

ICD-10 Comparability Ratio

Survey and Assessment Programs

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"ICD" stands for "International Classification of Diseases." It is a coding system maintained by the World Health Organization and the U.S. National Center for Health Statistics used to classify causes of death on death certificates and diagnoses, injury causes, and medical procedures for hospital and emergency department visits. They are also used in by public health assessment to track the number, incidence and prevalence rates of injury and disease in the community.

These codes are updated every decade or so to account for advances in medical technology. Currently, the U.S. is changing over from the 9th revision (ICD-9) to the 10th revision (ICD-10). The first public data set to change-over to the new ICD-10 codes was the 1999 death data from the National Center for Health Statistics.

ICD Revisions

Since the beginning of the century the ICD for mortality has been modified about once every ten years, except for the twenty year interval between the last two revisions, ICD-9 and ICD-10, as shown below:

ICD IMPLEMENTATION DATES IN U.S.

Revision	Year in Effect
First (ICD-1)	1900 -- 1909
Second (ICD-2)	1910 -- 1920
Third (ICD-3)	1921 -- 1929
Fourth (ICD-4)	1930 --1938
Fifth (ICD-5)	1939 -- 1948
Sixth (ICD-6)	1949 -- 1957
Seventh (ICD-7)	1958 -- 1967
Eighth, Adapted (ICDA-8)	1968 -- 1978
Ninth (ICD-9)	1979 -- 1998
Tenth (ICD-10)	1999 --

The rationale for the periodic revisions has been to reflect advances in medical science and changes in diagnostic terminology. Historically, the U.S. accepted the WHO versions of the ICD, except for the Eighth Revision, when the U.S. produced its own "adapted" version, which is symbolized by the "A" in ICDA-8. The U.S.'s rejection of the WHO version reflected principally disagreements on the content of the circulatory chapter. That changes in the ICD for mortality have been made only every ten to twenty years rather than annually promotes comparability over time in mortality trend data.

Differences between ICD-10 and ICD-9

ICD-10 differs from ICD-9 in a number of respects: 1) ICD-10 is far more detailed than ICD-9; about 8,000 categories compared with 4,000 categories. The expansion was mainly to provide more clinical detail for morbidity applications; 2) ICD-10 uses 4-digit alphanumeric codes compared with 4-digit numeric codes in ICD-9; 3) three additional chapters have been added and some chapters rearranged; 4) cause-of-death titles have been changed, and conditions have been regrouped; 5) some coding rules have been changed. 6) Finally, ICD-10 is published in three volumes compared with two volumes in ICD-9.

Statistical Impact and Comparability

The introduction of a new revision of the ICD can create major discontinuities in trend data, as shown in Figure 1. Figure 1 shows trends in leading causes of death in the United States from 1950 to 1997 in terms of age-adjusted death rates. The lines on the chart are not continuous, but rather are broken by vertical lines that represent the introduction of a new revision of the ICD. Thus, ICD-9 was introduced in 1979. Further, the level of the rates is sometimes discontinuous between

revisions. For example, a large discontinuity occurred between 1978 and 1979 in mortality for the 11th leading cause of death, "Nephritis, nephrotic syndrome, and nephrosis." The rate for this cause in 1979 was over 70 percent higher than in the previous year, because of the introduction of ICD-9.

The extent of the discontinuity is measured using a "comparability ratio," which results from double-coding a large sample of the national mortality file, once by the old revision (ICDA-9), and again by the new revision (ICD-10), and expressing the results of the comparison as a ratio of deaths for a cause of death by the later revision divided by the number of that cause of death coded and classified by the earlier revision.

For ICD-10, two sets of comparability ratios are being prepared: a preliminary set scheduled for early release based on a very large sample of deaths (in excess of 1.8 million records) occurring in 1996 that will accompany the publication of preliminary national mortality data for 1999, and a final set of comparability ratios based on the entire national mortality file of 1996 (over 2.3 million records) that will be published one year later. The final comparability ratios are expected to differ little from the preliminary ratios, but will permit calculation of state-specific ratios, cross tabulation by age and sex, and the use of more detailed tabulation lists than the standard ICD-10 tabulation list of 113 Selected Causes of Death (see Appendix 1). Preliminary comparability ratios for ICD-10 are shown in a companion document to this Guide.

