. Given that far more 19-year-old women than 15-year-old women are married in Thailand, the age distribution of this age group tends to be skewed towards the older end.

Table 12 Mean calculated age, percentage whose calculated age is less than bracketed by age group, and percentage whose calculated age is more than bracketed by age group, by age group based on different types of age determination

Age group	Mean calculated age when age grouped by:			Percentage less than bracketed by age group when age grouped by:		Percentage more than bracketed by age group when age grouped by:	
		Age stated in:		Age stated in:		Age stated in:	
	Calculated age	Women's questionnaire	Household schedule	Women's questionnaire	Household schedule	Women's questionnaire	Household schedule
15-19	18.0	17.7	17.8	a	b	3	4
20-24	22.2	21.8	21.8	10	9	5	7
25-29	27.1	26.5	26.6	11	12	1	3
30-34	31.9	31.3	31.4	15	14	3	4
35-39	36.8	36.2	36.3	16	15	2	3
40-44	41.9	41.5	41.6	13	13	6	7
45-49	46.8	46.2	46.2	16	16	b	b
All ages[b]	32.5	32.5	32.5	14	14	3	4

Notes: Results in this table are weighted.
[a] Since women whose calculated age was under 15 or over 49 were excluded from the TDHS sample, the percentage whose actual age is less than the 15-19 age group or more than the 45-49 age group is necessarily zero.
[b] Includes women for whom stated age is 50 or over, but calculated age is under 50.

When women are grouped according to stated ages, whether based on ages as stated in the eligible woman questionnaire or in the household schedule, the mean age is lower than when women are grouped according to calculated age. This reflects the predominant tendency for a substantial portion of women to state an age one year older than their actual completed age. For most age groups, the difference in the mean calculated age is 0.4 to 0.6 years younger when women are grouped according to their stated age compared to when they are grouped according to their calculated age. Generally there is very little difference between the mean calculated age of parallel age groups based on the two sources of stated age, i.e., the eligible woman questionnaire and the household schedule. This is not surprising since, as pointed out above, the eligible women respondent was frequently also the informant for the household schedule.

Table 12 also shows, for those groupings based on stated ages, the percentage of women whose calculated age is less than the ages bracketed by the interval as well as the percentage of women whose calculated age is more than the ages bracketed by the interval. Overall, less than a fifth of eligible women would be placed in the "wrong" age group (assuming that the calculated age represents the true age) if grouped according to stated age: 14 percent fall in an older age group and 3 to 4 percent fall in a younger age group than those to which they actually belong. The greater likelihood of being incorrectly classified into an older age group, rather than a younger group, again reflects the predominance of cases in which age is stated to be one year older than the actual completed age whenever stated

and calculated ages disagree. As would be expected, it makes little difference whether stated ages from the eligible woman questionnaire or from the household schedule are used as the basis for the age groupings.

Table 13 examines the pattern of differences between calculated and stated ages according to various background characteristics of the eligible women respondents. Almost regardless of any background characteristic, the most common error among women who do not state their age as equal to their calculated completed age is to state their age as one year older. This is true of all age groups, although the tendency appears to be particularly pronounced among the youngest women. Likewise, it holds true regardless of rural-urban residence, region, ethnicity, or education.

More serious reporting errors, however, do vary according to the background characteristics shown in Table 13. For example, the proportion of women who state their age to be more than 2 years different in either direction from their calculated age increases fairly steadily with the age of the women. None of the women whose calculated age was 15-19 stated that they were 2 or more years younger than they actually were, and only 5 percent stated an age 2 or more years older than their calculated age. In contrast, stated age deviated from calculated age by 2 or more years for 18 percent of women aged 40-44 and 16 percent of those aged 45-49.

