Decomposing Regional and Sex Differentials in Mortality of China, 1999: The Perspective of Causes of Death

Yong Li

Johns Hopkins University

Acknowledgement: This research was made possible by the supports from Hewlett Fellowship from the Hopkins Population Center and the Department of Population and Family Health Sciences at the Johns Hopkins University. The author is very grateful to Dr. Emily Agree and Dr. Kenneth Hill for many helpful suggestions and comments.

Abstract

Using data on causes of death from the Chinese Diseases Surveillance Points (DSP) System in 1999, the author applied indirect demographic estimation methods to adjust the coverage of death registration based on China Censuses of 1990 and 2000, constructed multi-decrement and associated decrement life tables on twelve classifications of causes-of-death as used in Preston et. al. (1972), compared the added years of life if specified causes were eliminated for China in 1999 with Taiwan, Hong Kong, Japan, England and Wales, and United States in 1964 at the similar level of life expectancy at birth, and lastly decomposed the regional and sex differentials in life expectancy at birth by age groups and by causes of death for China in 1999. The results show there were 4.59 years of regional differential between urban and rural areas, and 2.87 years of sex differential for China in 1999. The comparison with the five countries and regions in 1960s suggests that the contemporary China experienced less infectious and parasitic disease but increasing chronic diseases and violence. Decomposition further shows the female infants were in the worst situation comparing with male counterparts on diseases of infancy, respiratory diseases and infant homicide, especially in rural areas. To improve the rural female infant and child health, especially focusing on the above mentioned causes-of-death, is key to reduce the regional and sex differential in mortality of contemporary China.

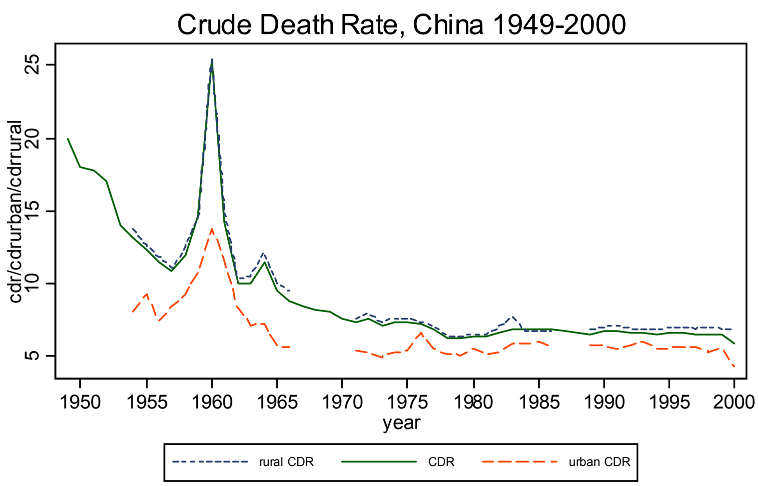
Contents

List of Tables

I. Introduction

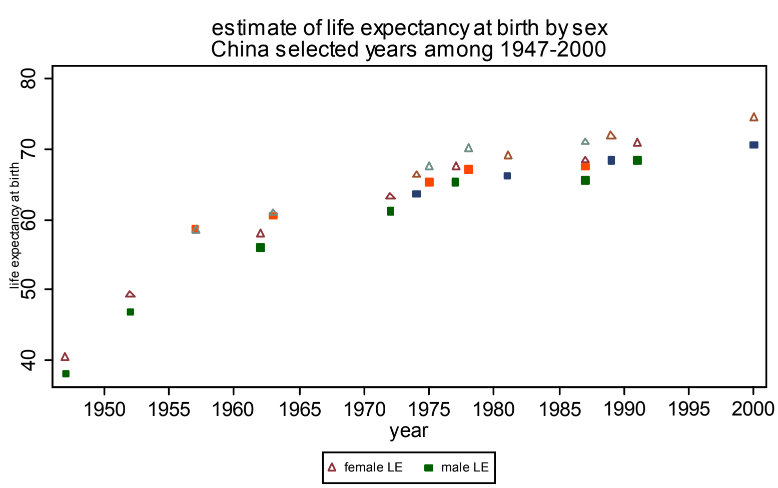
Since 1950s China has experienced a dramatic decline of mortality. The crude death rate has reduced from nearly 20 per thousand in 1949 to 5.9 per thousand in 2000 for the whole country. The decline was not uniform: the severe interruption observed during 1958-61 by the disastrous famine and societal disturbance bounded the crude death rate upwards to the peak 25 per thousand in 1960. Since 1960s mortality restored to decline until 1980s. Over the recent twenty years the crude death rate flats between 6 and 7 per thousand (Figure I-1). In terms of life expectancy at birth, it was estimated about 40 years for males and females in 1940s and increased to nearly 71 years for males and 74 years for females in 2000 (Figure I-2).

Figure I-1



Data sources: 1949-1999 from Chinese statistical yearbook 2000,
with missing cdr at years 1949-53, 67-70, 87-88 for urban and rural areas;
2000 from China 2000 Census, urban refers to city and town and rural refers to county

Figure I-2

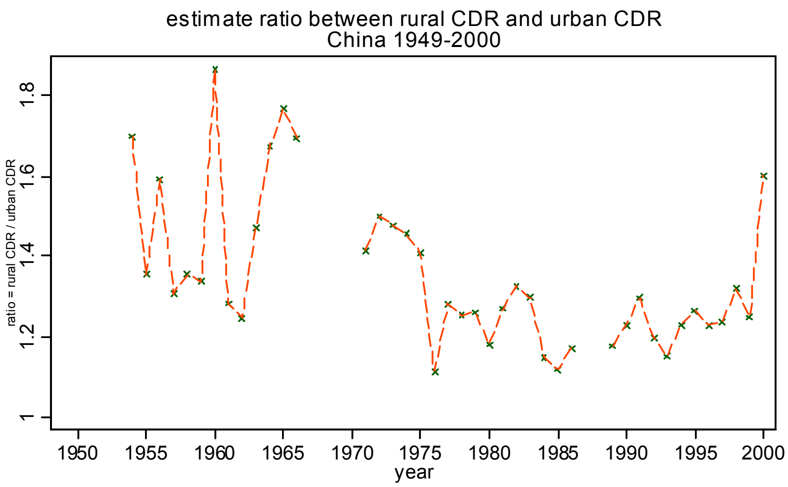


Data sources: 1947, 52, 62, 72, 77, 87, 91 estimate from fertility sampling surveys 1982, 1988 and 1992;
1957, 63, 75, 78, 87 estimate from Chinese statistical yearbook and
adjusted by official CDR in corresponding years;
1981, 89 and 2000 estimate from China Census 1982, 1990 and 2000

Note: estimates from fertility sampling survey (Yan Rui et. al 1993, Liang Jimin 1989); estimates from Chinese statistical yearbook after adjustment (Yasuko Hayase et. al. 1991); estimate from 1982, 1990, 2000 Census (China statistical bureau 1985, 1992, 2002)

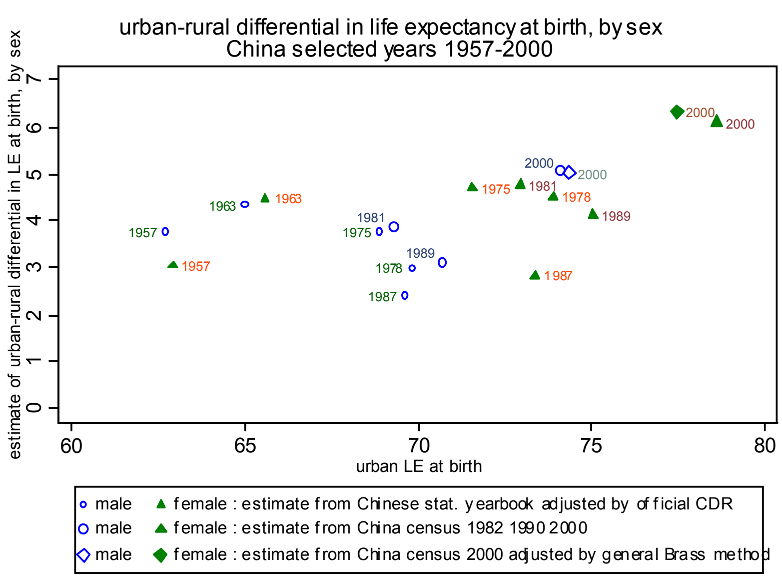
Figure I-1 also shows the regional differential in mortality exists between urban and rural areas. Before mid-1970s, the ratio of crude death rates between urban and rural areas shown in Figure I-3 was averagely around 1.5; it was reduced to averagely 1.25 since 1975. Figure I-4 shows the Rural-urban differential in mortality by sex is relatively stable over the past fifty years. The regional differential for males was about 4 to 5 years and for females was about 3 to 4 years. China 1982 and 1990 census revealed the regional differential at the provincial level shown in Figure I-5 and I-6 that the largest urban-rural differential in life expectancy at birth was nearly 10 years in the north/southwest provinces of China. Among majority of provinces regional differential were averagely 3 to 5 years in 1981, and 2 to 4 years in 1989.

Figure I-3



Data sources: 1949-1999 from Chinese statistical yearbook 2000,
with missing cdr at years 1949-53, 67-70, 87-88 for urban and rural areas;
2000 from China 2000 Census, urban refers to city and town and rural refers to county

Figure I-4



Data sources refer to figure I-2 in page 5.

Figure I-5

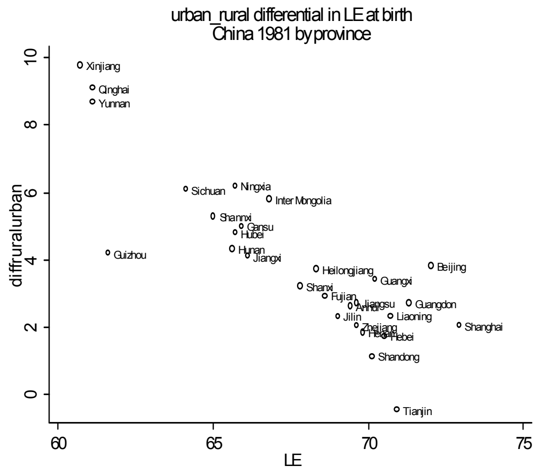
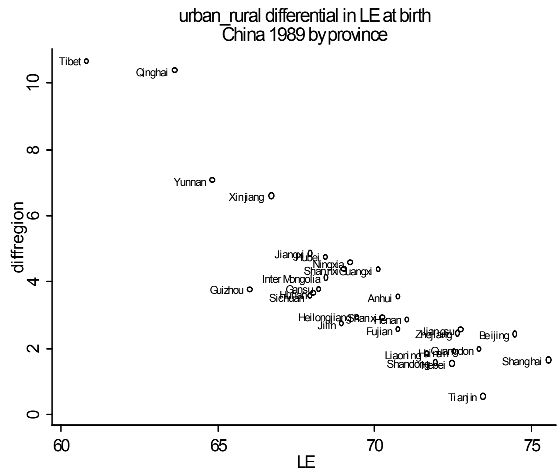
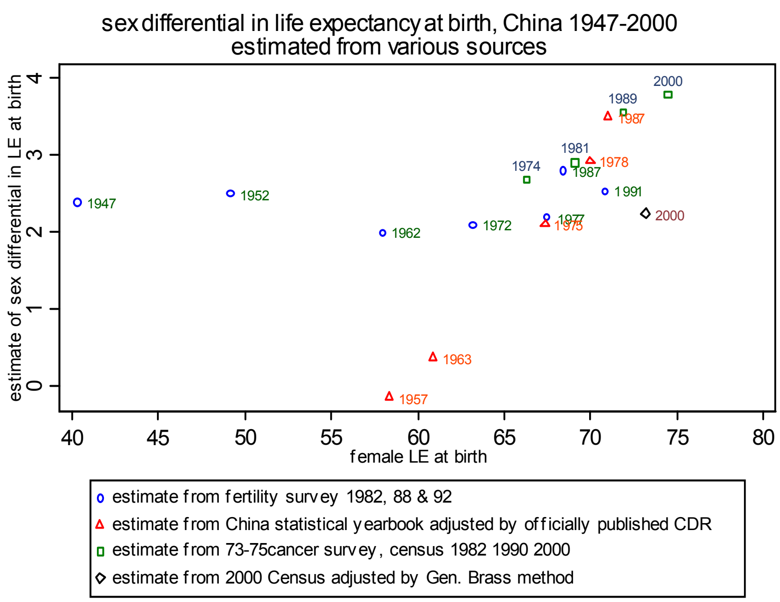


Figure I-6



In contrast to relatively stable regional differential, sex differential in mortality shown in Figure I-7 increased over time at least starting from 1970s. The estimates of sex differential from two sources don't agree each other before mid-1960s: the estimate from 1982 fertility sampling survey shows relatively stable sex differential in 1945-49, 50-54, 60-64, 70-74, 75-79, 87, and 1991-92; the estimate from Chinese statistical yearbook in 1957, 63, 75, 78 and 1987 population sampling survey (adjusted by officially published crude death rate in these years) show apparently increasing trend.

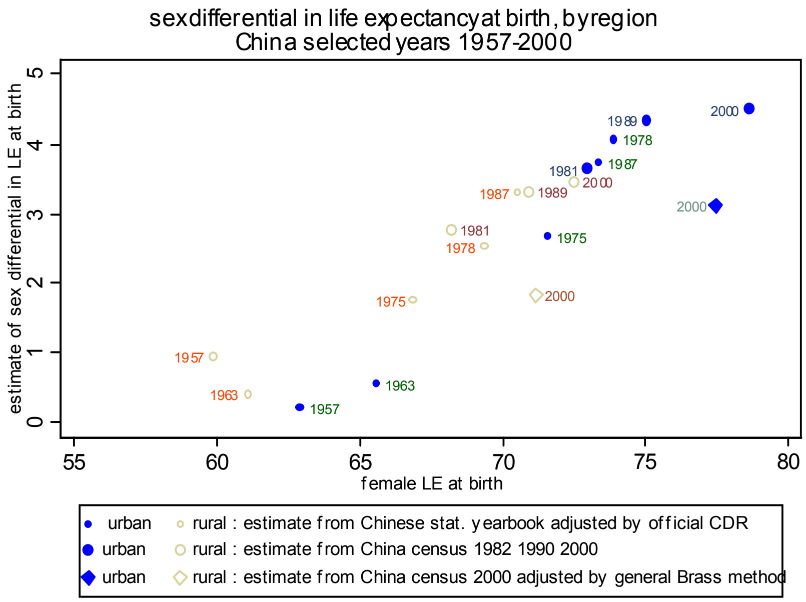
Figure I-7



Data sources: The 1973 – 75 national cancer survey (Rong Shoude et. al. 1981);
Others refer to Figure I-2 in page 5.

With increasing female life expectancy at birth, Figure I-8 shows that the sex differential increased as well both in urban and in rural areas, but more increase observed in urban areas since 1980s.

Figure I-8



Figures I-9 and I-10 show at the provincial level, the sex differential in LE at birth in 1982 and 1990 census reveal that the poorest developed provinces have the lowest sex differential in life expectancy wile the most developed provinces have the highest sex differential.

Figure I-9

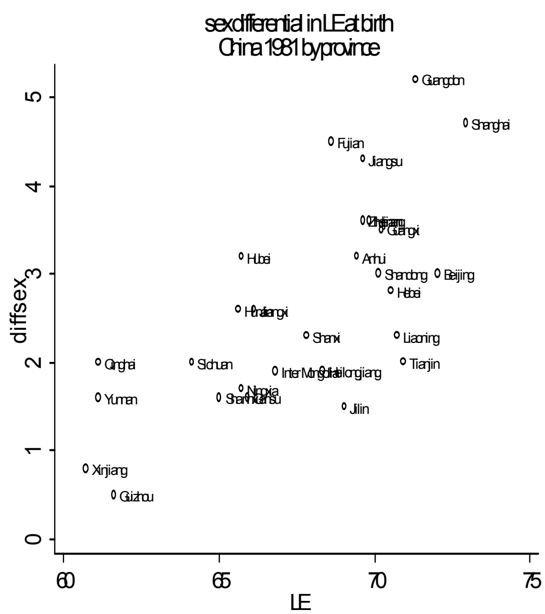
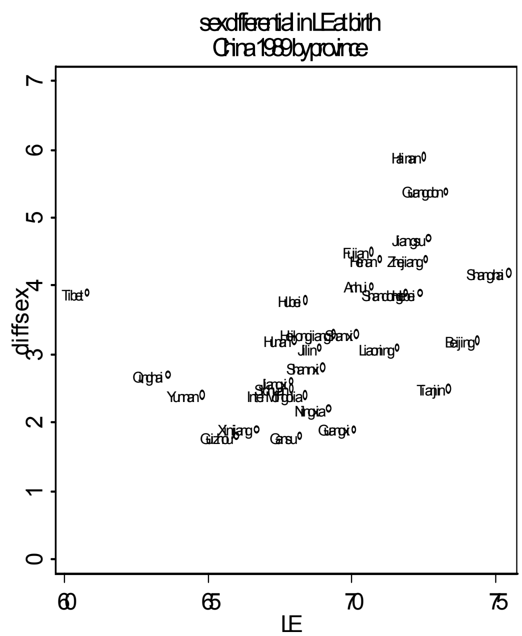


Figure I-10



Therefore, to further explore the large mortality differential between regions and sexes in current China requires detailed decomposition analysis by age groups and causes of death, which is the subject of this paper. The main data used in the paper include causes of death data from annual reports of Chinese Disease Surveillance Points (DSP) System in 1993-99 and mortality data of China Census in 2000. Only DSP 1999 annual report provides the age-specific number of causes of death by sexes and by urban-rural region, which will be fully used in this paper. The China 1990 Census and Chinese DSP 1993 data were also used as required by the indirect estimation methods. The paper consists of following sections:

First, data adjustment include two parts: indirect demographic estimation methods were applied to adjust the death data in Census 2000 and in DSP 1999 for males and females respectively; then, the comparison between Census 2000 and DSP 1999 data gave clues to further adjust the infant and child mortality by sexes in DSP 1999 data. Using the adjusted male and female mortality, the urban and rural mortality in DSP 1999 were adjusted accordingly.