The introduction of a new revision of ICD can create major discontinuities in trend data, for example discontinuities between 1998 death data and 1999 death data. The extent of the discontinuity is measured using a "comparability ratio."

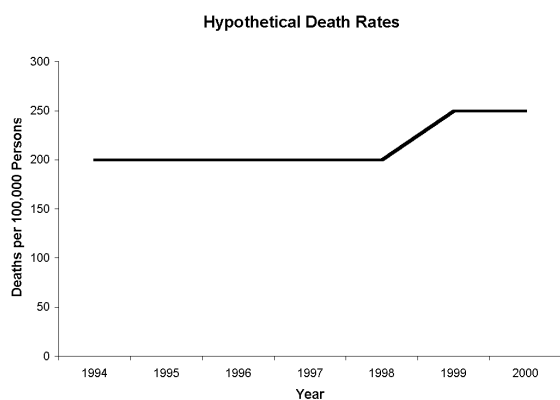
Comparability Ratio

A comparability ratio measures the level of agreement between ICD-9 and ICD-10 classification systems. NCHS provides "comparability ratios" for 113 selected causes of death by a double-coding exercise using 1996 death data. NCHS coded 1.8 million death certifications from 1996 first using ICD-9 and then using ICD-10. Based on that double-coding, NCHS has produced the set of Comparability Ratios for 113 Selected Causes of Death. A list of comparability ratios for the National Center for Health Statistics (NCHS) 113 Causes of Death and 50 Leading Causes of Death may be found in Appendix 1. Each ratio is an expression of the results of the comparison as a ratio of death for a cause of death by the later revision divided by the number of cause of death coded and classified by the earlier revision:

$$\text{Comparability ratio} = \text{ICD-10 deaths} / \text{ICD-9 deaths}$$

To accurately portray trends that include both years 1980-1998 and 1999 on, the death counts or rates for the earlier years must be "comparability modified." This is accomplished by multiplying the earlier death count (or rate) by the comparability ratio for that cause of death.

Consider a cause of death in which there was no change in the true death rate, but for which the two coding systems produced incomparable rates. If you were to graph death rates across the two time periods for that cause of death, you would see a sharp increase or decrease in the trend line starting with 1999. This increase or decrease would be an artifact of the change in the coding system, and not an actual difference in the underlying risk of death from that cause.



Application of ICD-10 Comparability ratio to Utah Death Certificate Database in SAS

Comparability ratios are now available to 113 selected death causes provided by NCHS. For a statistical analysis of cause-specific mortality including 1999 death data or after, comparability ratios need to be applied to each death record in the **earlier** years data. Each count of death related to 113 selected death causes before 1999 data should multiply the comparability ratio. For example, If a record with the death cause "Salmonella infections" (ICD-9 between "002" and "0039"), this record is counted as 0.81(=1*0.81) instead of 1. 0.81 is the comparability ratio for this specific cause. An example of applying comparability ratios using SAS may be found in Appendix 2.

Issues In Using Comparability Ratios

You should exercise caution and seek further information on the validity of using comparability ratios in the following circumstances:

1. For analysis of geographic areas smaller than the U.S.

The comparability ratios were computed empirically using a large national dataset. It is possible that the comparability ratio for one or more causes of death would be different for a population other than the entire U.S. When used with geographic areas that are smaller than the nation as a whole, there is a possibility that they will not be valid. By using them on the IBIS-Q query system website, the Utah Department of Health and Human Services is offering defacto approval of their use in state level analyses. However, the smaller the geographic area, the less similar it is from the national death file, and the less certain you may be of the validity of the results of your comparability-modified results. If you are observing rates for a small geographic area, you may need to wait for two or more year's worth of data before evaluating the existence of a trend.

2. For age-specific or directly age-adjusted rates.

This issue is very similar to the one expressed immediately above in #1. The comparability ratios have been based on an analysis of the entire population. Applying these ratios to some smaller segment of the population may not be valid. Direct age-adjustment applies the same comparability ratio to each age

group. Officials at NCHS have indicated that age-specific comparability ratios will eventually become available, and until then it is probably not misleading to use the current comparability ratios with age-adjusted data.

3. To examine data prior to 1996.

The comparability ratios are based on an empirical analysis of the death data that were double-coded in 1996. For years prior to 1996, and especially those in the 1980s, it is unknown whether the comparability ratios are valid.