Only rather modest differences in the extent of such serious age misstatement are apparent according to rural-urban residence or region. Among ethnic groups, however, Malay Moslems and Cambodians show particularly high percentages (22 and 28 percent respectively) of women who stated ages that differed from their calculated ages by two years or more. It is somewhat surprising that hill tribes showed the greatest accuracy in stated ages, but this finding may be largely artifactual. Interviewers of hill tribe women may have relied more on household registration forms to determine age, either because of communications problems or because hill tribe women were unable to state their age on their own. Educational attainment also shows a relationship to the accuracy of age reporting, with the most educated women being the least likely to misstate their ages by 2 years or more.

Children of Eligible Women

As noted above, the TDHS asked eligible women for the month and year of all live births, with documentation if possible, and the age of each child still living. It is thus possible to calculate the completed age of each living child for which the requested information was provided and to compare the calculated age with the stated age to assess the accuracy of the age reporting. The results are presented in Table 14 according to the calculated age of the child.

Clearly the extent of age misreporting for children, at least when measured in terms of whole years, increases with the age of the child and is extremely low for the youngest children. No infant under six months of age and only 1 percent of those age 6-8 months old were reported to be a year old. However, infants who are close to a year old are sometimes reported as being age one. As children get older, increasing proportions are reported as being a year

Table 13 Percent distribution of ever-married women aged 15-49 according to differences between age as calculated from birth year and month and age as stated in the women's questionnaire, by selected characteristics

Characteristic	Difference between stated and calculated age					Total percent
	Calculated greater by:		Both equal	Stated greater by:		
	≥2 years	1 year		1 year	≥2 years	
AGE (calculated)						
15-19	0	3	29	63	5	100
20-24	0	6	42	45	6	100
25-29	3	6	37	46	8	100
30-34	3	10	41	35	11	100
35-39	5	10	33	42	10	100
40-44	5	8	33	41	13	100
45-49	6	10	34	40	10	100
RESIDENCE						
Deep rural	4	9	37	41	10	100
Semi-urban	4	7	35	46	8	100
Urban	2	7	37	45	9	100
REGION						
Bangkok	2	7	38	44	10	100
Central, excluding Bangkok	3	10	38	43	7	100
Northeast	4	7	36	43	11	100
North	3	8	38	42	9	100
South	5	10	34	43	8	100
RELIGIO-LINGUISTIC ETHNICITY						
Central Thai Buddhists	3	8	38	42	9	100
Northeastern Thai Buddhists	3	7	35	44	11	100
Northern Thai Buddhists	3	7	39	46	6	100
Southern Thai Buddhists	3	11	33	45	8	100
Thai Moslems	7	12	35	38	8	100
Malay Moslems	14	12	35	32	8	100
Cambodians	12	10	31	30	16	100
Hill Tribes	2	14	480	24	12	100
Others	8	4	450	33	9	100
EDUCATION						
0-3 years	7	10	35	35	14	100
4-7 years	3	8	36	43	9	100
Secondary or more	2	7	400	46	5	100

Note: Results in this table are weighted and are restricted to women for whom both a birth year and month were reported.

older than they actually are. Not until children reach age five, however, do the proportions whose stated age is one year older than their calculated age approach the proportions of eligible women who state their own age to be one greater than their calculated age. The greater accuracy of age reporting for younger compared to older children or to the eligible women themselves undoubtedly results from the practice of expressing ages of young children in greater detail than whole years, as documented above (see Tables 7 and 8).

Table 14 Percent distribution of children by the difference between the age of the child as stated by the mother and the age as calculated from birth date, according to calculated age of the child

Calculated age	Difference between stated and calculated age, in years					Total percent	Number of cases
	-≥2	-1	0	1	≥2		
< 6 months	0	0	100	0	0	100	307
6-8 months	0	0	99	1	0	100	173
9-11 months	0	0	89	10	1	100	185
1 year	0	1	87	11	1	100	737
2 years	0	3	79	17	1	100	679
3 years	0	2	70	25	3	100	668
4 years	0	4	61	31	3	100	693
5-9 years	0	4	45	44	7	100	3541
10-14 yrs	1	7	47	39	5	100	3376
15-19 yrs	1	8	48	39	4	100	2792
≥ 20 yrs	3	10	44	37	5	100	2353
TOTAL	1	6	53	35	5	100	15504

Note: Results in this table are unweighted.