Second, using adjusted mortality data in DSP 1999, the multi-decrement life tables and cause-specific associated life tables were constructed for males and females respectively, then for urban and rural areas respectively. The twelve classifications of causes and the iterative algorithm of life table construction followed the way presented in the work of *Causes of death: life table for national populations* (Preston et. al. 1972). The derived results of male and female associated life tables were also compared with the corresponding results of Taiwan and Hong Kong in 1964 included in *Causes of death.*

Third, the mortality differentials in life expectancy at birth by sexes and by urban-rural regions were decomposed by age-group and causes-of-death. The contribution to the gap of sex differential and regional differential for each age group and for each classification of deaths then was revealed and followed with discussion and conclusion.

II. Data adjustment: Estimation of completeness of death registration

The generalized Brass growth balance method (Hill, 1987) and Bennett-Horiuchi method (Bennett and Horiuchi, 1981) will be used for the China 2000 Census and the Chinese DSP 1999 data. A combined Bennett-Horiuchi method after adjusting population enumeration from the generalized Brass method (Hill, 2002) will be used for the Chinese DSP 1999 data as well.

Data: the 2000 China Census

By applying the generalized Brass method, the completeness of death registration relative to the completeness of population enumeration in 2000 Census is estimated to be 102% for males and 91% for females. The coverage of population enumeration between the 1990 and 2000 Census was quite close. The 1990 census was 0.6 percent less completely enumerated than the 2000 census for males, and 1.5 percent less completely enumerated than the 2000 census for females. The output of regression coefficients as shown in Figure II-1 and II-2 are presented in Appendix I.

Figure II-1

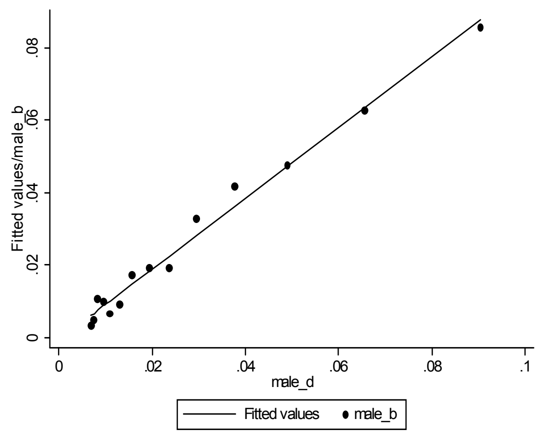
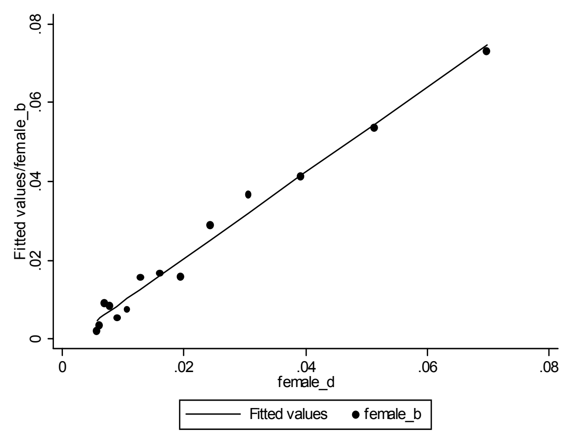
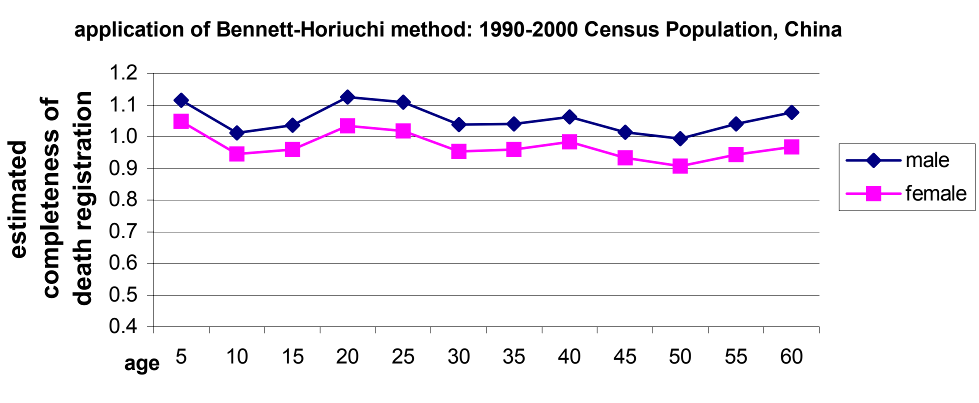


Figure II-2



By applying Bennett-Horiuchi method, the completeness of death registration relative to census population enumeration is estimated to be 104% for males and 96% for females, as shown in Figure II-3.

Figure II-3



Data: the 1999 Chinese DSP data

Both the generalized Brass method and Bennett-Horiuchi method assume the population is a non-stable but closed. The Chinese DSP population, however, violates the assumption of closeness. The causes may come from two sources: One, the net internal migration occurs between the population within DSP system and that of out of DSP system; Two, the manmade changes are due to the annual data collection of DSP system. The DSP system consists of 145 surveillance points where each point represents a city district or a township or a county. The quality of data collected from these points varies. The poorest data after careful evaluation will be dropped out of the data presented in the annual DSP report resulting in the artificial population changes from year to year. Unlike the net internal migration, the dropout procedure takes out of the population in all ages of the surveillance points judged with poorest data quality. It acts as the change of the universal coverage of DSP population enumeration, which can be largely captured by the generalized Brass method. However, to account for the net internal migration, it has to be relied on the "correct" age-specific annual growth rates borrowed from other reliable sources for those age groups affected most by migration.

The general Brass method was used first to estimate the completeness of population enumeration in 1999 DSP relative to the 1993 DSP. It was shown that the 1999 DSP population was 79% less completely enumerated for both males and females relative to the 1993 DSP population. The regression results are seen in Appendix I.

Next, adjusting 1999 DSP population enumeration to obtain the new age-specific annual growth rates between 1993 and 1999 for males and females respectively, the generalized Brass method was then applied. The estimated results suggest that the completeness of 1999 DSP death registration relative to the 1999 DSP population enumeration was 77% for males and 72% for females. The regression results are seen in Appendix I.

Noticing the non-linear shape among ages 15-40 in the estimated regression line both for males and females, it indicated the net migration was most likely occurring and responsible for the curvature at these age groups (seen in circle points of Figure 16 and 17). To correct the net migration effect on regression estimate, the 1990-2000 intercensal age-specific annual growth rates at ages 15-40 were used instead for males and females respectively. Under the mixed age-specific annual growth rates between 1993-1999 DSP population, the generalized Brass method estimated that the completeness of death registration was 72.5% for males and 67.4% for females among 1999 DSP population. The regression outputs are seen in Appendix I.

Figure II-4 and II-5 show the final regression line estimated by generalized Brass method when the mixed growth rates is used (scatter points are based on the mixed rates). Figure II-6 and II-7 added the circled scatter points derived from the 1993-99 inter-DSP rates alone. The correction of effect of net migration was revealed.

Figure II-4

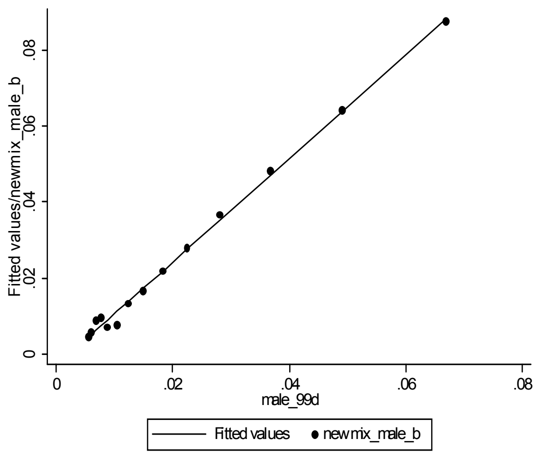


Figure II-5

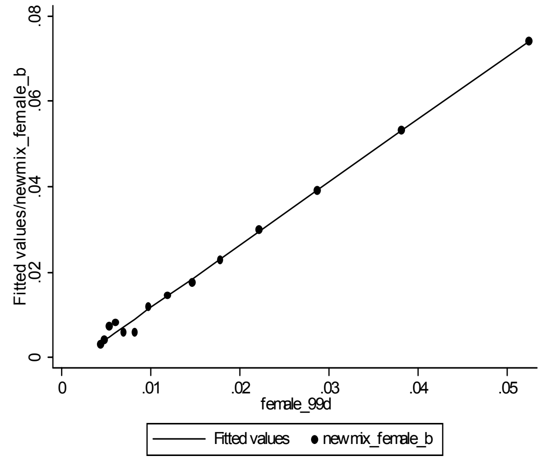


Figure II-6

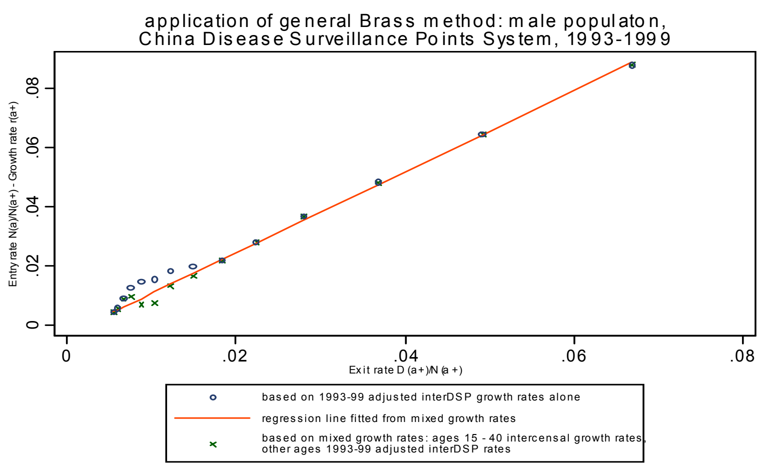
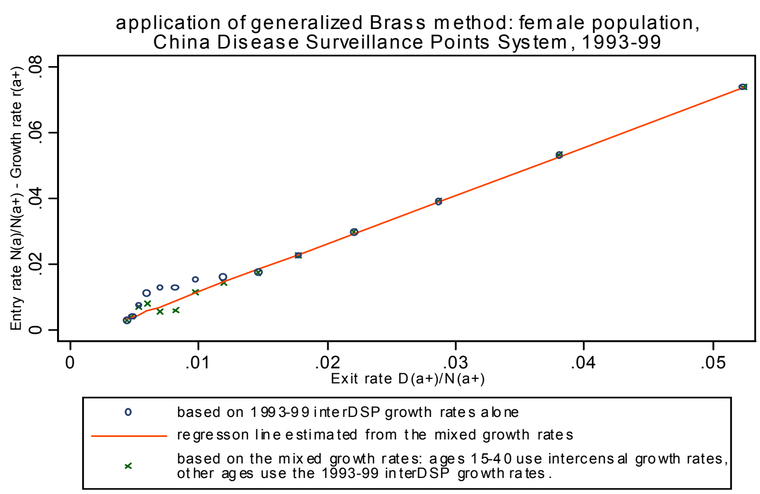


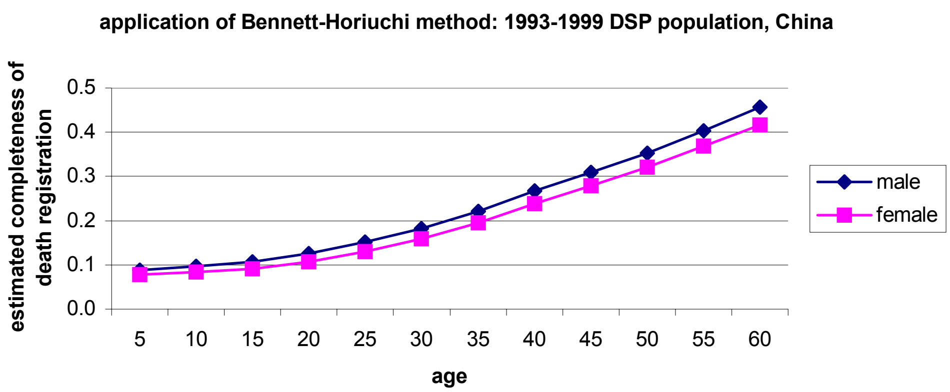
Figure II-7



To compare, generalized Brass method were also applied when the intercensal annual age-specific growth rates at all ages are used (Appendix I). It is shown that the completeness of death registration was 80% for males and 66% for females in 1999 DSP data (Figures are not shown). The estimate for females was consistent with the 67.4% estimated from the mixed rates, while the estimate for males was 8% higher than the estimate 72% from the mixed rates.

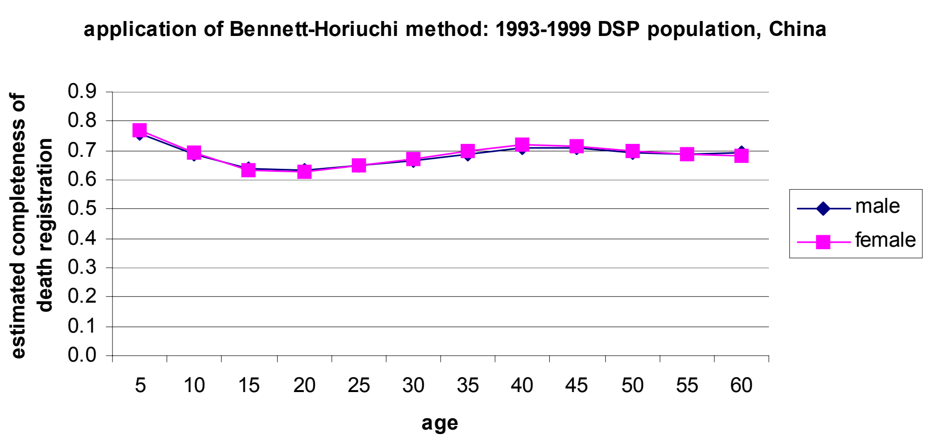
Bennett-Horiuchi method was also applied to the 1993-99 DSP data. First, the observed inter-DSP age-specific annual growth rates were used. Result is shown in Figure II-8.

Figure II-8



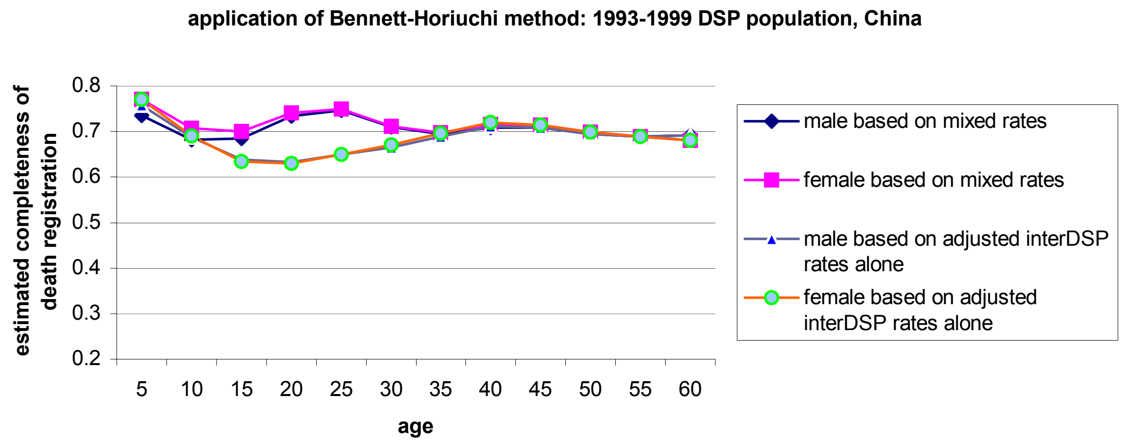
The very low and increasing estimates of completeness of death registration are largely due to the less population enumeration in 1999 DSP. The generalized Brass method has shown earlier that there was only 79% completeness of population enumeration in 1999 relative to 1993 population enumeration for males and females. Thus, adjusting the 1999 DSP population accordingly to obtain the new inter-DSP age-specific annual growth rates, then Bennett-Horiuchi method was re-applied as shown in Figure II-9. Figure II-9 also shows the age 15-30 appears to be affected most by net migration effect.