4. For statistical analysis of trends.

When performing statistical analyses on trend information using comparability-modified counts or rates, you will need to take the standard error of the comparability ratio into account. Please refer to the following publication: [A Guide to State Implementation of ICD-10 for Mortality: Part II - Applying Comparability Ratios](#), National Center for Health Statistics, U.S. Centers for Disease Control and Prevention, December 4, 2000.

Appendix 1. NCHS Comparability Ratios for 113 Causes of Death
and 50 Leading Causes of Death

Comparability ratios for NCHS 113 selected causes of death and UDOH Leading Causes of Death (LCD) for Reporting Purposes							
NCHS Comparability Ratios for 113 Causes of Death							
113#	LCD?	Cause of death	ICD-9 Codes	ICD-10 codes	Comparability Ratio	Standard Error	Note
1	LCD	Salmonella infections	002-003	A01-A02	0.81	0.0644	
2	LCD	Shigellosis and amebiasis	004,006	A03,A06	*	*	
3		Certain other intestinal infections	007-009	A04,A07-A09	0.60	0.0248	
	LCD	Tuberculosis	010-018	A16-A19	0.85	0.0172	
4		Respiratory tuberculosis	010-012	A16	0.91	0.0201	
5		Other tuberculosis	013-018	A17-A19	0.70	0.0407	
6	LCD	Whooping cough	033	A37	*	*	
7	LCD	Scarlet fever and erysipelas	034.1 - 035	A38,A46	*	*	
8	LCD	Meningococcal infection	036	A39	1.00	0.0149	
9	LCD	Septicemia	038	A40-A41	1.19	0.0042	
10	LCD	Syphilis	090-097	A50-A53	0.64	0.1184	
11	LCD	Acute poliomyelitis	045	A80	*	*	
12	LCD	Arthropod-borne viral encephalitis	062-064	A83-A84,A85.2	*	*	
13	LCD	Measles	055	B05	*	*	
14	LCD	Viral hepatitis	070	B15-B19	0.83	0.0120	
15	LCD	Human immunodeficiency virus (HIV) disease	042-044	B20-B24	1.06	0.0018	
16	LCD	Malaria	084	B50-B54	*	*	
17		Other and unspecified infectious and parasitic diseases and their sequelae	001,005,020-032,037,039-041,046-054,056-061,065-066,071-083,085-088,098-134,136-139,771.3	A00,A05,A20-A36,A42-A44,A48-A49,A54-A79,A81-A82,A85.0-A85.1,A85.8,A86-B04,B06-B09,B25-B49,B55-B99	1.10	0.0154	
	LCD	Malignant neoplasms	140-208	C00-C97	1.01	0.0002	
18		Malignant neoplasms of lip, oral cavity and pharynx	140-149	C00-C14	0.96	0.0040	
19		Malignant neoplasm of esophagus	150	C15	1.00	0.0020	
20		Malignant neoplasm of stomach	151	C16	1.01	0.0019	
21		Malignant neoplasms of colon, rectum and anus	153-154	C18-C21	1999 --1.00	0.0009	
22		Malignant neoplasms of liver and intrahepatic bile ducts	155	C22	0.96	0.0023	
23		Malignant neoplasm of pancreas	157	C25	1.00	0.0009	
24		Malignant neoplasm of larynx	161	C32	1.00	0.0053	