Given that eligible women provided the interviewer with documentary evidence of the child's birth date for slightly over half of their children, it is of interest to examine if the accuracy of age reporting is related to whether or not the child's birth date was documented. As Table 15 shows, the pattern of age reporting is relatively similar for children whose birth dates were documented and for those whose birth dates were based only on the mother's report. In both cases, stated and calculated ages (in terms of years) are almost always identical for infants under age one. The tendency to state the child's age as one year older than the calculated completed age is clearly evident for children aged one to four but is still considerably below the levels found for children over five. Whether or not documentation of the birth date was shown to the interviewer appears to have little bearing on the basic pattern of differences between stated and calculated ages and the association of this pattern with the age of the child.

There can be little doubt that birth dates based on documentation are largely correct (except for data entry errors). In addition, it seems unlikely that the stated ages for the children were influenced to any great extent by whether or not documentation was shown to the interviewer. Thus the finding that the patterns of differences between stated and calculated ages of children are very similar regardless of whether their birth dates were documented can be taken as strong evidence that the non-documented birth dates were reasonably accurately reported.

Table 15 Percent distribution of children by the difference between the age of the child as stated by the mother and the age as calculated from the birth date, according to calculated age to child and source of birth date information

Calculated age and source of birth date information	Difference between stated and calculated age, in years					Total percent	Number of cases
	-≥2	-1	0	1	≥2		
< 1 YEAR							
Documentation	0	0	95	4	1	100	313
Mother's report	0	0	98	2	0	100	345
1-4 YEARS							
Documentation	0	3	72	23	3	100	1554
Mother's report	0	2	78	19	1	100	1182
5-9 YEARS							
Documentation	0	4	44	45	7	100	2109
Mother's report	1	4	47	42	6	100	1399
≥ 10 YEARS							
Documentation	2	8	45	40	5	100	5025
Mother's report	2	8	49	36	4	100	3408

Note: Results in this table are unweighted and exclude cases for which the source of the birth date information is unknown.

Results presented in Table 16 show the clear association between the timing of the interview relative to the birth month of a child and the difference between the stated age and calculated age for the child. The stated age tends to agree with the actual completed age (as indicated by the calculated age) in cases where the interview took place during or after the child's birth month but tends to be one year older when the interview occurs prior to the birth month. This is the same pattern as found for the eligible women themselves and confirms the tendency to equate a person's age with the difference between the current year and the birth year without reference to when during the year the person was born. The pattern is considerably less pronounced for children under five than for older children, due to the tendency to state ages in units less than whole years for young children which almost assures accuracy.

Table 16 Percent distribution of children by the difference between the age of the child as stated by the mother and the age as calculated from the birth date, according to calculated age of child and timing of interview

Calculated age and timing of interview relative to birth month	Difference between stated and calculated age, in years					Total percent	Number of cases
	-≥2	1	0	1	≥2		
0-4 YEARS							
≥2 months later	0	2	92	5	1	100	710
1 month later	0	3	91	6	0	100	309
same month	0	13	83	3	1	100	265
1 month earlier	0	0	51	44	5	100	277
≥2 months earlier	0	0	75	22	2	100	1881
5-9 YEARS							
≥2 months later	1	8	71	18	2	100	704
1 month later	0	9	74	15	2	100	272
same month	2	13	73	11	1	100	295
1 month earlier	0	1	24	61	13	100	309
≥2 months earlier	0	2	31	59	8	100	1961
≥10 YEARS							
≥2 months later	3	12	64	18	3	100	1805
1 month later	3	16	66	13	2	100	814
same month	2	21	65	10	1	100	807
1 month earlier	2	3	26	61	8	100	648
≥2 months earlier	1	4	36	53	6	100	4447

Note: Results in this table are unweighted.