Figure II-9



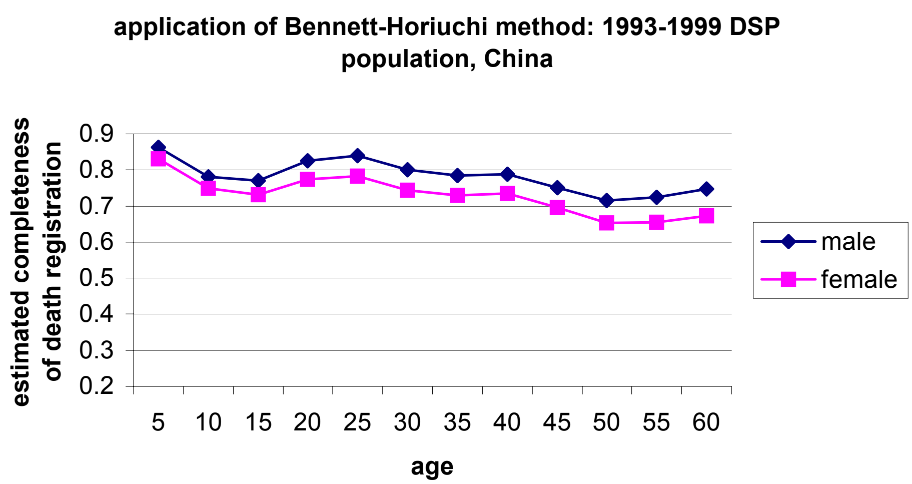
To correct the net migration effect, the mixed age-specific annual growth rates were used as shown in Figure II-10: at age 15-40 the intercensal rates were used. It was estimated from medians that the estimated completeness of death registration was 70% for males and 71% for females.

Figure II-10



To compare, Figure II-11 shows results of applying Bennett-Horiuchi method when the intercensal growth rates were used: the completeness of death registration was 78% for males and 73% for females.

Figure II-11



In sum, the applications of generalized Brass method and Bennett-Horiuchi method to 1993-99 China DSP data were consist most when the mixed growth rates were used (Table 1).

Table 1 : Estimated completeness of death registration relative to the coverage of population enumeration in 1999 DSP data, by two indirect estimation methods

Estimation method	Generalized Brass method			Bennett-Horiuchi method [after adjustment of 1999 DSP population coverage]	
	InterDSP growth rates	Mixed growth rates	Intercensal growth rates	Mixed growth rates	Intercensal growth rates
Males	77%	72.5%	80%	70%	78%
Females	72%	67.4%	66%	71%	73%

Since the generalized Brass method requires less assumption than the Bennett-Horiuchi method: Bennett-Horiuchi method needs to know the life expectancy at highest age of estimation derived from other reliable life tables, here the highest age is age 70 and life expectancy at age 70 for males and for females used the corresponding estimates from 2000 Census male/female life tables (seen in Appendix ?). Thus, the estimates from generalized Brass method based on the mixed rates was preferred and chosen to adjust the observed 1999 DSP deaths.

Confined by the same fact that the urban and rural populations in 1999 DSP are not closed and the age-specific intercensal growth rates of urban and rural populations in the 2000 Census cannot be borrowed since they are also affected by non-closeness, thus the indirect estimation method cannot be used on the population by region. However, assuming that the estimated completeness of death registration by sex is constant across regions, the completeness of death registration by urban-rural region can then be estimated accordingly by knowing the sex composition of each regional population. The completeness of death registration in the 1999 DSP for urban and rural areas was estimated therefore. The results are almost the same: 70% for urban and rural areas. The results are consist with the estimation of the Chinese DSP system "Catch-Re-Catch"(CRC) survey in 1998 on death registration: 75% for urban and 78% for rural area. The higher estimates from the Chinese DSP survey may due to the limitation of the CRC method: it assumes there are no correlation between the probability of death omission in DSP and the probability of death omission in the CRC survey. However this assumption tends to be violated often due to the fact that some subgroup is more likely than average to be omitted from both reporting system. The correlation bias generally produces lower estimated omission rates, thus higher completeness of death registration, than the indirect demographic estimation method (PHM, 2000).

In conclusion, the estimated completeness of death registration relative to the coverage of population enumeration in 1999 DSP was 72.5% for males and 67.4% for females, and 70% both for urban and rural areas.

III. Data adjustment: infant and child mortality in 1999 DSP data

The 1999 China DSP data was collected close to the 2000 China Census in time. It is preferred to use the Census mortality information to further examine whether the death registration was complete among the infants and children under age five in 1999 DSP data. Before the 2000 Census is used, a comparison between the Census and known model life tables would give evidence on the completeness of Census infants and children under five were good enough, after the deaths have been adjusted through generalized Brass method.

Data: the 2000 China Census

After adjustment of completeness of death registration relative to the population enumeration, the single life table for 2000 Census males and females were constructed. Based on the life table survivor probability in adult ages 15-45, the corresponding levels in the West family of Coale-Demeny regional model life tables (Coale and Demeny, 1983) and in the far eastern pattern of UN model life tables for developing countries (UN, 1982) were interpolated as shown in Figure III-1 and III-2.

Figure III-1

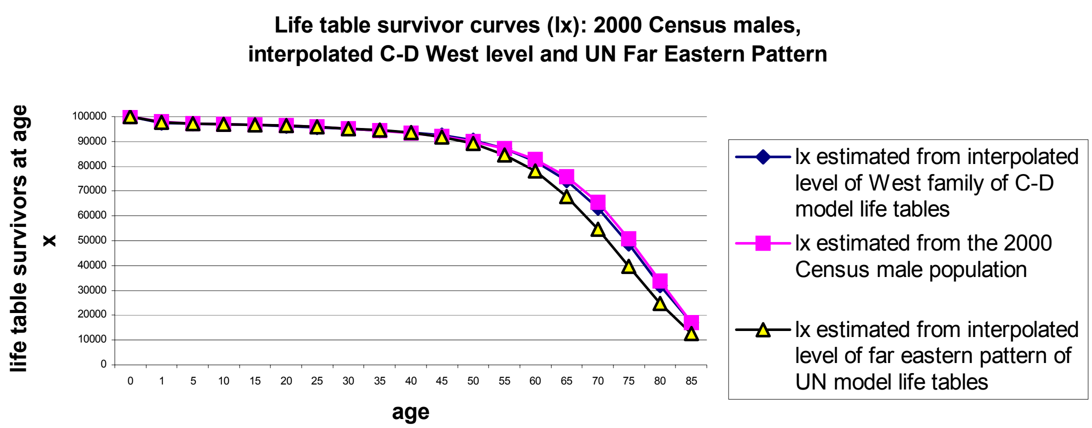
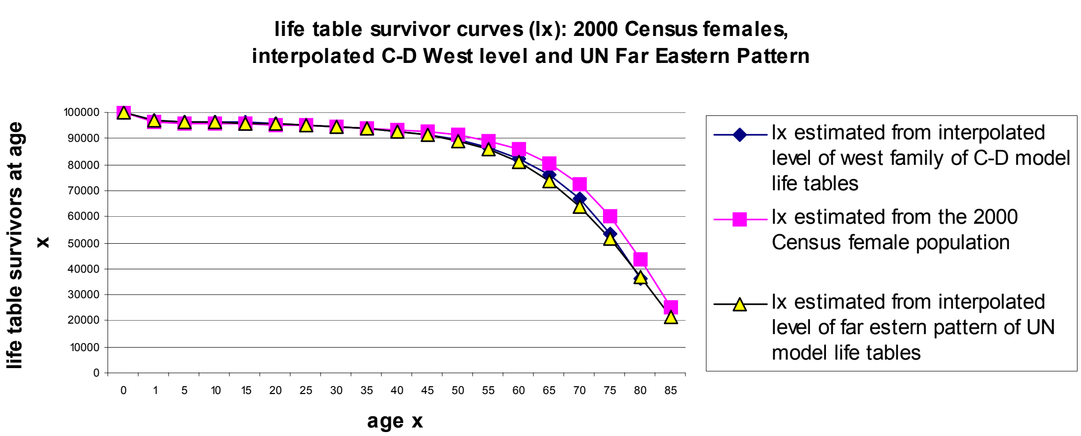


Figure III-2



It was shown that the interpolated level of West family of Coale-Demeny model life tables fits better with data than the interpolated level of Far Eastern pattern of UN model life tables, especially for males. It is also noted that both interpolated levels have lower survive probability than the observed probability for older females at age 50 above. The comparison confirmed the adjusted mortality of Census infants and children under five were consistent with known model life tables though the mortality for older females shows some degree of difference. Since there are no firm evidences indicating extra omission of death registration among older Chinese females, their lower mortality level than known model life tables probably reflects the fact.

Data: the 1999 Chinese DSP data

1. By sex:

Figure III-3 and III-4 shows the absolute difference and relative difference between the age-specific death rates of the 2000 Census and the 1999 DSP data, by sex. The absolute difference indicates that the death rates of infants and older ages 70 above for males and females are different. The relative difference indicates that female infants and child under five and male infants are the age groups with highest difference. The fluctuation of relative difference among adult ages 15-49 was due to the difference of population composition between 1999 DSP data and 2000 Census as shown in Figure III-5 and III-6.

Figure III-3

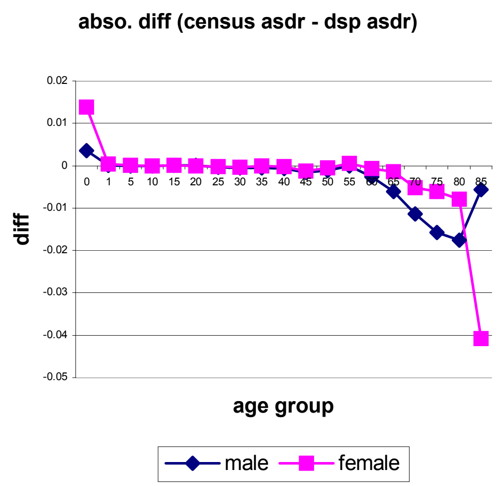


Figure III-4

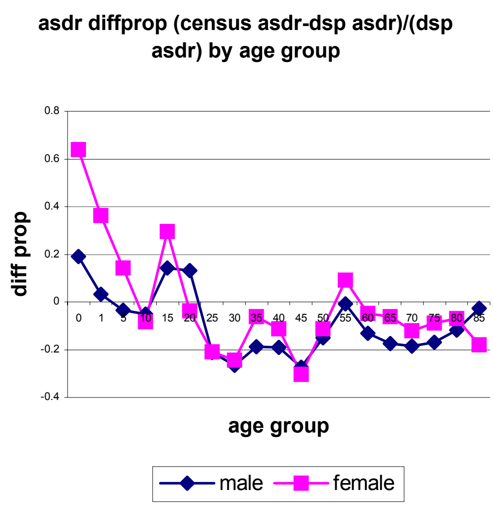


Figure III-5

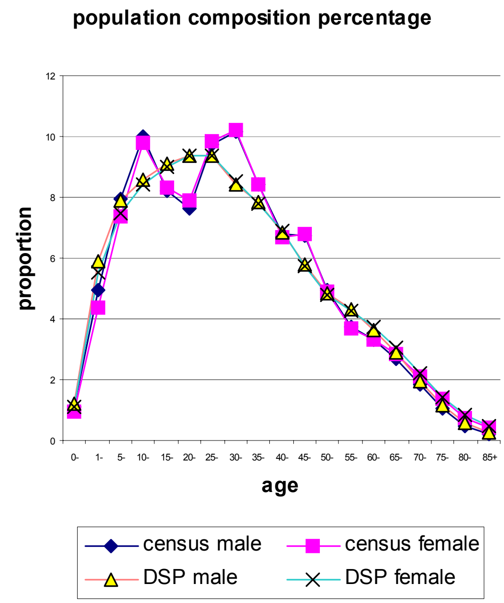


Figure III-6

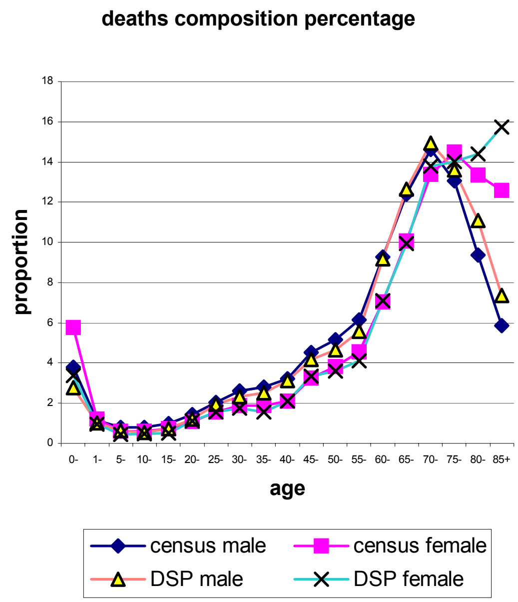


Figure III-5 and III-6 show the age-specific proportion of population and deaths in 2000 Census and in 1999 DSP data, by sex. The fluctuation of age-specific death rates between them among adult and older ages shown in Figure 24 and 25 could be largely due to the different composition of population and then deaths between the two data sources: the DSP population is smoother among young and adult ages and has relatively higher proportion of elderly than the Census population. Accordingly more DSP deaths occurred in the older ages and fewer deaths occurred in the young and adult ages compared with the corresponding age groups of the Census. Therefore the observed DSP age-specific death rates tend to be a little higher after age 25 than the Census. The higher age-specific death rate at age 15-24 in the Census is probably caused by the obviously lower proportion of population at that age group in Census compared to the DSP (since the deaths are very small at that age group).

Based on the above observation, it is concluded that in the 1999 DSP data after adjustment by indirect estimation method, additional omission of death registration compared to the 2000 Census were most likely occurring among male infants, female infants and female child under five. Thus, the corresponding Census age-specific death rates will be used at above age groups when the DSP male/female life table is constructed.

2. By region:

Following the same logic, the infant and child under five mortality by region was examined between the 2000 Census and the 1999 DSP data (Figure III-7 and III-8). The proportion of population and deaths by region was also examined to identify the discrepancy of age-specific death rates due to the additional omission of death registration, not by the difference between the structure of population and deaths from two sources (Figure III-9 and III-10). It is concluded that in the 1999 DSP data after adjustment by indirect estimation method, additional omission of death registration compared to the 2000 Census were most likely occurring among urban infants, rural infants and rural child under five. Thus, the corresponding Census age-specific death rates by region will be used at above age groups when the DSP urban/rural life table is constructed.