25		Malignant neoplasms of trachea, bronchus and lung	162	C33-C34	0.98	0.0005
26		Malignant melanoma of skin	172	C43	0.97	0.0032
27		Malignant neoplasm of breast	174-175	C50	1.01	0.0010
28		Malignant neoplasm of cervix uteri	180	C53	0.99	0.0034
29		Malignant neoplasms of corpus uteri and uterus, part unspecified	179,182	C54-C55	1.03	0.0040
30		Malignant neoplasm of ovary	183.0	C56	1.00	0.0016
31		Malignant neoplasm of prostate	185	C61	1.01	0.0015
32		Malignant neoplasms of kidney and renal pelvis	189.0,189.1	C64-C65	1.00	0.0022
33		Malignant neoplasm of bladder	188	C67	1.00	0.0026
34		Malignant neoplasms of meninges, brain and other parts of central nervous system	191-192	C70-C72	0.97	0.0025
		Malignant neoplasms of lymphoid, hematopoietic and related tissue	200-208	C81-C96	1.00	0.0012
35		Hodgkin's disease	201	C81	0.99	0.0089
36		Non-Hodgkin's lymphoma	200,202	C82-C85	0.98	0.0018
37		Leukemia	204-208	C91-C95	1.01	0.0019
38		Multiple myeloma and immunoproliferative neoplasms	203	C88,C90	1.04	0.0030
39		Other and unspecified malignant neoplasms of lymphoid, hematopoietic and related tissue	---	C96	1999 --1999 - -1999 --1999 -- -1999 --1999 -- *	*
40		All other and unspecified malignant neoplasms	152,156,158-160,163-171,173,181,183.2-184,186-187,189.2-190,193-199	C17,C23-C24,C26-C31,C37-C41,C44-C49,C51-C52,C57-C60,C62-C63,C66,C68-C69,C73-C80,C97	1.13	0.0021
41	LCD	In situ neoplasms, benign neoplasms and neoplasms of uncertain or unknown behavior	210-239	D00-D48	1.67	0.0164
42	LCD	Anemias	280-285	D50-D64	0.96	0.0077
43	LCD	Diabetes mellitus	250	E10-E14	1.01	0.0011
	LCD	Nutritional deficiencies	260-269	E40-E64	1.16	0.0165
44		Malnutrition	260-263	E40-E46	0.98	0.0151
45		Other nutritional deficiencies	264-269	E50-E64	6.20	0.5961
46	LCD	Meningitis	320-322	G00,G03	1.01	0.0136
47	LCD	Parkinson's disease	332	G20-G21	1.00	0.0028
48	LCD	Alzheimer's disease	331.0	G30	1.55	0.0071
		Major cardiovascular diseases	390-434,436-448	I00-I78	1.00	0.0002
	LCD	Diseases of heart	390-398,402,404,410-429	I00-I09,I11,I13,I20-I51	0.99	0.0002
49		Acute rheumatic fever and chronic rheumatic heart diseases	390-398	I00-I09	0.82	0.0089
50		Hypertensive heart disease	402	I11	0.80	0.0028
51			404	I13	1.07	0.0160

		Hypertensive heart and renal disease						
		Ischemic heart diseases	410-414,429.2	I20-I25		1.00	0.0002	
52		Acute myocardial infarction	410	I21-I22		0.99	0.0003	
53		Other acute ischemic heart diseases	411	I24		1.01	0.0117	
		Other forms of chronic ischemic heart disease	412-414,429.2	I20,I25		1.01	0.0004	
54		Atherosclerotic cardiovascular disease, so described	429.2	I25.0		1.05	0.0016	
55		All other forms of chronic ischemic heart disease	412-414	I20,I25.1-I25.9		0.99	0.0004	
		Other heart diseases	415-429.1,429.3-429.9	I26-I51		0.97	0.0010	
56		Acute and subacute endocarditis	421	I33		1.00	0.0137	
57		Diseases of pericardium and acute myocarditis	420,422-423	I30-I31,I40		1.03	0.0160	
58		Heart failure	428	I50		1.04	0.0013	
59		All other forms of heart disease	415-417,424-427,429.0-429.1,429.3-429.9	I26-I28,I34-I38,I42-I49,I51		0.94	0.0014	
60	LCD	Essential (primary) hypertension and hypertensive renal disease	401,403	I10,I12		1.12	0.0050	
61	LCD	Cerebrovascular diseases	430-434,436-438	I60-I69		1.06	0.0008	435:transient cerebral ischemia
62	LCD	Atherosclerosis	440	I70		0.96	0.0025	
		Other diseases of circulatory system	441-448	I71-I78		0.95	0.0021	
63	LCD	Aortic aneurysm and dissection	441	I71		1.00	0.0010	
64		Other diseases of arteries, arterioles and capillaries	442-448	I72-I78		0.85	0.0053	
65		Other disorders of circulatory system	451-459	I80-I99		1.03	0.0172	
	LCD	Influenza and pneumonia	480-487	J10-J18		0.70	0.0018	
66		Influenza	487	J10-J11		1.01	0.0073	
67		Pneumonia	480-486	J12-J18		0.70	0.0018	
		Other acute lower respiratory infections	466	J20-J22		0.97	0.0392	
68	LCD	Acute bronchitis and bronchiolitis	466	J20-J21		0.75	0.0264	
69		Unspecified acute lower respiratory infection	---	J22		*	*	
	LCD	Chronic lower respiratory diseases	490-494,496	J40-J47		1.05	0.0009	495:extrinsic allergic alveolitis
70		Bronchitis, chronic and unspecified	490-491	J40-J42		0.39	0.0107	
71		Emphysema	492	J43		0.97	0.0031	
72		Asthma	493	J45-J46		0.89	0.0061	
73		Other chronic lower respiratory diseases	494,496	J44,J47		1.10	0.0014	
74	LCD	Pneumoconioses and chemical effects	500-506	J60-J66,J68		1.02	0.0099	
75	LCD	Pneumonitis due to solids and liquids	507	J69		1.12	0.0048	
76		Other diseases of respiratory system	034.0,460-465,470-478,495,508-519	J00-J06,J30-J39,J67,J70-J98		1.17	0.0052	
77	LCD	Peptic ulcer	531-534	K25-K28		0.97	0.0045	534:Gastrojejunal ulcer
78	LCD	Diseases of appendix	540-543	K35-K38		1.03	0.0242	