The noticeably higher percentages of children whose stated age is one year younger than their calculated age among children whose birth month is the same as the interview month is likely to be an artifact of the way the calculated age was computed. As already noted, the day of the month that a birth took place was not recorded in the TDHS. Thus calculated ages are based on only the month and year of birth in relation to the month and year of interview. Cases in which the interview and birth month are identical were treated as having already reached their birthday and thus to have attained the completed age associated with the birthday in that month. Since in some cases the interview would have occurred prior to the birthday, the person in question would technically fall short of the completed age by some days and in fact be one year younger than imputed by the age calculation.[33]

[33] A detailed examination of differences between calculated and completed ages for children in the first few years of life revealed that most cases where the stated age was one year less than the calculated age were concentrated among those children whose birth month was identical to the interview month. This suggests that the disagreement between calculated and stated age in these cases was probably more a function of the imprecision of the calculation than a genuine age misstatement, especially given the fact that ages of small children tend to be stated in smaller units than whole years. The concentration of cases in which

As discussed above, ages of children who were considered usual members of the household or who happened to be present the night prior to the interview were recorded in the household schedule. Although in most cases the informant for the information recorded in the household schedule was the eligible woman herself, in a substantial minority of cases someone other than the woman served as the household schedule respondent. In most such cases the respondent was either the woman's husband (and typically father of the children) or a grandparent of the children. Information on the identity of the household informant was included in the data set for the specially coded subsample of children previously described. Table 17 compares the pattern of differences between the age of a child as stated in the household schedule and the calculated age based on the birth month and year recorded in the eligible woman questionnaire according to whether the informant for the household schedule was the child's mother or someone else. Informants other than the mother are grouped together, because there are too few cases to distinguish among them.

Table 17 Percent distribution of children by the difference between the age of the child as stated in the household schedule and as calculated from the birth date, according to calculated age of child and relationship of respondent to child

Calculated age and relationship of respondent to child	Difference between stated and calculated age, in years					Total percent	Number of cases
	-≥2	-1	0	1	≥2		
< 1 YEAR							
Mother	0	0	97	3	0	100	143
Other	0	0	95	5	0	100	75
1-4 YEARS							
Mother	0	1	79	19	1	100	136
Other	0	4	78	17	1	100	77
5-9 YEARS							
Mother	0	6	54	38	3	100	72
Other	0	6	38	41	15	100	34

Note: Results in this table are unweighted and are based on the specially coded subsample of children.

The results suggest that the other informants can provide almost as accurate age information for young children in the household but that they are less likely to state the age of older children accurately. Regardless of the identity

the stated age is one year lower than the calculated age among children whose birth month was the same as the interview month is considerably less pronounced for older children as well as for the eligible women themselves.

of the informant, a tendency to state the child's age as one year older than the calculated age is evident. Compared to others, however, the mother is less likely to state an age that is more than a year older or that is a year younger than the child's completed age for children who are five years old or over. Given that this finding is based on relatively few cases, it should be considered as only suggestive.

Conclusions

Clearly Thailand is one of the countries in the developing world where ages and birth dates are reported relatively accurately. The results presented above suggest that most ever-married women of reproductive age, when interviewed in a survey, can accurately state their age within a year of their actual completed age. Almost all Thais know their year of birth, because the information is important in the context of Thai culture, most notably in connection with astrology. Moreover, ever-married women of reproductive age are able to state the ages of their children with at least equal accuracy and can also correctly report the birth dates of their children.

These conclusions are justified despite the fact that the birth dates of eligible women respondents (which were the basis for assessing the accuracy of their reporting) were generally not verified and despite the fact that in slightly more than half of the cases the birth dates of children were recorded from documents rather than the woman's memory. The pattern of differences between stated and calculated ages of children whose birth dates were documented (and thus assumed to be accurate) is virtually identical to the pattern found for children whose birth dates were based only on the mother's report. Moreover, the pattern of differences between stated and calculated ages found for the eligible women respondents themselves is quite similar to that revealed for older children. For these findings to be the result of mere coincidence, rather than a reflection of relatively accurate reporting of non-documented birth dates, seems unlikely.