Figure III-7

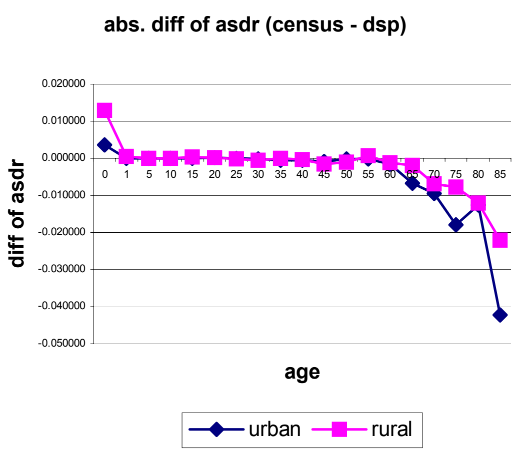


Figure III-8

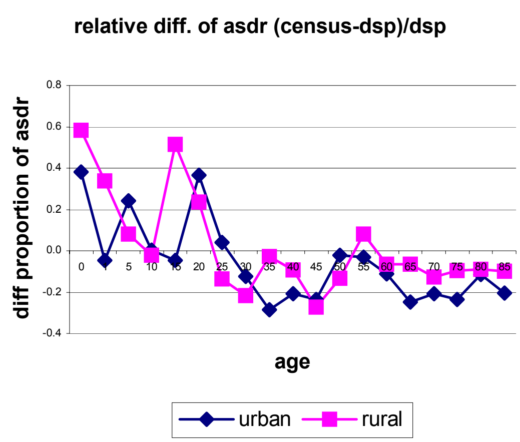


Figure III-9

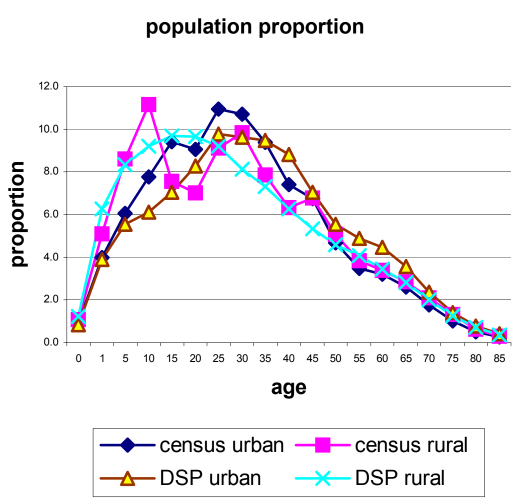
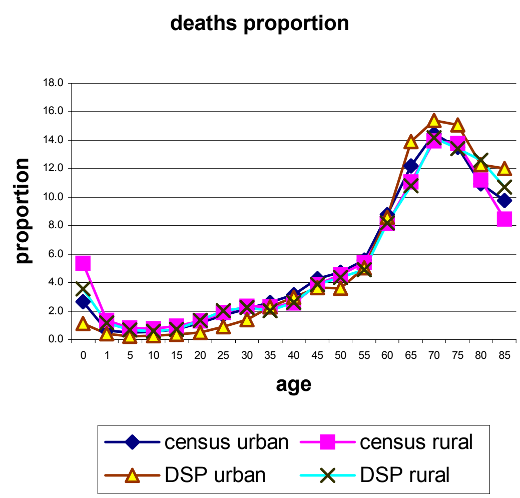


Figure III-10



IV. Life tables for the 1999 DSP male/female/urban/rural population

Based on the previous sections, the observed age-specific number of deaths was first adjusted by the estimated completeness of death registration, by sex and by urban-rural region respectively; then special adjustment go to the female infant and child age 1-4 deaths, male infant deaths, urban infant deaths, and rural infant and child age 1-4 deaths: these age-specific death rates will use the age-specific death rates (adjusted) in the 2000 Census accordingly. Once the mortality rates were adjusted, the cause-age-specific number of deaths reported (unadjusted) in the 1999 DSP data would be adjusted according to the observed distribution of numbers of deaths by causes-of-death within each age group. These adjusted cause-age-specific numbers of deaths would be used in the multi-decrement life tables.

The iterative algorithm of constructing multi-decrement and cause-specific associated decrement life tables were used by Preston et. al. in their work of *Causes of death: life table for national populations* in 1972. The reason to adopt the iterative algorithm include maximizing the accuracy of computation and to make the our results soundly comparable with those country life tables given in their work, specially Taiwan, Hong Kong, Japan, England and Wales, and United States in the year of 1964.

The causes-of-death reported in the 1999 China DSP data were coded according to the 57 two-digit rubrics of the Basic Tabulation List of ICD-9th revision published in 1977. Within each two-digit rubric, up to 9 three-digit rubrics are identified in the Basic Tabulation List. However, not all the three-digit rubrics within each two-digit rubric were included in the 1999 China DSP data. The twelve classification of causes used in the *Causes of death* was used to classify the causes-of-death to larger group. The twelve classifications are respiratory tuberculosis, other infectious and parasitic diseases, neoplasms, cardiovascular diseases, influenza/pneumonia/bronchitis (respiratory diseases), diarrheal diseases, certain degenerative diseases (diabetes, nephritis, stomach ulcers, cirrhosis of liver), maternal mortality (complications of pregnancy), certain diseases of early infancy, motor vehicle accidents, other accidents and violence, and other and unknown causes. The detailed causes under each classification and the codes under the various revisions of the ICD were given in the *Causes of death* (Preston et.al. 1972, page 6).

The ICD-7th revision (WHO, 1957) was used in 1972. The ICD-9th revision (WHO, 1977) was used in the 1999 China DSP data, thus a careful comparison has to be taken to ensure the appropriate causes under ICD-9th tabulation are matched correctly with the twelve classifications of causes-of-death used in 1972 under the past ICD revisions. Among all the twelve classifications, only diarrheal diseases couldn't be classified from the 1999 DSP data. The reason was that the detailed causes within the classification of diarrheal diseases were not included in the Basic tabulation list of ICD-9th revision, which the 1999 China DSP data followed. Under the ICD-7th revision abridged list (1955) used in *Causes of death*, the diarrheal diseases refer to the B36 group including the detailed causes 543, 571, and 572, i.e. gastritis, duodenitis, enteritis and colitis, except diarrhea of the newborn. These detailed causes are recoded as 535, 555-558 in the ICD-9th revision.

Unfortunately the Basic tabulation list of ICD-9th revision does not include these detailed causes. Therefore, the 1999 China DSP data didn't report these causes either. Table 2 shows the ICD-9th revision Basic Tabulation List on the disease codes where diarrheal diseases are located.

Table 2 selected group containing the diarrheal disease among ICD-9th revision Basic Tabulation List

34 (*)	Diseases of other parts of the digestive system		530-579
	340	Diseases of oesophagus	530
	341 (*)	Ulcer of stomach and duodenum	531-533
	342 (*)	Appendicitis	540-543
	343	Hernia of abdominal cavity	550-553
	344	Intestinal obstruction without mention of hernia	560
	345	Diverticula of intestine	562
	346	Other functional digestive disorders	564
	347 (*)	Chronic liver disease and cirrhosis	571
	348 (*)	Cholelithiasis and cholecystitis	574-575.1

Source: cited from the Basic Tabulation List of ICD-9th revision (WHO 1977, page 751)

The numbers on the left side are the two-digit and three-digit rubrics used in the Basic Tabulation List of ICD-9th revision and used in the 1999 China DSP data. The numbers on the right side are the clinical codes. As seen from the table 2, the gastritis and duodenitis (535) and the chronic enteritis and colitis (555-558) are not listed in the right columns of Basic Tabulation List. So these detailed causes under the diarrheal diseases are not included in the Basic Tabulation List. The rubrics on the left side with star mark indicated these causes were reported in the 1999 China DSP data. Thus, the proportion of remaining unreported causes (including the diarreal diseases) under the group 34 can be calculated from the 1999 DSP data: 19.66% for males, 26.75% for females, 21.92% for rural population and 23.53% for urban population. Observing these relatively small proportions accounted by the remaining unreported causes (including the diarrheal diseases), the deaths of unreported causes under group 34 could be an approximation of the death of the diarrheal diseases. It is an overestimation of the deaths caused by diarrheal diseases. However it is the best approximation we can obtain, and considering the small proportion due to the remaining unreported causes under group 34, we believe that it would not bias our results severely although a cautious interpretation should be made.

Another difference, though very small, was the classification of respiratory tuberculosis including pulmonary tuberculosis and other respiratory tuberculosis coded 020 and 021 in the ICD-9th revision. The 1999 China DSP data only reported the pulmonary tuberculosis (020), so the classification of respiratory tuberculosis would not include deaths from other respiratory tuberculosis (021). However, observing the reported number of deaths due to pulmonary tuberculosis (020) was 92% of all the reported number of deaths due to tuberculosis (02), we believe that omitting the deaths of other respiratory tuberculosis would not lead noticeable underestimation.

Finally the twelve classification of causes-of-death were composed in the 1999 China DSP data. It should be aware that when building the multi-decrement life table, the slightly over-grouping of diarrheal diseases and under-grouping of respiratory tuberculosis would only affect, if there are any, themselves and the residual group of others and unknown causes. All the other nine classifications of causes would not be affected at all.

The results of abridge single life tables for all causes combined, multi-decrement life tables, and cause-specific associated decrement life tables for each of the 1999 DSP male/female/urban/rural population are listed in Appendix II (Table 6-8 is for males, 9-11 for females, 12-14 for urban population, and 15-17 for rural population). The life tables show the life expectancy at birth was 73.98 for urban population, 69.39 for rural population, 72.17 for females and 69.30 for males for China in 1999. The twelve causes-specific associated decrement life tables show the added year of life for each specified causes eliminated for each of four populations shown in Table 3. The added years of life for Taiwan, Hong Kong, Japan, England and Wales, and United States in 1964 were also included for comparison (Preston et. al. 1972).

Excluding other and unknown causes, the cardiovascular diseases, neoplasms, influenza/Pneumonia/Bronchitis, and violence consist of the top four causes leading large added years of life if they were eliminated across the four populations. Cardiovascular disease ranked the first place across populations. Influenza/Penumonia/Bronchitis ranked the second place among rural and female population while neoplasms ranked the second among urban and male population. Violence (motor vehicle and other violence) ranked the fourth across all the four populations. For urban and females, certain diseases of infancy ranked next to violence at the fifth place and certain degenerative diseases ranked the sixth. For rural and males, the certain degenerative diseases ranked the fifth and certain diseases of infancy in the next. The infectious and parasitic disease and diarrheal diseases are the causes with smaller added years of life if they were eliminated. It is noted that the respiratory tuberculosis was still the dominant one among infectious and parasitic diseases, accounting for one third in rural and urban population, one quarter in females and two fifth for males of the added years of life if infectious and parasitic disease were eliminated.

Comparing with the 1964 male and female population in Taiwan and Hong Kong, it is no surprise to found the added years of life if infectious and parasitic diseases were eliminated were lower in China 1999, and the proportion of added years due to respiratory tuberculosis were lower as well. The chronic diseases had been the leading one in terms of the added years of life if they were eliminated in Taiwan and Hong Kong in 1964, except the 1964 Taiwan males experienced more lost years of life due to violence. Comparatively more lost years of life due to influenza/pneumonia/bronchitis in China 1999 were found than Taiwan and Hong Kong in 1964. Extending the comparison to three developed countries in 1964: Japan, England and Wales, and United States, it shows generally the 1999 China had rather higher added years of life if eliminating respiratory diseases and lesser added years if eliminating cardiovascular diseases.

Table 3: Added year of life expectancy at birth if specified causes were eliminated. (life expectancy at birth for each specific population in brackets)

Added years of life	1 Respirat. T.B.	2 Other Infec. And Paras.	3 Neo plasms	4 Cardio vascular	5 Infl. Pneu., Bronch	6 Diarrheal	7 Cert. Degene.	8 Maternal	9 Cert. Dis. Of Infancy	10 Motor vehicle	11 Other violence	12 Other and unknown	1+2 Infec. And Paras.	10+11 violence
China DSP 1999														
Urban [73.98]	.041	.085	3.038	5.655	1.237	.086	.745	.007	.477	.268	.496	1.847	.126	.767
Rural [69.39]	.148	.270	2.324	5.864	2.508	.109	.617	.022	.870	.447	1.396	1.885	.419	1.858
Females [72.17]	.091	.251	2.020	6.017	2.368	.098	.590	.042	.948	.267	1.025	1.984	.343	1.298
Males [69.30]	.144	.204	2.835	5.531	2.033	.112	.682	.000	.561	.518	1.300	1.656	.349	1.835
Taiwan 1964														
Females [68.95]	.795	.53	1.421	3.979	1.85	.566	1.05	.171	.623	.065	.963	3.621	1.334	1.029
Males [64.55]	1.166	.49	1.38	3.56	1.698	.55	1.271	.000	.677	.198	1.86	2.896	1.671	2.068
Hong Kong 1964														
Females [73.82]	.51	.369	2.316	4.803	1.552	.175	.46	.076	.992	.134	.672	4.074	.883	.808
Males [65.69]	1.275	.391	2.333	4.4	1.344	.147	.656	.000	1.21	.21	.956	2.983	1.682	1.171
Japan 1964														
Females [72.98]	.329	.208	2.163	6.098	.649	.326	.578	.09	.723	.179	.658	3.223	.539	.839
Males [67.77]	.528	.22	2.228	5.803	.633	.25	.743	.000	.863	.638	1.313	2.313	.752	1.972
England and Wales 1964														
Females [74.76]	.034	.08	2.786	11.073	1.136	.098	.278	.034	.68	.186	.525	1.489	.114	.714
Males [68.57]	.081	.082	2.772	8.375	1.556	.079	.284	.000	.851	.525	.71	1.309	.163	1.244
United States 1964														
Females [73.78]	.04	.111	2.558	17.068	.518	.09	.637	.048	.93	.366	.625	1.483	.151	.997
Males [66.91]	.08	.121	2.265	13.299	.57	.079	.627	.000	1.143	.874	1.329	1.658	.201	2.231

Data Sources: China Disease Surveillance System (1999): calculated from annual report of Chinese DSP in 1999.
Taiwan, Hong Kong, Japan, England and Wales, United States (1964): Causes of death: life table for national populations (Preston et. al. 1972)

Figure IV-1 to IV-3 show the estimated sex ratio of added years of life if specified causes were eliminated for all the countries. Figure IV-1 shows the sex ratio of added years of life if infectious and parasitic disease were eliminated. Chinese females showed higher risk on the other infectious and parasitic diseases relative to Chinese males in 1999, compared with other countries in 1964.

Figure IV-1

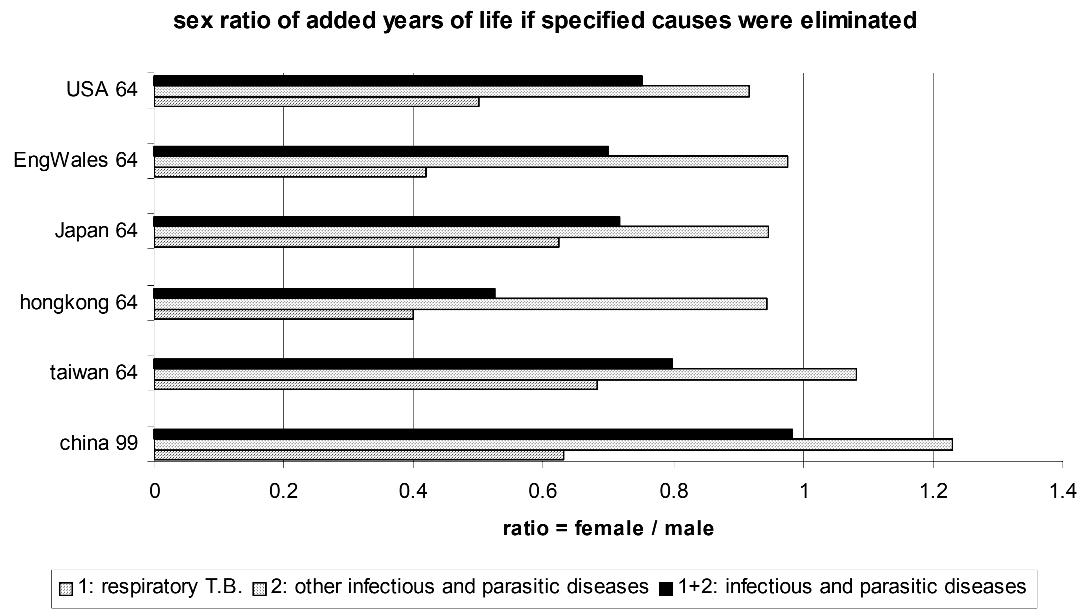


Figure IV-2 shows the sex ratio of added years of life if the neoplasms were eliminated was the lowest for China 1999. Chinese males seem to have very high risk relative to Chinese females dying from neoplasms compared with other countries in 1960s. It also shows the sex ratio of added year if respiratory diseases were eliminated was higher among the four Asian regions: China in 1999, Taiwan, Hong Kong and Japan in 1964, compared with England and Wales, and United States in 1964. The sex ratio for diarrheal disease shows China is the lowest, but the recall the group of diarrheal diseases for China 1999 were grouped indirectly, the lowest sex ratio could be due to the different grouping strategy.

Figure IV-3 shows the sex ratio of added years of life if certain diseases of infancy were eliminated is highest in China 1999, nearly doubled than the sex ratio from the other countries. It suggests the disadvantaged health condition of female infants in recent Chain, predominantly in the rural areas. The improvement of infant and child health has been unequally progressed between sexes. Figure 3 also shows the relatively higher sex ratio of added years of life if violence were eliminated in China 1999 across the countries and regions, only Hong Kong in 1964 was close to. The sex differential in violence will be further elaborated in the next decomposition section.