79	LCD	Hernia	550-553	K40-K46	1.04	0.0154	560:intestinal obstruction without mention of hernia
	LCD	Chronic liver disease and cirrhosis	571	K70,K73-K74	1.04	0.0027	
80		Alcoholic liver disease	571.0-571.3	K70	1.02	0.0050	
81		Other chronic liver disease and cirrhosis	571.4-571.9	K73-K74	1.05	0.0041	
82	LCD	Cholelithiasis and other disorders of gallbladder	574-575	K80-K82	0.96	0.0060	
	LCD	Nephritis, nephrotic syndrome and nephrosis	580-589	N00-N07,N17-N19,N25-N27	1.23	0.0044	
83		Acute and rapidly progressive nephritic and nephrotic syndrome	580-581	N00-N01,N04	0.65	0.0342	
84		Chronic glomerulonephritis, nephritis and nephritis not specified as acute or chronic, and renal sclerosis unspecified	582-583,587	N02-N03,N05-N07,N26	0.39	0.0144	
85		Renal failure	584-586	N17-N19	1.29	0.0050	
86		Other disorders of kidney	588-589	N25,N27	0.91	0.0867	
87	LCD	Infections of kidney	590	N10-N12,N13.6,N15.1	1.01	0.0144	
88	LCD	Hyperplasia of prostate	600	N40	1.00	0.0159	
89	LCD	Inflammatory diseases of female pelvic organs	614-616	N70-N76	0.98	0.0410	
	LCD	Pregnancy, childbirth and the puerperium	630-676	O00-099	*	*	
90		Pregnancy with abortive outcome	630-639	O00-O07	*	*	
91		Other complications of pregnancy, childbirth and the puerperium	640-676	O10-O99	*	*	
92	LCD	Certain conditions originating in the perinatal period	760-771.2,771.4-779	P00-P96	1.07	0.0033	771.3:tetanus neonatorum
93	LCD	Congenital malformations, deformations and chromosomal abnormalities	740-759	Q00-Q99	0.85	0.0055	
94		Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	780-799	R00-R99	0.96	0.0034	
95		All other diseases (Residual)	Residual	Residual	0.90	0.0015	
	LCD	Unintentional injuries	E800-E869,E880-E929	V01-X59,Y85-Y86	1.03	0.0014	
		Unintentional injury: Transport	E800-E848,E929.0,E929.1	V01-V99,Y85	1.00	0.0006	
96		Motor vehicle crash	E810-E825	V02-V04,V09.0,V09.2,V12-V14,V19.0-V19.2,V19.4-V19.6,V20-V79,V80.3-V80.5,V81.0-V81.1,V82.0-V82.1,V83-V86,V87.0-V87.8,V88.0-V88.8,V89.0,V89.2	0.85	0.0027	
97		Unintentional injury: Other land transport	E800-E807,E826-E829	V01,V05-V06,V09.1,V09.3-V09.9,V10-V11,V15-V18,V19.3,V19.8-V19.9,V80.0-V80.2,V80.6-V80.9,V81.2-V81.9,V82.2-V82.9,V87.9,V88.9,V89.1,V89.3,V89.9	14.13	0.9952	
98		Unintentional injury: Water, air and space, and other transport	E830-E848,E929.0,E929.1	V90-V99,Y85	1.01	0.0209	
		Unintentional injury: Nontransport	E850-E869,E880-E928,E929.2-	W00-X59,Y86	1.08	0.0035	