Although most Thais have a reasonably accurate idea of their age, the evidence presented here indicates that they do not necessarily think of age strictly in terms of completed years. Indeed, several practices for determining age appear to coexist, and apparently only a minority of Thais consciously consider their age to be that reached at their last birthday. At least some appear to think of their age as the age they will reach at their next birthday, i.e., the "going-on" age. The most common practice, however, is to consider age to be the difference between the year of birth and the current year without regard to the month and day of birth. This appears to be a practice of convenience rather than the result of a specific cultural definition of age. It is undoubtedly related to the fact that, at least for most rural Thais, birthdays are not celebrated and often pass unnoticed.[34]

---

[34] The ethnographer deYoung claims that "The Thai reckon a person's age from the time of conception rather than from the day he is born" (1958:48-49). The evidence presented here clearly contradicts this claim. Ages of infants and young children as stated by their mothers or respondents do not incorporate an extra 9 months. In addition, although stated ages often are one year greater than completed age, the relationship of this pattern to the timing of the interview relative to the birthday is contrary to the pattern that would be expected if deYoung's claim were correct. Moreover, none of the many Thais with whom we have discussed age determination has ever indicated that age is reckoned from conception.

From the point of view of demographers, for whom age is correctly defined in terms of completed years, this tendency to determine age without regard to birthdays is potentially the most common source of age misstatement in Thailand. It is important to recognize, however, that the impact of this practice on age reporting will vary depending on when during the year an inquiry is conducted. Respondents interviewed *after* their birthday has taken place will state their age correctly; only respondents interviewed *before* their birthday will tend to overstate their age. Therefore, age data are far more likely to be affected when based on inquiries early in the year than when they are collected later in the year. Note that the TDHS, as well as Thailand's national censuses, took place during the first half of the year, making their results relatively susceptible to errors of this kind.

The fact that Thais commonly overstate their age by a year in the months preceding their birthday is no doubt related to their specific cultural context. Both the need to know one's birth year for astrological purposes and the relative unimportance of celebrating birthdays contribute to the pattern of age misreporting in Thailand. This limits the extent to which the findings here can be generalized to other populations. However, it is likely that the underlying practice of simplifying the calculation of age, using only the current year and the year of birth, is by no means unique to Thailand and will be found in some similar form elsewhere. The logic for defining age in terms of completed years may well be no more compelling to people in other societies than it is for Thais.

Although the magnitude of error introduced into age reporting by this practice may seem relatively insignificant for most purposes, it can produce perceptible distortions in the age pattern of behavioral correlates that are very sensitive to small differences in age, at least within certain ranges of the age span. For example, a distortion of even half a year on average can noticeably affect the proportions married or the mean cumulative number of children born at ages where the onset of marriage and childbearing are concentrated.

The finding likely to be of most general relevance is the tendency for informants to report the ages of young children in units smaller than whole years, and the fact that this tendency declines rapidly with the age of the child. Appropriate studies quite likely would reveal similar patterns in many other populations. As a consequence, the proportion of infants who are actually less than one year old in terms of completed age, but who are reported as age one, is smaller than the proportion of children who in fact are age one but are reported as age two. This pattern repeats itself with increasing age until the point at which children's ages are no longer reported in greater detail than whole years.

Age misstatement of this kind is likely to lead to apparent undercounts of children in the first few years of life when stated age serves as the basis of age tabulations. In addition, the ages of very young children, when stated in units smaller than years, run an added risk of being miscoded because they must be converted from the stated units into years. For instance, the age of a child stated to be 5 months old may be inadvertently keyed in as 5 years old by a coder who is paying less than full attention. This adds to the tendency to incorrectly classify young children by age.

Given these findings, the undercount of infants commonly observed in censuses and surveys in a number of countries including Thailand often may be less the result of under-enumeration than of age misclassification arising from a pattern of age reporting for young children similar to the one documented in the present study. This would only be the case, of course, when age tabulations are based on stated ages rather than ages calculated from birth dates. A comparison of the 1960 and 1970 census age distributions in Thailand clearly illustrates this point (Chamratrithirong et al., 1978). As in the case of earlier censuses, the 1960 census tabulated age based on directly stated ages and is clearly characterized by a deficit of infants under one: the size of the age group under one in the 1960 census is only 68 percent as large as the group aged one. Starting with the 1970 census, age tabulations are based on the reported month and year of birth and, as a result, the apparent deficit of infants disappears: the age group under one in the 1970 census is 10 percent larger than the group aged one. Likewise, little apparent deficit of infants is evident in the 1980 census.