Figure IV-2

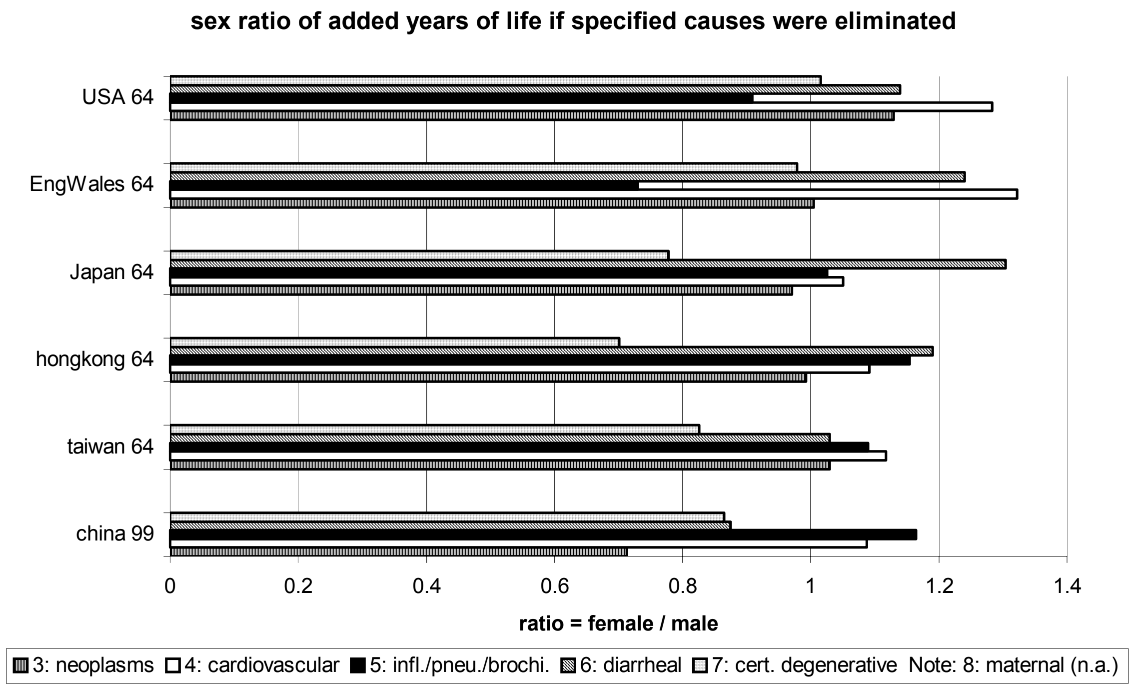
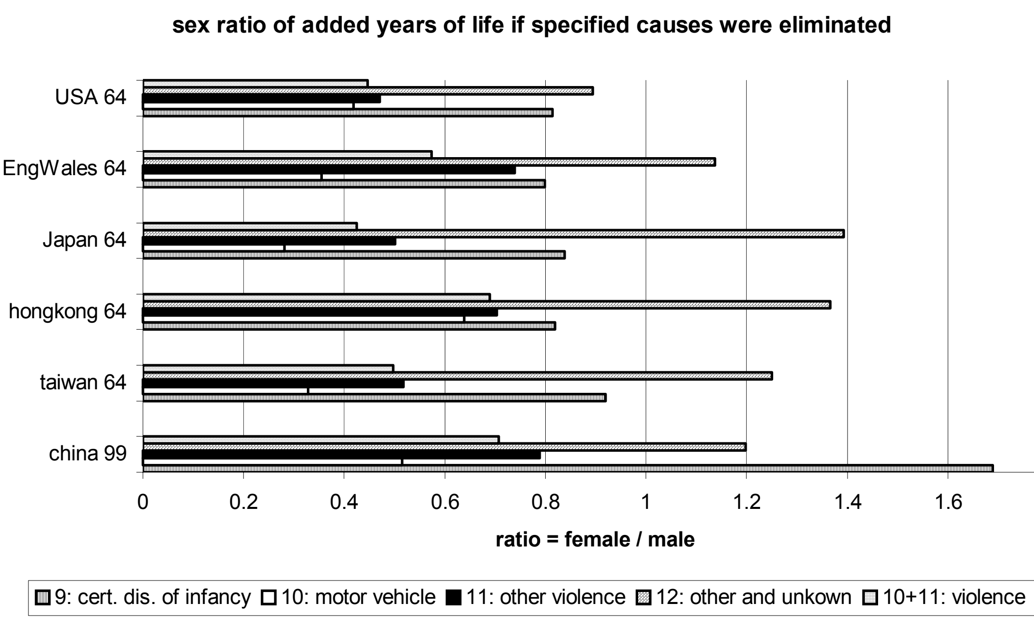


Figure IV-3



V. Decomposition of regional and sex differential in mortality

Based on the constructed abridged single and multi-decrement life tables for the rural/urban/male/female population in China 1999, decomposition techniques (Arriaga, 1984, 1989) were applied towards the regional and sex differentials in life expectancy at birth. The results are shown in Table 4 and 5. In each table, the total regional/sex differential in life expectancy at birth in China 1999 was shown in the left-bottom corner of the table: 4.59 years for total regional differential and 2.87 years for total sex differential. Each total differential was decomposed by age groups in the columns and by the twelve classifications of causes in the rows. The "all causes" column sums the total regional/sex differential accounted by age groups, i.e. the age-specific regional/sex differential. The "sum" row shows the total regional/sex differential accounted by causes-of-death, i.e. the causes-specific regional/sex differential. Inside the dotted line of the table, the matrix shows the age-specific regional/sex differential in each row accounted by causes-of-death vertically, and the causes-specific regional/sex differential in each column accounted by age groups horizontally.

The cause-specific regional differential was shown in Figure V-1. It shows only neoplasms reduce the urban advantage by a small amount of 0.17 years. For all other causes-of-death, urban population was better off over rural population. The top four causes are influenza/pneumonia/bronchitis, violence (motor vehicle and other violence), cardiovascular diseases, and certain diseases of infancy. They contributed 1.47, 1.2, 0.79 and 0.44 years towards the regional differential respectively. Their total contribution takes 85% of the total regional differential in China 1999. The infectious and parasitic diseases also show 0.33 years urban advantage.

Figure V-1

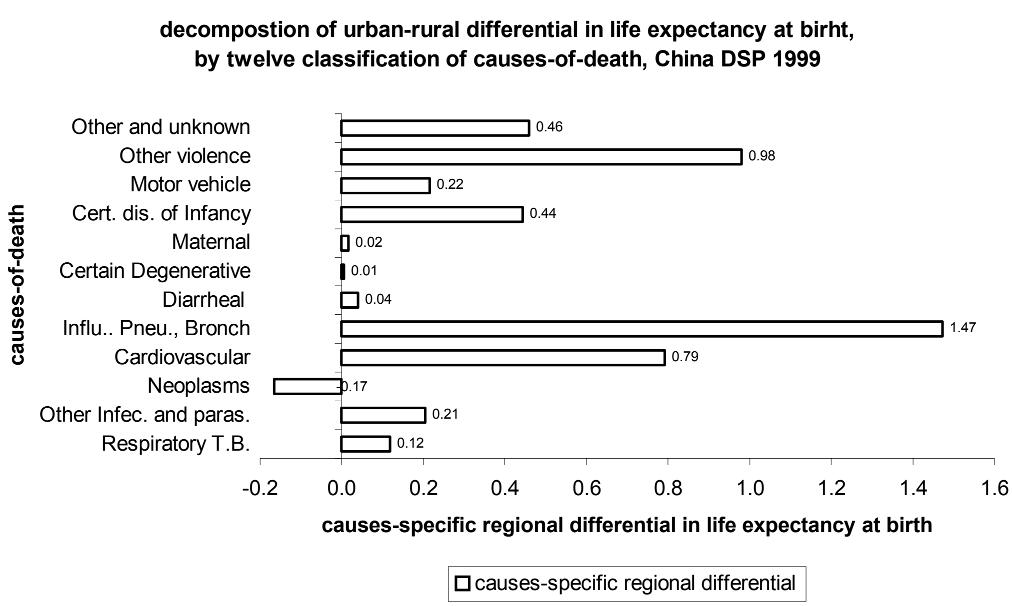
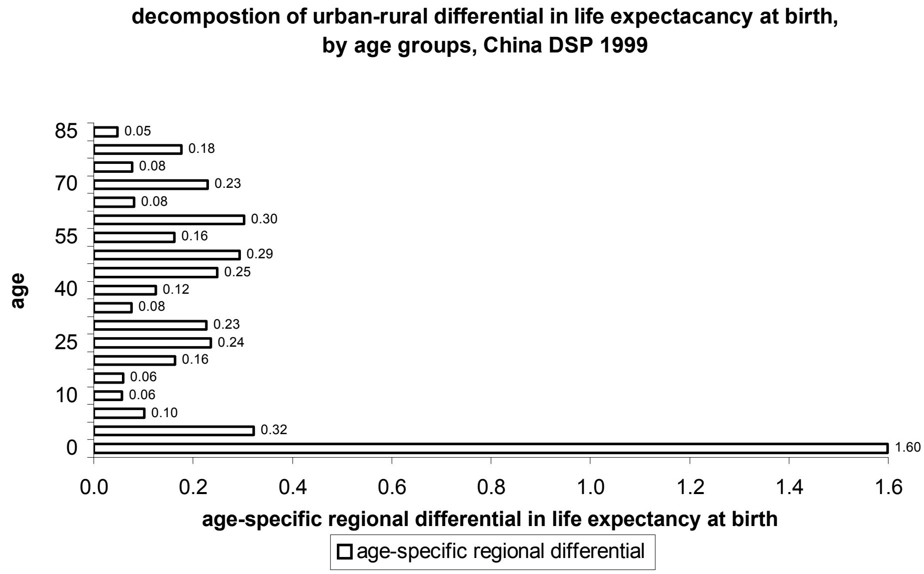
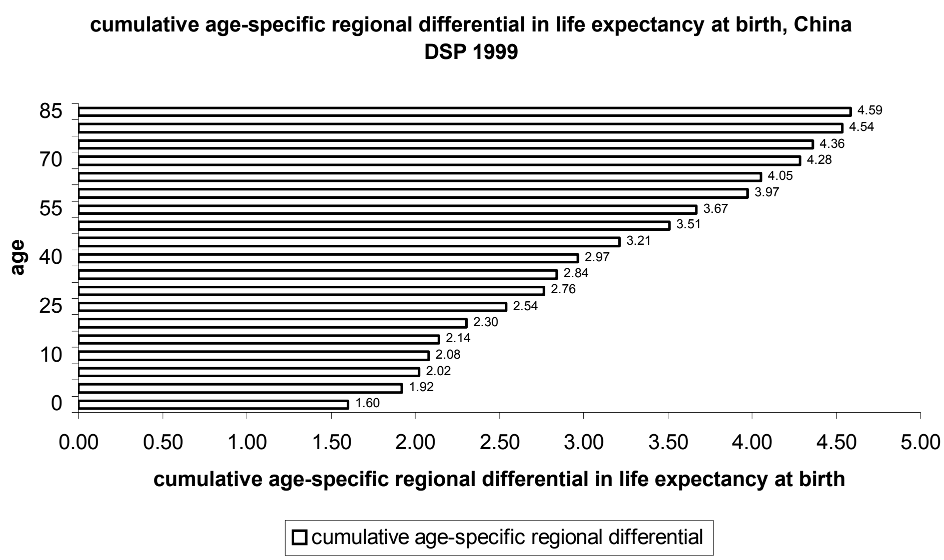


Figure V-2



The age-specific regional differential was shown in Figure V-2. In each age group, rural population was disadvantaged compared with their urban counterpart. The infant group accounted for the largest share of rural disadvantage: 35% of total regional differential. The children under age five accounted for 42% of total regional differential. The children especially infants predominantly was responsible for the large regional differential in life expectancy at birth. Figure V-3 shows the cumulative age-specific regional differential.

Figure V-3



The inside matrix of Table 4 provides information on further decomposing cause-specific regional differential into age groups. For the infectious and parasitic diseases, respiratory T.B most affected at age 50 and above. For other infectious and parasitic diseases, the infant and young children under age 10 were affected most. The advantage of rural population on neoplasms only occurred at the age 55 and above. For the young adult at age 15-49, rural population was worse-off. Similar change of trend was also observed in diarrheal and certain degenerative diseases. This change probably reflects the health experiences of different cohorts. Whether the crossed trend will change over time requires more data and time-series studies in future.

Rural population also suffered the cardiovascular diseases more than urban population and the gap increased with age. For infants and child 1-4 the negative shares on cardiovascular diseases probably were due to the data quality (most likely classified into other and unknown causes due to poor death registration in rural areas) rather than the rural advantage at these age groups. The largest share for urban advantage on respiratory diseases (influenza/pneumonia/bronchitis) as shown in Figure V-1 came from the infant and child age 1-4 groups which accounted for about 54% (0.8/1.47) of the total differential due to respiratory diseases. Maternal diseases accounted for a small portion of total regional differential. However, the certain diseases of infancy showed quite high contribution to the total regional differential. Rural adults showed disadvantage on motor vehicle accidents, and also suffered more on other kinds of violence from age 25 to 70. It should be noted that within the group of other violence, the rural infant and children under age ten contributed about one quarter of regional differential.

A further examination of the detailed causes within the group of other violence reported in the 1999 China DSP data, it is shown that compared with their urban counterparts, homicide was the most responsible cause for rural infants, drowning was the most responsible cause for rural children age 1-14, and suicide was the most responsible cause for rural adults age 25 to 70. The above pattern outstands again as comparing females with males as discussed next.

The cause-specific sex differential was shown in Figure V-4. Females advantaged over males on most causes, except the certain disease of infancy, maternal and other infectious and parasitic diseases. The certain disease of infancy lost 0.36 years for females compared to males. Together there was 0.42 years lost for females compared to males. The gain for female most came from neoplasms (1.17), cardiovascular (0.94) and violence (motor vehicle and other violence 0.72). The above three together made 2.83 years for females over males. A mediate female advantage was also shown in certain degenerative diseases, and small gains from respiratory tuberculosis, respiratory diseases and diarrheal diseases.

Figure V-4

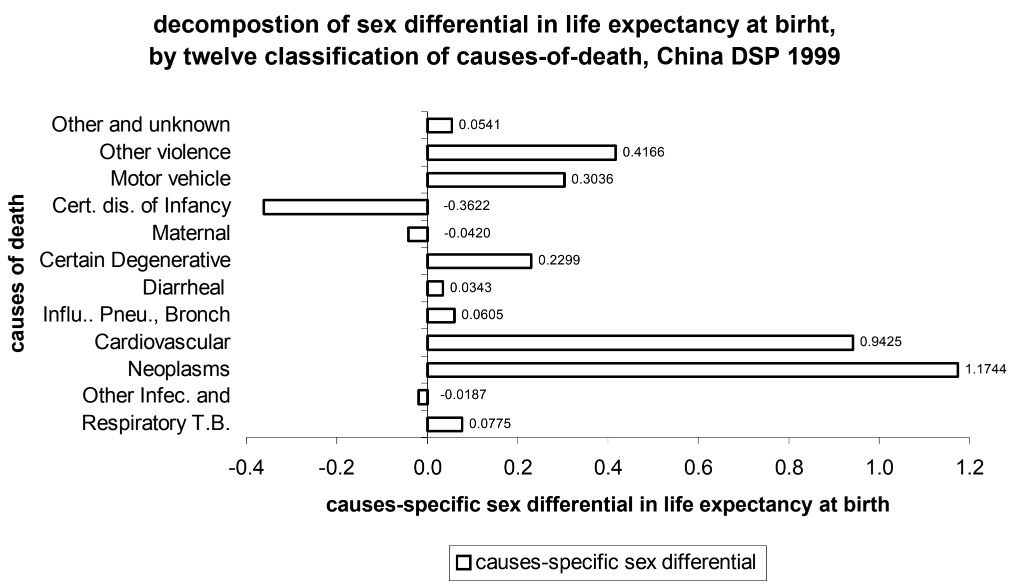
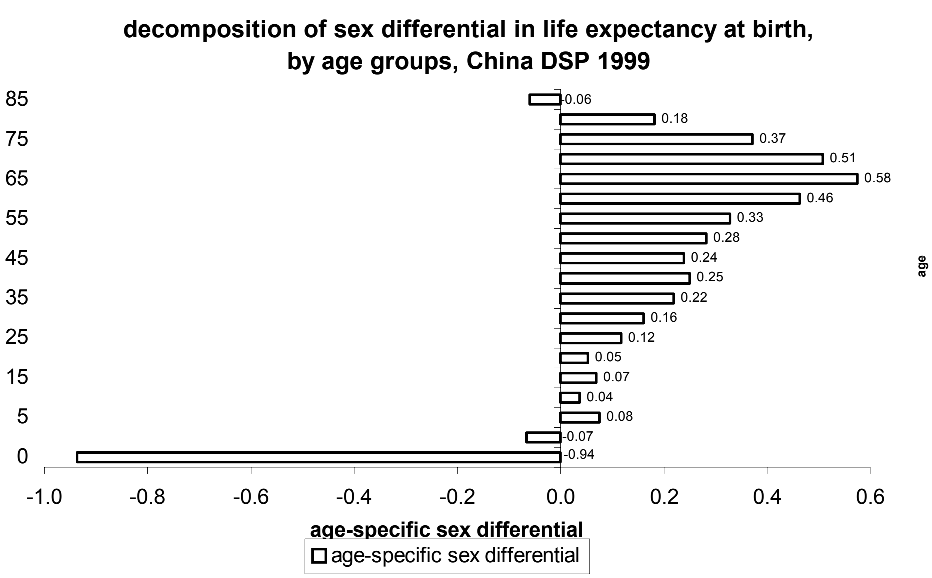
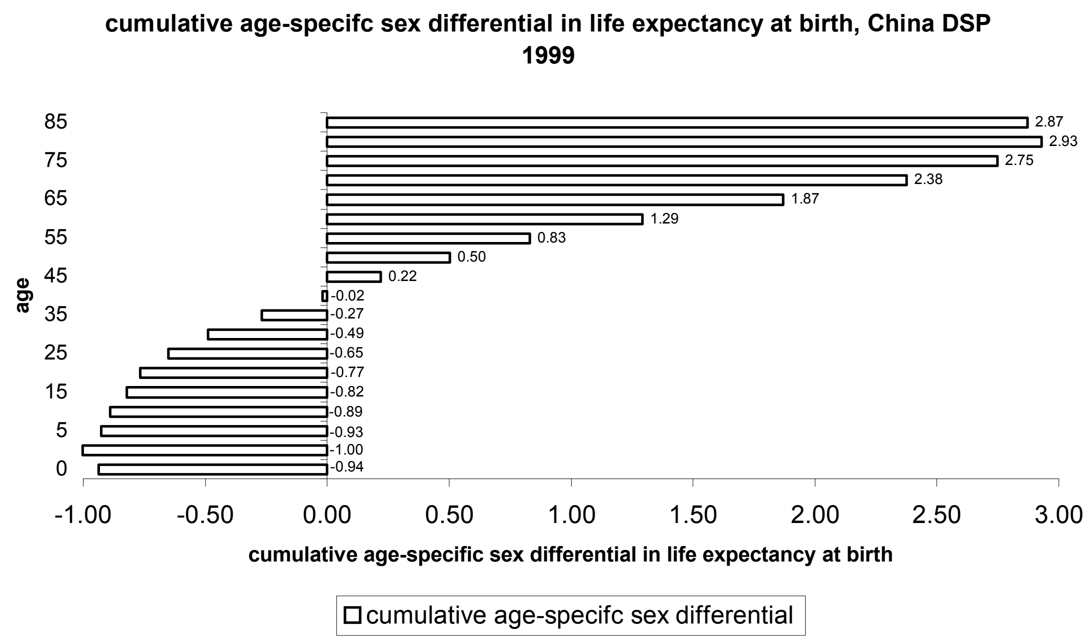