			E929.9				
99		Falls	E880-E888	W00-W19	0.84	0.0049	
100		Accidental discharge of firearms	E922	W32-W34	1.06	0.0127	
101		Accidental drowning and submersion	E910	W65-W74	1.00	0.0127	
102		Accidental exposure to smoke, fire and flames	E890-E899	X00-X09	0.97	0.0089	
103		Accidental poisoning and exposure to noxious substances	E850-E869,E924.1	X40-X49	0.89	0.0191	
104		Other and unspecified nontransport accidents and their sequelae	E900-E909,E911-E921,E923-E924.0,E924.8-E928,E929.2-E929.9	W20-W31,W35-W64,W75-W99,X10-X39,X50-X59,Y86	1.42	0.0123	
	LCD	Intentional self-harm (suicide)	E950-E959	X60-X84,Y87.0	1.00	0.0005	
105		Intentional self-harm (suicide) by discharge of firearms	E955.0-E955.4	X72-X74	1.00	0.0007	
106		Intentional self-harm (suicide) by other and unspecified means and their sequelae	E950-E954,E955.5-E959	X60-X71,X75-X84,Y87.0	1.00	0.0023	
	LCD	Assault (homicide)	E960-E969	X85-Y09,Y87.1	1.00	0.0006	
107		Assault (homicide) by discharge of firearms	E965.0-E965.4	X93-X95	1.00	0.0008	
108		Assault (homicide) by other and unspecified means and their sequelae	E960-E964,E965.5-E969	X85-X92,X96-Y09,Y87.1	1.00	0.0024	
109	LCD	Legal intervention	E970-E978	Y35,Y89.0	*	*	
		Events of undetermined intent	E980-E989	Y10-Y34,Y87.2,Y89.9	*	*	
110		Discharge of firearms, undetermined intent	E985.0-E985.4	Y22-Y24	*	*	
111		Other and unspecified events of undetermined intent and their sequelae	E980-E984,E985.5-E989	Y10-Y21,Y25-Y34,Y87.2,Y89.9	*	*	
112	LCD	Operations of war and their sequelae	E990-E999	Y36,Y89.1	*	*	
113	LCD	Complications of medical and surgical care	E870-E879,E930-E949	Y40-Y84,Y88	*	*	
		--- Category not applicable.					
		* Figure does not meet standards of reliability or precision					

Appendix 2. Applying Comparability Ratios Using SAS

The steps to get a trend count from Utah Death Certificate Database in SAS are:

(1) Create a count variable (*trendcnt*) for yearly data.

For 1999 death data or after, let the variable *trendcnt* equal 1 for each record, which means each record is counted as 1.

(2) For death data before 1999, *trendcnt* equals to comparability ratio based on 113 selected death causes for each record. The one record could be counted as less than 1 or greater than one.

(3) Group the death cause of each record into 113 selected death causes.

(4) Sum up *trendcnt* by year and specific cause of death among 113 selected causes. The trend counts for specific cause of death in certain year are generated.

Example: Death Trend Over Time Including 1999 on Certain Other Intestinal Infections, Respiratory Tuberculosis, and Other Tuberculosis.

If year>=1999 then do; **(1)**

trendcnt=1;

end;

If year<1999 then do; **(2)**

/*Only part of 113 selected death causes */

If ('007 ' <=: dthcause1 <=: '0099') then trendcnt =0.6;

if ('010 ' <=: dthcause1 <=: '0129') then trendcnt =0.91;

if ('013 ' <=: dthcause1 <=: '0189') then trendcnt =0.70;

if dthcause1 =: '038' then trendcnt =1.19;

end;