There are undoubtedly other aspects of age reporting in Thailand that bear on the accuracy of age tabulations that could not be addressed in the present study based on TDHS data. For example, stated ages of the elderly are probably affected by practices specific to older persons (Chayovan et al., 1990; Luther et al., 1986). In addition, even among children and ever-married women of reproductive age, the two groups on which the present study has focused, this study has been unable to offer insights into the sources of the more serious age misstatements, limited though they are.[35] Nevertheless, the present study illustrates the potential for furthering the understanding of age and birth date reporting when some forethought is given to the design of survey questionnaires. In the case of the TDHS, only relatively minor additions or modifications of the questionnaire yielded data that considerably expanded researchers' ability to investigate these issues.

Given the very basic importance of age and birth date information to demographic research, studies that yield insights into these topics, both generally and within the specific cultural contexts of the populations under investigation deserve encouragement. Moreover, the likelihood that the social and cultural dynamics influencing age and birth date reporting are constantly changing makes the need for continually updating such research all the more compelling.

[35] Examination of cases in which unusually large discrepancies existed between reported and calculated ages of children revealed that a disproportionate share of coding and data entry errors were involved.

References

Chamratrithirong, A., N. Debavalya, and J. Knodel. 1978. *Age Reporting in Thailand: Age at Last Birthday versus Age at Next Birthday.* Institute of Population Studies, Research Paper No. 25, Bangkok, Thailand: Chulalongkorn University.

Chayovan, N., P. Kamnuansilpa, and J. Knodel. 1988. *Thailand Demographic and Health Survey, 1987.* Bangkok, Thailand: Chulalongkorn University Printing House.

Chayovan, N., J.Knodel, and S. Siriboon. 1990. *Thailand's Elderly Population: A Demographic and Social Profile Based on Official Statistical Sources.* Comparative Study of the Elderly in Asia, Research Report No. 90-2. Ann Arbor, Michigan: Population Studies Center, University of Michigan.

deYoung, J.E. 1958. *Village Life in Modern Thailand.* Berkeley: University of California Press.

Ewbank, D. 1981. *Age Misreporting and Age-selective Underenumeration: Sources, Patterns, and Consequences for Demographic Analysis.* Committee on Population and Demography, Report No. 4, Washington, D.C.: National Academy Press.

Knodel, J. and M. Wongsith. 1989. Monitoring the Educational Gap in Thailand: Trends and Differentials in Secondary School Enrollment. *Asian and Pacific Population Forum* 3(4):1-10,25-35.

Luther, N., N. Dhanasakdi, and F. Arnold. 1986. *Consistent Correction of Census and Vital Registration Data for Thailand, 1960-80.* Papers of the East-West Population Institute, No. 103, Honolulu, Hawaii: East-West Center.

Phongphit, S. and K. Hewison. 1990. *Thai Village Life: Culture and Transition in the Northeast.* Bangkok: Mooban Press.

The Royal Institute. 1987. *Thai Encyclopedia* (in Thai). 1st ed. Bangkok: Prachan Publisher.

Sathirakoses. 1986. *Trud, Sarth: Festival Traditions* (in Thai). 2d ed. Bangkok: Kurusapa.

Shryock, H. and J.S. Siegel (and associates). 1976. *The Methods and Materials of Demography.* Condensed edition by G. Stockwell. New York: Academic Press.

Sindhusarn, U. 1973. *Thai Encyclopedia* (in Thai). Bangkok: Asromsilpa and Sartre.

Taetomsab, A. 1990. Predictions for the year 2533 (1990) (In Thai). *Thammavimoke* 11(107):13-19.