Figure V-5



The age-specific sex differential was shown in Figure V-5. The largest share of years for female was negative in infant group (-0.94). The child age 1-4 and the oldest age group 85 plus were negative as well but with much smaller amount less than 0.1 years. Starting from age 5, females gradually gained the advantage over males up to age 84. Figure V-6 showed the cumulative age-specific sex differential. Until age 45 female overrided the disadvantage rooted in infant and child under five, and expelled males in life expectancy at birth.

Figure V-6



The inside matrix of Table 5 provides information on further decomposing cause-specific sex differential into age groups. The infectious and parasitic diseases showed quite small differential between sexes, but the female infants and child under five were the group suffered most. Female advantage on neoplasms, cardiovascular, and respiratory diseases mostly came from age 50 and above. Contrast to the small female advantage observed for respiratory diseases (0.06), the female infant and child age 1-4 were the worst group compared to their male counterparts. Together female children under age five lose 0.35 years of sex differential from respiratory diseases. Female advantage on certain degenerative diseases concentrated on the middle adult age 35-60.

It is impressive to see female infants were in the worst position not only compared to male infants but also compared to the females in other ages. Female infants were disadvantaged in all causes except cardiovascular and maternal diseases. The respiratory diseases, certain disease of infancy and violence together consist of the most part of sex differential among infants accounting for almost 80% of the female disadvantage in sex differential at the infant year.

Table 4 Decomposition of urban-rural regional differential in life expectancy at birth (4.59 years), by age groups and causes-of-death, China DSP 1999

		1	2	3	4	5	6	7	8	9	10	11	12
Age	All Causes	Respirat. T.B.	Other Infec. and paras.	Neo plasms	Cardio vascular	Influ.. Pneu., Bronch	Diarrheal	Certain Degenerat .	Maternal	Cert. dis. of Infancy	Motor vehicle	Other violence	Other and unknown
0	1.60	0.0020	0.0793	0.0056	-0.0109	0.6914	0.0141	-0.0122	0.0000	0.4352	0.0040	0.0973	0.2933
1	0.32	0.0013	0.0424	0.0026	-0.0077	0.1111	0.0107	0.0039	0.0000	0.0079	0.0143	0.0875	0.0478
5	0.10	0.0008	0.0117	-0.0034	0.0079	0.0130	0.0023	0.0001	0.0000	0.0000	0.0123	0.0665	-0.0091
10	0.06	0.0000	0.0050	0.0008	0.0048	0.0040	0.0014	0.0042	0.0000	0.0000	-0.0039	0.0327	0.0077
15	0.06	0.0006	0.0061	0.0030	0.0020	0.0050	0.0018	-0.0033	0.0015	0.0000	0.0125	0.0244	0.0056
20	0.16	0.0035	0.0034	0.0083	0.0065	0.0021	-0.0010	0.0130	0.0043	0.0000	0.0474	0.0613	0.0147
25	0.24	0.0048	0.0042	0.0202	0.0280	0.0020	0.0005	0.0117	0.0072	0.0000	0.0290	0.1028	0.0252
30	0.23	0.0077	0.0079	0.0079	0.0295	-0.0025	0.0048	0.0232	0.0047	0.0000	0.0178	0.1007	0.0251
35	0.08	0.0019	0.0006	-0.0225	0.0218	0.0065	-0.0016	0.0039	-0.0013	0.0000	0.0153	0.0477	0.0043
40	0.12	0.0101	-0.0013	0.0079	0.0325	0.0115	0.0014	0.0109	0.0008	0.0000	0.0095	0.0428	-0.0013
45	0.25	0.0088	0.0023	0.0625	0.0234	0.0141	0.0006	0.0267	0.0000	0.0000	0.0258	0.0671	0.0169
50	0.29	0.0138	0.0052	0.0567	0.0959	0.0336	0.0010	0.0161	0.0000	0.0000	0.0073	0.0416	0.0222
55	0.16	0.0130	0.0022	-0.0286	0.0431	0.0470	0.0043	0.0123	0.0000	0.0000	0.0032	0.0321	0.0341
60	0.30	0.0181	0.0043	-0.0093	0.0937	0.1062	0.0057	0.0011	0.0000	0.0000	0.0078	0.0481	0.0272
65	0.08	0.0152	0.0089	-0.1066	0.0506	0.0955	-0.0010	-0.0328	-0.0008	0.0000	0.0060	0.0452	0.0005
70	0.23	0.0100	0.0070	-0.0929	0.1317	0.1445	-0.0017	-0.0221	0.0000	0.0000	0.0004	0.0467	0.0056
75	0.08	0.0059	0.0085	-0.0446	0.0554	0.0701	-0.0022	-0.0351	0.0000	0.0000	0.0058	0.0205	-0.0064
80	0.18	0.0018	0.0051	-0.0224	0.1150	0.0853	-0.0025	-0.0020	0.0000	0.0000	0.0013	0.0111	-0.0168
85	0.05	0.0001	0.0027	-0.0106	0.0681	0.0331	0.0016	-0.0143	0.0000	0.0000	-0.0006	0.0048	-0.0368
Sum	4.59	0.1193	0.2055	-0.1655	0.7913	1.4736	0.0404	0.0055	0.0163	0.4431	0.2151	0.9809	0.4598

Table 5 Decomposition of Sex differential in life expectancy at birth (2.87 years), by age groups and causes-of-death, China DSP 1999

		1	2	3	4	5	6	7	8	9	10	11	12
Age	All Causes	Respirat. T.B.	Other Infec. and paras.	Neo plasms	Cardio vascular	Influ.. Pneu., Bronch	Diarrheal	Certain Degenerat.	Maternal	Cert. dis. of Infancy	Motor vehicle	Other violence	Other and unknown
0	-0.94	-0.0037	-0.0259	-0.0003	0.0194	-0.3113	-0.0019	-0.0150	0.0000	-0.3747	-0.0075	-0.0646	-0.1512
1	-0.07	0.0015	-0.0134	0.0010	-0.0061	-0.0409	0.0036	-0.0073	0.0000	0.0125	0.0004	0.0343	-0.0522
5	0.08	0.0013	-0.0073	0.0101	0.0092	-0.0034	0.0052	0.0078	0.0000	0.0000	0.0013	0.0517	-0.0001
10	0.04	0.0000	-0.0022	-0.0031	-0.0049	0.0030	-0.0002	0.0019	0.0000	0.0000	0.0080	0.0288	0.0058
15	0.07	0.0010	-0.0006	0.0087	0.0046	-0.0020	0.0029	-0.0037	-0.0027	0.0000	0.0175	0.0314	0.0124
20	0.05	0.0004	-0.0021	0.0026	-0.0025	-0.0012	-0.0010	0.0022	-0.0118	0.0000	0.0421	0.0223	0.0022
25	0.12	-0.0014	0.0042	0.0156	-0.0056	0.0034	0.0020	0.0081	-0.0116	0.0000	0.0542	0.0420	0.0064
30	0.16	0.0057	0.0071	0.0284	0.0102	-0.0081	0.0020	0.0157	-0.0105	0.0000	0.0495	0.0515	0.0099
35	0.22	0.0071	0.0026	0.0301	0.0172	0.0016	-0.0002	0.0333	-0.0036	0.0000	0.0440	0.0598	0.0274
40	0.25	0.0030	0.0097	0.0562	0.0476	0.0061	0.0013	0.0393	-0.0012	0.0000	0.0236	0.0348	0.0294
45	0.24	0.0057	0.0073	0.0770	0.0410	-0.0039	0.0027	0.0399	0.0000	0.0000	0.0183	0.0167	0.0350
50	0.28	0.0053	0.0056	0.1088	0.0438	0.0129	0.0047	0.0406	0.0000	0.0000	0.0180	0.0261	0.0160
55	0.33	0.0049	0.0009	0.1229	0.1095	0.0122	0.0054	0.0219	0.0000	0.0000	0.0103	0.0027	0.0381
60	0.46	0.0120	-0.0008	0.1912	0.1405	0.0480	0.0047	0.0082	0.0000	0.0000	0.0064	0.0294	0.0235
65	0.58	0.0076	-0.0030	0.1883	0.2157	0.0796	-0.0009	0.0154	-0.0005	0.0000	0.0116	0.0158	0.0457
70	0.51	0.0140	0.0027	0.1672	0.1639	0.1238	0.0015	0.0038	0.0000	0.0000	-0.0004	0.0175	0.0139
75	0.37	0.0104	-0.0028	0.1008	0.1216	0.0953	0.0015	0.0030	0.0000	0.0000	0.0023	0.0119	0.0273
80	0.18	0.0027	0.0019	0.0483	0.0689	0.0409	0.0001	0.0114	0.0000	0.0000	0.0021	0.0031	0.0027
85	-0.06	0.0001	-0.0026	0.0208	-0.0514	0.0045	0.0008	0.0034	0.0000	0.0000	0.0017	0.0014	-0.0382
sum	2.87	0.0775	-0.0187	1.1744	0.9425	0.0605	0.0343	0.2299	-0.0420	-0.3622	0.3036	0.4166	0.0541

References

Arriaga, Eduardo. 1984. "Measuring and explaining the change in life expectancy". *Demography*, 21(1): 83-96.

---------. 1989. "Changing trends in mortality decline during the last decades" pp. 105-29 in Lado Ruzicka, Guillaume Wunsch, and Penny Kane, eds., *Differential Mortality : methodological issues and biosocial factors.* Oxford. England: Clarendon Press. International Studies in Demography.

Bennett, Neil G. and Horiuchi, Shiro. 1981. "Estimating the completeness of death registration in a closed population". *Population Index* 47(2): 207-222.

China State of Statistical Bureau. 1985. *Tabulations of China 1982 Population Census Data*. Beijing, China: China statistical publication Press.

--------, 1992. *Tabulations of China 1990 Population Census Data.* Beijing. China: China statistical publication Press.

--------, 2002. *Tabulations of China 2000 Population Census Data.* Beijing. China: China statistical publication Press.

Department of Disease Control of Ministry of Health and Chinese Academy of Preventive Medicine, 2001. *The 1999 annual report on Chinese diseases surveillance.* Beijing, China.

Hayasse, Yasuko and Kawamata, Seiko. 1991. *Population policy and vital statistics in China.* Tokyo, Japan.

Hill, Kenneth. 1987. "Estimating census and death registration completeness". *Asian and Pacific Population Forum.* Vol. 1 No.3: 8-13.

--------, 2002. "Methods for Measuring Adult Mortality in Developing Countries: A Comparative Review." Unpublished manuscript.

Liang, jimin and Chen, Shengli, 1989. *Analytic Data Volume of the Sampling Survey on Fertility and Birth Control in China.* Vol. of Death & Migration. Beijing, China.

Preston, Samuel H., Keyfitz, Nathan and Schoen, Robert. 1972. *Causes of death: life tables for national populations.* New York: Seminar Press. Studies in Population.

Rong, Shoude, et. al. 1981. "Statistical Analysis on China Residents Expectancy Life, 1973-1975". *Population and Economy*. Vol. 1.

World Heath Organization, 1957. *Manual of the international statistical classification of diseases, injuries, and causes of death: based on the recommendations of the Seventh* *revision conference, 1955 and adopted by the Ninth world health assembly under the WHO Nomenclature REgulations.* Vol. I. Geneva.

World Heath Organization, 1977. *Manual of the international statistical classification of diseases, injuries, and causes of death: based on the recommendations of the Ninth revision conference, 1975 and adopted by the Twenty-ninth world health assembly.* Vol. I. Geneva.

Yan, Rui and Chen, Shengli. 1993. “Research on China Age Specific Death Rate and Life Level in the last 40 years”, in *Thesis of international council in Beijing on the sampling survey on fertility and birth control in China.* Beijing: China Population Publishing House.

Appendix I. Regression outputs of generalized Brass method

G-B method on the 2000 China Census

[1]. Males

```
. regress male_b male_d, robust
Regression with robust standard errors              Number of obs =      14
                                                    F(  1,    12) = 1450.37
                                                    Prob > F      =  0.0000
                                                    R-squared     =  0.9852
                                                    Root MSE      =  .00313
------------------------------------------------------------------------------
             |               Robust
      male_b |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      male_d |   .9775185   .0256676    38.08   0.000     .9215936    1.033443
       _cons |  -.0005816     .00116    -0.50   0.625    -.003109    .0019458
------------------------------------------------------------------------------

. dis exp(10.337*-.0005816)
.99400604

. dis sqrt(.99400604)/.9775185
1.019928
```

[2]. Females:

```
. regress female_b female_d, robust
Regression with robust standard errors              Number of obs =      14
                                                    F(  1,    12) = 1510.36
                                                    Prob > F      =  0.0000
                                                    R-squared     =  0.9830
                                                    Root MSE      =   .0029
------------------------------------------------------------------------------
             |               Robust
    female_b |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    female_d |   1.091595   .0280881    38.86   0.000     1.030396    1.152793
       _cons |  -.0014482   .0011089    -1.31   0.216    -.0038642    .0009678
------------------------------------------------------------------------------

. dis exp(10.337*-.0014482)
.98514145

. dis sqrt(.98514145)/1.091595
.90925931
```

G-B method on the 1999 Chinese DSP data

[1] using observed inter-DSP growth rates:

Males :

```
. regress male_b male_99d,robust
Regression with robust standard errors                Number of obs =      14
                                                      F(  1,    12) = 3910.07
                                                      Prob > F      =  0.0000
                                                      R-squared     =  0.9939
                                                      Root MSE      =  .00196
------------------------------------------------------------------------------
             |               Robust
      male_b |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    male_99d |   1.301678   .0208167    62.53   0.000     1.256323    1.347034
       _cons |   .0395254   .0009349    42.28   0.000     .0374885    .0415623
------------------------------------------------------------------------------
. dis exp(6*.0395254)
1.2676343

. dis sqrt(1.2676343)/1.301678
.86495483
```

Females :

```
. regress female_b female_99d,robust
Regression with robust standard errors                Number of obs =      14
                                                      F(  1,    12) = 1859.29
                                                      Prob > F      =  0.0000
                                                      R-squared     =  0.9889
                                                      Root MSE      =  .00221
------------------------------------------------------------------------------
             |               Robust
    female_b |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  female_99d |   1.394127   .0323317    43.12   0.000     1.323682    1.464571
       _cons |   .0392239   .0010304    38.07   0.000     .0369789    .0414689
------------------------------------------------------------------------------
. dis exp(6*0.0392239)
1.2653432

. dis sqrt(1.2653432)/1.394127
.80686677
```

[2] using the inter-DSP growth rates adjusted by the coverage of 1999 DSP population:

Males:

```
. regress male_b_GB male_99d, robust
Regression with robust standard errors              Number of obs =      14
                                                    F(  1,    12) = 3910.07
                                                    Prob > F      =  0.0000
                                                    R-squared     =  0.9939
                                                    Root MSE      =  .00196

------------------------------------------------------------------------------
             |               Robust
   male_b_GB |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    male_99d |   1.301678   .0208167    62.53   0.000     1.256323    1.347034
       _cons |   .0002383   .0009349     0.25   0.803    -.0017985    .0022752
------------------------------------------------------------------------------

. dis exp(6*0.0002383)
1.0014308

. dis sqrt(1.0014308)/1.301678
.76878855
```

Females:

```
. regress female_b_GB female_99d, robust
Regression with robust standard errors              Number of obs =      14
                                                    F(  1,    12) = 1859.29
                                                    Prob > F      =  0.0000
                                                    R-squared     =  0.9889
                                                    Root MSE      =  .00221
------------------------------------------------------------------------------
             |               Robust
 female_b_GB |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  female_99d |   1.394127   .0323317    43.12   0.000     1.323682    1.464572
       _cons |  -.0000632   .0010304    -0.06   0.952    -.0023082    .0021818
------------------------------------------------------------------------------
. dis exp(6*-.0000632)
.99962087

. dis sqrt(.99962087)/1.394127
.71715878
```

[3] using the mixed growth rates, i.e. adjusted inter-DSP rates and intercensal growth rates at age 15, 20, 25, 30, 35, 40:

Males:

```
. regress newmix_male_b male_99d, robust
Regression with robust standard errors              Number of obs =      14
                                                    F(  1,    12) = 5326.14
                                                    Prob > F      =  0.0000
                                                    R-squared     =  0.9958
                                                    Root MSE      =   .0017
------------------------------------------------------------------------------
             |               Robust
newmix_mal~b |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    male_99d |   1.366296   .0187214    72.98   0.000     1.325505    1.407086
       _cons |  -.0030605    .000792    -3.86   0.002    -.0047861   -.0013349
------------------------------------------------------------------------------

. dis exp(6*-.0030605)
.98180457

. dis sqrt(.98180457)/1.366296
.72521659
```

Females :

```
. regress newmix_female_b female_99d, robust
Regression with robust standard errors              Number of obs =      14
                                                    F(  1,    12) = 5885.42
                                                    Prob > F      =  0.0000
                                                    R-squared     =  0.9958
                                                    Root MSE      =  .00143
------------------------------------------------------------------------------
             |               Robust
newmix_fem~b |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  female_99d |   1.470371   .0191663    76.72   0.000     1.428611    1.512131
       _cons |  -.0030267   .0006885    -4.40   0.001    -.0045268   -.0015266
------------------------------------------------------------------------------
. dis exp(6*-.0030267)
.9820037

. dis sqrt(.9820037)/1.470371
.67395304
```

[4] using the intercensal growth rates at all ages:

Males:

. regress DSP_C_male_b male_99d, robust

DSP_C_male_b	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
male_99d	1.241329	.0374679	33.13	0.000	1.159694	1.322965
_cons	-.002113	.0009976	-2.12	0.056	-.0042866	.0000606

. dis exp(6*-.002113)
.98740203

. dis sqrt(.98740203)/1.241329
.80049773

Females:

.regress DSP_C_female_b female_99d, robust

DSP_C_fema~b	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
female_99d	1.486476	.0550814	26.99	0.000	1.366464	1.606488
_cons	-.0030981	.0010135	-3.06	0.010	-.0053062	-.00089

. dis exp(6*-.0030981)
.9815831

. dis sqrt(.9815831)/1.486476
.66650841

Appendix II. Life tables for the Chinese DSP population of 1999

Table 6: abridged single life table for all causes combined , male population, China DSP system, 1999

Age x	nMx	Lx	nLx	ndx	nax	nqx	nmx	Tx	ex
0	0.022115	100000	98065	2169	0.108	0.021687	0.022115	6929817	69.298
1	0.001403	97831	389958	547	1.500	0.005591	0.001403	6831752	69.832
5	0.000656	97284	485625	318	2.500	0.003273	0.000656	6441795	66.216
10	0.000522	96966	484197	253	2.496	0.002606	0.000522	5956169	61.425
15	0.000651	96713	482832	314	2.662	0.003245	0.00065	5471973	56.579
20	0.001035	96399	480856	497	2.704	0.005154	0.001033	4989140	51.755
25	0.001676	95902	477625	801	2.643	0.008351	0.001677	4508284	47.009
30	0.00221	95102	472978	1046	2.582	0.011002	0.002212	4030660	42.383
35	0.00259	94055	467382	1213	2.613	0.012893	0.002595	3557682	37.825
40	0.003685	92843	460252	1703	2.674	0.018343	0.0037	3090300	33.285
45	0.005838	91140	449459	2635	2.632	0.028912	0.005863	2630048	28.857
50	0.007745	88505	434445	3375	2.606	0.038130	0.007768	2180589	24.638
55	0.010439	85130	415691	4356	2.714	0.051173	0.01048	1746144	20.512
60	0.020252	80774	385821	7846	2.700	0.097141	0.020337	1330454	16.471
65	0.035136	72927	336692	11889	2.650	0.163028	0.035312	944633	12.953
70	0.061362	61038	265293	16389	2.566	0.268499	0.061775	607940	9.960
75	0.094151	44649	180291	17049	2.480	0.381846	0.094565	342647	7.674
80	0.148177	27600	100142	14790	2.440	0.535882	0.147695	162356	5.882
85	0.205898	12810	62214	12810	4.857	1.000000	0.205898	62214	4.857

Table 7: multi-decrement life table: number of persons dying (out of 100,000 at birth) above age x from specified causes, male population, Chinese DSP system, 1999

Age x	Respiratory T.B.	Other Infec. And Paras.	Neo plasms	Cardio vascular	Infl. Pneu., Bronch	Diarrheal +	Certain Degenerative	Maternal	Cert. Dis. Of Infancy	Motor vehicle	Other violence	Other and unknown	All causes
0	1016	847	19305	39141	16573	707	4638	0	800	1760	4908	10303	100000
1	1016	775	19290	39083	15970	676	4638	0	21	1760	4847	9756	97831
5	1014	740	19255	39067	15868	661	4638	0	0	1740	4691	9611	97284
10	1012	730	19225	39048	15854	653	4627	0	0	1699	4547	9571	96966
15	1012	719	19191	39042	15846	651	4620	0	0	1676	4432	9523	96713
20	1010	711	19149	39023	15836	646	4613	0	0	1620	4313	9477	96399
25	1000	708	19116	38989	15834	645	4588	0	0	1503	4123	9396	95902
30	991	690	19014	38928	15821	635	4548	0	0	1353	3836	9285	95102
35	968	662	18845	38811	15813	625	4467	0	0	1184	3529	9151	94055
40	946	631	18605	38631	15796	621	4344	0	0	1016	3251	9002	92843
45	921	591	18127	38272	15749	613	4161	0	0	866	3000	8840	91140
50	877	547	17291	37598	15689	598	3903	0	0	725	2670	8605	88505
55	821	500	16100	36653	15523	570	3562	0	0	594	2401	8406	85130
60	763	454	14592	35211	15227	531	3208	0	0	501	2209	8077	80773
65	634	408	12197	32207	14433	481	2766	0	0	402	1830	7568	72926
70	482	343	9005	27294	12916	430	2149	0	0	253	1425	6742	61040
75	295	241	5424	20256	9807	333	1501	0	0	190	939	5666	44653
80	107	173	2629	12513	6256	226	843	0	0	103	539	4212	27602
85	34	54	919	5497	2969	128	364	0	0	47	234	2564	12810

Table 8: cause-specific associated decrement life tables: life expectancy at age x if specified causes were eliminated, male population, Chinese DSP system, 1999

		1	2	3	4	5	6	7	8	9	10	11	12	1+2	10+11
Age x	No causes	Respiratory T.B.	Other Infec. And Paras.	Neo plasms	Cardio vascular	Infl. Pneu., Bronch	Diarrheal +	Certain Degenerati	Maternal	Cert. Dis. Of Infancy	Motor vehicle	Other violence	Other and unknown	Infec. And Paras.	Violence
0	69.298	69.442	69.502	72.133	74.829	71.331	69.410	69.980	69.298	69.859	69.816	70.598	70.954	69.647	71.133
1	69.832	69.979	69.988	72.718	75.441	71.467	69.924	70.529	69.832	69.846	70.362	71.116	71.125	70.136	71.663
5	66.216	66.362	66.349	69.093	71.845	67.788	66.298	66.917	66.216	66.216	66.734	67.396	67.413	66.496	67.930
10	61.425	61.571	61.552	64.291	67.058	62.993	61.503	62.121	61.425	61.425	61.918	62.512	62.599	61.698	63.020
15	56.579	56.725	56.700	59.431	62.223	58.146	56.656	57.273	56.579	56.579	57.060	57.597	57.727	56.846	58.092
20	51.755	51.900	51.871	54.591	57.405	53.320	51.829	52.447	51.755	51.755	52.205	52.708	52.880	52.017	53.172
25	47.009	47.150	47.124	49.842	52.669	48.582	47.082	47.691	47.009	47.009	47.401	47.868	48.097	47.266	48.271
30	42.383	42.520	42.491	45.188	48.059	43.962	42.452	43.052	42.383	42.383	42.707	43.112	43.426	42.629	43.445
35	37.825	37.955	37.923	40.586	43.507	39.419	37.891	38.467	37.825	37.825	38.081	38.430	38.823	38.053	38.692
40	33.285	33.408	33.372	35.984	38.962	34.893	33.351	33.888	33.285	33.285	33.479	33.789	34.237	33.495	33.988
45	28.857	28.974	28.932	31.430	34.497	30.478	28.921	29.408	28.857	28.857	29.003	29.284	29.770	29.049	29.434
50	24.638	24.745	24.701	27.013	30.200	26.288	24.699	25.126	24.638	24.638	24.746	24.977	25.505	24.809	25.087
55	20.511	20.607	20.565	22.635	25.984	22.180	20.568	20.926	20.511	20.511	20.588	20.791	21.358	20.661	20.870
60	16.471	16.559	16.517	18.330	21.817	18.158	16.522	16.826	16.471	16.471	16.531	16.721	17.285	16.606	16.783
65	12.953	13.025	12.994	14.478	18.061	14.645	12.999	13.256	12.953	12.953	12.999	13.153	13.747	13.067	13.201
70	9.960	10.017	9.997	11.117	14.754	11.660	10.005	10.204	9.960	9.960	9.987	10.122	10.745	10.055	10.150
75	7.674	7.715	7.705	8.474	12.124	9.277	7.717	7.877	7.674	7.674	7.699	7.799	8.518	7.746	7.825
80	5.882	5.903	5.916	6.423	9.991	7.410	5.925	6.046	5.882	5.882	5.901	5.985	6.848	5.936	6.005
85	4.857	4.870	4.877	5.232	8.507	6.322	4.906	4.999	4.857	4.857	4.875	4.947	6.072	4.890	4.966
Added year of life		0.144	0.204	2.835	5.531	2.033	0.112	0.682	0.000	0.561	0.518	1.300	1.656	0.349	1.835

Table 9 abridged single life table for all causes combined, female population, Chinese DSP system, 1999

Age x	nMx	lx	nLx	ndx	nax	nqx	nmx	Tx	ex
0	0.035303	100000	97020	3425	0.130	0.034251	0.035303	7216865	72.169
1	0.001638	96575	384724	630	1.500	0.006526	0.001638	7119844	73.724
5	0.000425	95945	479214	204	2.500	0.002123	0.000425	6735120	70.198
10	0.000399	95741	478225	191	2.487	0.001995	0.000399	6255906	65.342
15	0.000403	95550	477313	192	2.719	0.002005	0.000401	5777681	60.468
20	0.000826	95358	475886	393	2.692	0.004116	0.000825	5300368	55.584
25	0.001167	94966	473506	553	2.605	0.005820	0.001167	4824482	50.802
30	0.001428	94413	470406	672	2.530	0.007120	0.001429	4350976	46.084
35	0.001388	93741	467146	649	2.599	0.006926	0.00139	3880571	41.397
40	0.002104	93092	463259	981	2.757	0.010534	0.002117	3413424	36.667
45	0.004048	92111	456193	1857	2.650	0.020160	0.004071	2950166	32.028
50	0.005194	90254	445686	2321	2.594	0.025719	0.005208	2493973	27.633
55	0.006682	87933	433055	2906	2.725	0.033046	0.00671	2048287	23.294
60	0.013187	85027	412640	5465	2.713	0.064276	0.013244	1615231	18.997
65	0.022359	79562	378298	8506	2.706	0.106906	0.022484	1202592	15.115
70	0.042727	71056	322276	13877	2.621	0.195290	0.043058	824294	11.601
75	0.067311	57180	245311	16597	2.555	0.290268	0.067659	502018	8.780
80	0.115097	40582	158543	18227	2.566	0.449142	0.114967	256706	6.326
85	0.227733	22355	98164	22355	4.391	1.000000	0.227733	98164	4.391

Table 10 multidecrement life table: number of persons dying (out of 100,000 at birth) above age x from specified causes, female population, Chinese DSP system, 1999

Age x	Respiratory T.B.	Other Infec. And Paras.	Neo plasms	Cardio vascular	Infl. Pneu., Bronch	Diarrheal +	Certain Degenerati	Maternal	Cert. Dis. Of Infancy	Motor vehicle	Other violence	Other and unknown	All causes
0	543	1056	12885	43618	17315	732	4267	92	1286	892	3868	13446	100000
1	538	949	12869	43587	16293	698	4246	92	3	882	3720	12698	96575
5	538	896	12835	43563	16137	688	4237	92	0	862	3613	12484	95945
10	538	876	12821	43557	16118	688	4237	92	0	824	3546	12444	95741
15	538	862	12782	43543	16115	686	4233	92	0	814	3477	12407	95550
20	538	853	12756	43533	16101	686	4220	87	0	789	3413	12382	95358
25	529	846	12728	43495	16097	683	4198	65	0	752	3267	12306	94966
30	517	837	12659	43423	16091	677	4176	41	0	714	3069	12209	94413
35	507	825	12555	43329	16065	672	4131	17	0	659	2881	12099	93741
40	503	800	12393	43194	16052	667	4094	8	0	604	2757	12020	93092
45	487	788	12076	42972	16023	663	4025	5	0	522	2607	11944	92111
50	462	769	11491	42428	15949	657	3900	5	0	442	2329	11824	90254
55	426	743	10710	41635	15830	647	3714	5	0	380	2158	11685	87933
60	390	700	9749	40677	15582	633	3454	5	0	334	1971	11531	85027
65	328	646	8396	38352	15037	610	3032	5	0	269	1751	11135	79562
70	221	547	6397	34650	14004	545	2470	0	0	200	1430	10593	71057
75	161	456	4035	28045	11698	444	1727	0	0	119	1047	9449	57182
80	90	313	2026	19670	8562	325	883	0	0	42	715	7957	40583
85	50	179	704	10521	4524	172	451	0	0	14	321	5420	22355

Table 11 cause-specific associated decrement life table: life expectancy at age x if specified causes were eliminated, female population, Chinese DSP system, 1999

		1	2	3	4	5	6	7	8	9	10	11	12	1+2	10+11
Age x	No causes	Respiratory T.B.	Other Infec. And Paras.	Neo plasms	Cardio vascular	Infl. Pneu., Bronch	Diarrheal +	Certain Degenerati	Maternal	Cert. Dis. Of Infancy	Motor vehicle	Other violence	Other and unknown	Infec. And Paras.	Violence
0	72.169	72.259	72.420	74.188	78.185	74.537	72.267	72.758	72.210	73.117	72.435	73.194	74.153	72.511	73.467
1	73.723	73.813	73.902	75.803	79.928	75.379	73.800	74.319	73.767	73.726	73.992	74.671	75.197	73.993	74.945
5	70.198	70.288	70.338	72.265	76.424	71.744	70.267	70.789	70.242	70.198	70.453	71.070	71.517	70.429	71.330
10	65.342	65.433	65.468	67.402	71.576	66.877	65.411	65.935	65.386	65.342	65.571	66.168	66.635	65.559	66.402
15	60.468	60.558	60.584	62.506	66.705	62.004	60.536	61.059	60.511	60.468	60.690	61.249	61.738	60.676	61.476
20	55.584	55.675	55.695	57.609	61.826	57.115	55.652	56.168	55.625	55.584	55.791	56.327	56.841	55.787	56.539
25	50.802	50.889	50.910	52.821	57.047	52.337	50.869	51.377	50.831	50.802	50.990	51.466	52.022	50.997	51.657
30	46.084	46.165	46.188	48.077	52.324	47.625	46.149	46.651	46.101	46.084	46.254	46.650	47.260	46.270	46.822
35	41.397	41.473	41.496	43.354	47.631	42.936	41.459	41.946	41.402	41.397	41.541	41.877	42.528	41.573	42.024
40	36.667	36.743	36.757	38.567	42.880	38.212	36.728	37.205	36.669	36.667	36.790	37.098	37.772	36.833	37.223
45	32.028	32.099	32.114	33.825	38.210	33.578	32.088	32.546	32.029	32.028	32.122	32.407	33.116	32.185	32.503
50	27.633	27.696	27.714	29.263	33.726	29.189	27.692	28.119	27.633	27.633	27.701	27.927	28.702	27.778	27.997
55	23.294	23.348	23.370	24.728	29.265	24.854	23.352	23.738	23.294	23.294	23.346	23.546	24.349	23.425	23.599
60	18.997	19.044	19.065	20.227	24.870	20.546	19.053	19.391	18.997	18.997	19.039	19.210	20.049	19.113	19.254
65	15.115	15.153	15.176	16.124	20.733	16.645	15.170	15.445	15.116	15.115	15.147	15.296	16.150	15.215	15.328
70	11.600	11.623	11.650	12.332	16.920	13.101	11.650	11.863	11.600	11.600	11.623	11.742	12.651	11.673	11.765
75	8.780	8.797	8.825	9.245	13.640	10.181	8.824	8.971	8.780	8.780	8.793	8.887	9.863	8.843	8.901
80	6.326	6.336	6.364	6.589	10.677	7.619	6.365	6.435	6.326	6.326	6.331	6.415	7.537	6.375	6.420
85	4.391	4.401	4.427	4.534	8.295	5.505	4.425	4.481	4.391	4.391	4.394	4.455	5.796	4.437	4.458
added year of life		0.091	0.251	2.020	6.017	2.368	0.098	0.590	0.042	0.948	0.267	1.025	1.984	0.343	1.298

Table 12 abridged single life table for all causes combined, urban population, Chinese DSP system, 1999

Age x	nMx	lx	nLx	ndx	nax	nqx	nmx	Tx	ex
0	0.012856	100000	98846	1271	0.092	0.012708	0.012856	7397777	73.978
1	0.000749	98729	394179	295	1.500	0.002989	0.000749	7298931	73.929
5	0.000288	98434	491816	142	2.500	0.001441	0.000288	6904752	70.146
10	0.000308	98292	491090	151	2.545	0.001538	0.000308	6412936	65.244
15	0.000357	98141	490280	175	2.564	0.001779	0.000356	5921846	60.340
20	0.000421	97966	489350	205	2.647	0.002092	0.000419	5431566	55.443
25	0.000656	97761	488071	319	2.690	0.003262	0.000653	4942217	50.554
30	0.001022	97443	486079	496	2.715	0.005093	0.001021	4454146	45.710
35	0.001721	96946	482788	831	2.661	0.008572	0.001721	3968067	40.931
40	0.002376	96115	477916	1139	2.664	0.011848	0.002383	3485280	36.261
45	0.003649	94977	470770	1727	2.618	0.018178	0.003667	3007363	31.664
50	0.004566	93250	461282	2117	2.653	0.022699	0.004589	2536593	27.202
55	0.007283	91133	448236	3279	2.734	0.035980	0.007315	2075311	22.772
60	0.013543	87854	426326	5797	2.767	0.065980	0.013597	1627075	18.520
65	0.027551	82058	385441	10695	2.677	0.130331	0.027747	1200749	14.633
70	0.04584	71363	321212	14862	2.604	0.208259	0.046268	815308	11.425
75	0.075788	56501	237504	18143	2.520	0.321101	0.076389	494096	8.745
80	0.109967	38359	151140	16565	2.546	0.431855	0.109603	256592	6.689
85	0.206665	21793	105452	21793	4.839	1.000000	0.206665	105452	4.839

Table 13 multidecrement life table: number of persons dying (out of 100,000 at birth) above age x from specified causes, urban population, Chinese DSP system, 1999

Age x	Respiratory T.B.	Other Infec. And Paras.	Neo plasms	Cardio vascular	Infl. Pneu., Bronch	Diarrheal +	Certain Degenerati	Maternal	Cert. Dis. Of Infancy	Motor vehicle	Other violence	Other and unknown	All causes
0	340	457	20473	41089	13214	784	5881	22	640	929	1955	14215	100000
1	340	446	20462	41022	13103	767	5859	22	7	929	1955	13817	98729
5	340	446	20425	40992	13089	767	5859	22	0	922	1898	13674	98434
10	340	446	20398	40989	13089	767	5853	22	0	898	1872	13619	98292
15	340	440	20362	40986	13089	767	5853	22	0	875	1820	13586	98141
20	340	440	20331	40974	13084	767	5838	22	0	851	1761	13557	97966
25	336	441	20313	40947	13084	763	5834	18	0	843	1683	13500	97761
30	333	434	20257	40924	13077	756	5821	18	0	791	1599	13434	97443
35	329	427	20129	40867	13056	756	5796	15	0	704	1517	13352	96946
40	319	398	19876	40744	13052	749	5718	8	0	615	1396	13240	96115
45	319	368	19477	40511	13037	745	5609	8	0	513	1278	13112	94977
50	304	340	18890	39932	13004	736	5473	8	0	463	1133	12967	93250
55	299	317	18015	39313	12958	718	5240	8	0	381	1028	12857	91133
60	299	279	16574	38189	12849	705	4959	8	0	318	950	12725	87854
65	279	246	14482	35748	12622	692	4501	8	0	265	849	12367	82057
70	233	216	10925	31344	11831	624	3648	0	0	182	742	11619	71364
75	176	168	6802	24913	10032	500	2699	0	0	107	654	10452	56503
80	93	157	3494	16491	7070	345	1432	0	0	84	484	8709	38359
85	53	89	1309	8871	4136	160	856	0	0	53	254	6011	21793

Table 14 cause-specific associated decrement life table: life expectancy at age x if specified causes were eliminated, urban population, Chinese DSP system, 1999

		1	2	3	4	5	6	7	8	9	10	11	12	1+2	10+11
Age x	No causes	Respiratory T.B.	Other Infec. And Paras.	Neo plasms	Cardio vascular	Infl. Pneu., Bronch	Diarrheal +	Certain Degenerati	Maternal	Cert. Dis. Of Infancy	Motor vehicle	Other violence	Other and unknown	Infec. And Paras.	Violence
0	73.978	74.019	74.062	77.015	79.633	75.215	74.064	74.722	73.985	74.455	74.245	74.474	75.825	74.104	74.745
1	73.929	73.970	74.006	76.996	79.602	75.097	74.003	74.666	73.936	73.934	74.200	74.431	75.494	74.048	74.705
5	70.146	70.188	70.223	73.195	75.812	71.307	70.221	70.885	70.153	70.146	70.413	70.607	71.608	70.265	70.877
10	65.244	65.285	65.321	68.277	70.916	66.406	65.318	65.980	65.251	65.244	65.494	65.688	66.669	65.363	65.941
15	60.340	60.382	60.414	63.354	66.019	61.504	60.415	61.078	60.348	60.340	60.576	60.752	61.746	60.456	60.991
20	55.443	55.485	55.517	58.443	61.124	56.607	55.518	56.173	55.451	55.443	55.665	55.821	56.834	55.560	56.045
25	50.554	50.594	50.628	53.550	56.231	51.720	50.627	51.283	50.559	50.554	50.772	50.889	51.916	50.668	51.110
30	45.710	45.749	45.782	48.687	51.394	46.877	45.780	46.435	45.716	45.710	45.904	46.005	47.044	45.820	46.201
35	40.931	40.967	40.999	43.862	46.614	42.093	41.001	41.648	40.934	40.931	41.086	41.190	42.233	41.036	41.347
40	36.261	36.294	36.319	39.110	41.938	37.433	36.329	36.954	36.262	36.261	36.382	36.474	37.529	36.352	36.597
45	31.664	31.698	31.712	34.393	37.312	32.844	31.732	32.325	31.665	31.664	31.750	31.837	32.899	31.745	31.924
50	27.202	27.232	27.242	29.781	32.738	28.393	27.268	27.831	27.203	27.202	27.273	27.332	28.412	27.271	27.404
55	22.772	22.801	22.807	25.148	28.231	23.977	22.835	23.351	22.773	22.772	22.823	22.876	23.979	22.835	22.928
60	18.520	18.550	18.547	20.613	23.853	19.743	18.582	19.053	18.521	18.520	18.558	18.610	19.739	18.577	18.648
65	14.633	14.661	14.655	16.407	19.702	15.895	14.696	15.110	14.634	14.633	14.663	14.709	15.862	14.683	14.739
70	11.425	11.449	11.444	12.744	16.158	12.721	11.485	11.814	11.425	11.425	11.444	11.492	12.690	11.468	11.512
75	8.745	8.765	8.761	9.597	13.072	10.025	8.799	9.062	8.745	8.745	8.755	8.814	10.111	8.781	8.825
80	6.689	6.702	6.711	7.222	10.485	7.889	6.739	6.894	6.689	6.689	6.700	6.758	8.290	6.724	6.769
85	4.839	4.851	4.859	5.148	8.160	5.972	4.875	5.037	4.839	4.839	4.851	4.896	6.682	4.871	4.908
added year of life		0.041	0.085	3.038	5.655	1.237	0.086	0.745	0.007	0.477	0.268	0.496	1.847	0.126	0.767

Table 15 abridged single life table for all causes combined ,rural population, Chinese DSP system, 1999

Age x	nMx	lx	nLx	ndx	nax	nqx	nmx	Tx	ex
0	0.035135	100000	97033	3409	0.130	0.034092	0.035135	6939244	69.392
1	0.001903	96591	384534	732	1.500	0.007574	0.001903	6842211	70.837
5	0.000604	95859	478573	289	2.500	0.003016	0.000604	6457677	67.366
10	0.000497	95570	477254	237	2.486	0.002482	0.000497	5979104	62.563
15	0.000574	95333	476039	273	2.707	0.002861	0.000573	5501850	57.712
20	0.001073	95060	474138	509	2.715	0.005350	0.001073	5025812	52.870
25	0.001692	94551	470865	798	2.628	0.008437	0.001694	4551673	48.140
30	0.002139	93754	466314	998	2.540	0.010647	0.002141	4080808	43.527
35	0.002146	92756	461394	992	2.596	0.010692	0.002149	3614495	38.968
40	0.00318	91764	455489	1456	2.713	0.015872	0.003198	3153101	34.361
45	0.005547	90307	445683	2483	2.642	0.027494	0.005571	2697612	29.871
50	0.007292	87824	431518	3154	2.589	0.035908	0.007308	2251929	25.641
55	0.009191	84671	414611	3826	2.715	0.045183	0.009227	1820411	21.500
60	0.018218	80845	387812	7096	2.687	0.087771	0.018297	1405800	17.389
65	0.029411	73749	344972	10191	2.667	0.138179	0.02954	1017988	13.803
70	0.054021	63559	280908	15267	2.584	0.240198	0.054348	673016	10.589
75	0.08109	48292	200783	16340	2.511	0.338361	0.081382	392108	8.120
80	0.135175	31952	119414	16098	2.494	0.503810	0.134806	191325	5.988
85	0.220471	15854	71911	15854	4.536	1.000000	0.220471	71911	4.536

Table 16 multidecrement life table: number of persons dying (out of 100,000 at birth) above age x from specified causes, rural population, Chinese DSP system, 1999

Age x	Respiratory T.B.	Other Infec. And Paras.	Neo plasms	Cardio vascular	Infl. Pneu., Bronch	Diarrheal +	Certain Degenerati	Maternal	Cert. Dis. Of Infancy	Motor vehicle	Other violence	Other and unknown	All causes
0	954	1091	15034	41029	18010	691	4039	50	1228	1489	5223	11162	100000
1	951	973	15016	40978	16966	655	4033	50	18	1484	5091	10375	96591
5	949	915	14976	40959	16799	640	4028	50	0	1457	4915	10170	95859
10	948	897	14955	40945	16780	637	4022	50	0	1415	4792	10130	95570
15	948	884	14919	40934	16774	634	4015	50	0	1400	4690	10085	95333
20	947	873	14883	40919	16760	631	4007	47	0	1354	4590	10048	95060
25	937	867	14850	40880	16756	629	3978	35	0	1257	4397	9964	94551
30	923	852	14754	40800	16746	621	3940	20	0	1147	4103	9848	93754
35	902	827	14613	40677	16731	610	3864	6	0	1022	3793	9711	92756
40	887	798	14429	40504	16711	608	3779	3	0	898	3555	9593	91764
45	857	773	14024	40185	16663	600	3642	0	0	773	3316	9475	90307
50	814	739	13255	39557	16584	589	3422	0	0	636	2948	9280	87824
55	753	696	12210	38595	16405	569	3140	0	0	531	2683	9088	84671
60	690	650	11018	37344	16075	536	2820	0	0	457	2455	8799	80845
65	563	594	9170	34560	15230	489	2397	0	0	362	2074	8309	73749
70	401	496	6848	30225	13760	436	1898	0	0	240	1617	7638	63560
75	250	384	4191	23291	10734	345	1293	0	0	171	1069	6564	48295
80	100	257	2019	15442	7279	246	709	0	0	72	645	5185	31953
85	38	117	673	7457	3505	142	288	0	0	25	272	3338	15854

Table 17 cause-specific associated decrement life table: life expectancy at age x if specified causes were eliminated, rural population, Chinese DSP system, 1999

		1	2	3	4	5	6	7	8	9	10	11	12	1+2	10+11
Age x	No causes	Respiratory T.B.	Other Infec. And Paras.	Neo plasms	Cardio vascular	Infl. Pneu., Bronch	Diarrheal +	Certain Degenerati	Maternal	Cert. Dis. Of Infancy	Motor vehicle	Other violence	Other and unknown	Infec. And Paras.	Violence
0	69.392	69.540	69.662	71.716	75.257	71.901	69.501	70.009	69.415	70.262	69.839	70.788	71.277	69.811	71.250
1	70.837	70.988	71.030	73.229	76.868	72.649	70.924	71.472	70.860	70.850	71.296	72.184	72.202	71.182	72.658
5	67.366	67.517	67.518	69.747	73.428	69.068	67.443	68.002	67.389	67.366	67.809	68.593	68.589	67.670	69.050
10	62.562	62.713	62.703	64.935	68.632	64.256	62.637	63.196	62.586	62.562	62.978	63.708	63.762	62.855	64.136
15	57.712	57.863	57.845	60.067	63.789	59.406	57.785	58.342	57.735	57.712	58.118	58.795	58.885	57.996	59.213
20	52.870	53.020	52.997	55.210	58.954	54.560	52.942	53.497	52.892	52.870	53.251	53.897	54.024	53.148	54.289
25	48.140	48.285	48.264	50.474	54.234	49.837	48.211	48.755	48.155	48.140	48.470	49.068	49.255	48.410	49.408
30	43.527	43.667	43.644	45.832	49.629	45.233	43.595	44.129	43.535	43.527	43.806	44.316	44.593	43.786	44.604
35	38.968	39.100	39.076	41.232	45.073	40.686	39.031	39.542	38.970	38.968	39.194	39.625	39.984	39.209	39.858
40	34.361	34.489	34.459	36.572	40.452	36.089	34.424	34.907	34.362	34.361	34.540	34.929	35.339	34.588	35.113
45	29.871	29.991	29.962	31.966	35.926	31.610	29.933	30.377	29.871	29.871	30.009	30.362	30.822	30.082	30.503
50	25.641	25.750	25.723	27.535	31.628	27.402	25.701	26.091	25.641	25.641	25.739	26.028	26.556	25.833	26.129
55	21.500	21.596	21.573	23.153	27.375	23.274	21.556	21.886	21.500	21.500	21.572	21.826	22.393	21.670	21.900
60	17.389	17.474	17.454	18.813	23.155	19.161	17.440	17.716	17.389	17.389	17.446	17.675	18.252	17.541	17.734
65	13.803	13.870	13.863	14.944	19.331	15.550	13.850	14.071	13.803	13.803	13.847	14.036	14.642	13.931	14.080
70	10.589	10.636	10.640	11.434	15.815	12.299	10.632	10.802	10.589	10.589	10.615	10.770	11.425	10.687	10.797
75	8.119	8.152	8.165	8.681	12.948	9.689	8.159	8.282	8.119	8.119	8.141	8.250	8.996	8.198	8.273
80	5.988	6.004	6.029	6.326	10.425	7.440	6.026	6.102	5.988	5.988	5.999	6.090	6.972	6.045	6.102
85	4.536	4.547	4.569	4.737	8.564	5.823	4.577	4.620	4.536	4.536	4.543	4.615	5.745	4.580	4.622
added year of life		0.148	0.270	2.324	5.864	2.508	0.109	0.617	0.022	0.870	0.447	1.396	1.885	0.419	1.858