/*113 Selected death causes */

if ('002 ' <=: dthcause1 <=: '0039') then cause = '1'; **(3)**

if dthcause1 =: '004' | dthcause1 =: '006' then cause = '2';

if ('007 ' <=: dthcause1 <=: '0099') then cause = '3';

if ('010 ' <=: dthcause1 <=: '0129') then cause = '4';

if ('013 ' <=: dthcause1 <=: '0189') then cause = '5';

if dthcause1 =: '033' then cause = '6';

if ('0341' <=: dthcause1 <=: '0359') then cause = '7';

if dthcause1 =: '036' then cause = '8';

if dthcause1 =: '038' then cause = '9';

if ('090 ' <=: dthcause1 <=: '0979') then cause = '10';

if dthcause1 =: '045' then cause = '11';

if ('062 ' <=: dthcause1 <=: '0649') then cause = '12';

if dthcause1 =: '055' then cause = '13';

if dthcause1 =: '070' then cause = '14';

if ('042 ' <=: dthcause1 <=: '0449') then cause = '15';

if dthcause1 =: '084' then cause = '16';

if dthcause1 =: '001' | dthcause1 =: '005' |

('020 ' <=: dthcause1 <=: '0329') |

dthcause1 =: '037' |

('039 ' <=: dthcause1 <=: '0419') |

('046 ' <=: dthcause1 <=: '0549') |

('056 ' <=: dthcause1 <=: '0619') |

('065 ' <=: dthcause1 <=: '0669') |

('071 ' <=: dthcause1 <=: '0839') |

('085 ' <=: dthcause1 <=: '0889') |

('098 ' <=: dthcause1 <=: '1349') |

('136 ' <=: dthcause1 <=: '1399') |


```
dthcause1 = '7713' then cause = '17';
;
if ('140 ' <=: dthcause1 <=: '1499') then cause = '18';
if dthcause1 = '150' then cause = '19';
if dthcause1 = '151' then cause = '20';
if ('153 ' <=: dthcause1 <=: '1549') then cause = '21';
if dthcause1 = '155' then cause = '22';
if dthcause1 = '157' then cause = '23';
if dthcause1 = '161' then cause = '24';
if dthcause1 = '162' then cause = '25';
if dthcause1 = '172' then cause = '26';
if ('174 ' <=: dthcause1 <=: '1759') then cause = '27';
if dthcause1 = '180' then cause = '28';
if dthcause1 = '179' | dthcause1 = '182' then cause = '29';
if dthcause1 = '1830' then cause = '30';
if dthcause1 = '185' then cause = '31';
if dthcause1 = '1890' | dthcause1 = '189.1' then cause = '32';
if dthcause1 = '188' then cause = '33';
if ('191 ' <=: dthcause1 <=: '1929') then cause = '34';
if dthcause1 = '201' then cause = '35';
if dthcause1 = '200' | dthcause1 = '202' then cause = '36';
if ('204 ' <=: dthcause1 <=: '2089') then cause = '37';
if dthcause1 = '203' then cause = '38';
if dthcause1 = '152' | dthcause1 = '156' |
('158 ' <=: dthcause1 <=: '1609') |
('163 ' <=: dthcause1 <=: '1719') |
dthcause1 = '173' | dthcause1 = '181' |
('1832 ' <=: dthcause1 <=: '1849') |
('186 ' <=: dthcause1 <=: '1879') |
('1892' <=: dthcause1 <=: '1909') |
('193 ' <=: dthcause1 <=: '1999') then cause = '40';
if ('210 ' <=: dthcause1 <=: '2399') then cause = '41';
if ('280 ' <=: dthcause1 <=: '2859') then cause = '42';
if dthcause1 = '250' then cause = '43';
if ('260 ' <=: dthcause1 <=: '2639') then cause = '44';
if ('264 ' <=: dthcause1 <=: '2699') then cause = '45';
if ('320 ' <=: dthcause1 <=: '3229') then cause = '46';
if dthcause1 = '332' then cause = '47';
if dthcause1 = '3310' then cause = '48';
if ('390 ' <=: dthcause1 <=: '3989') then cause = '46';
if dthcause1 = '402' then cause = '50';
```

```
if dthcause1 = '404' then cause = '51';
if dthcause1 = '410' then cause = '52';
if dthcause1 = '411' then cause = '53';
if dthcause1 = '4292' then cause = '54';
if ('412 ' <=: dthcause1 <=: '4149') then cause = '55';
if dthcause1 = '421' then cause = '56';
if dthcause1 = '420' | ('422 ' <=: dthcause1 <=: '4239') then cause = '57';
if dthcause1 = '428' then cause = '58';
if ('415 ' <=: dthcause1 <=: '4179') |
('424 ' <=: dthcause1 <=: '4279') |
('4290' <=: dthcause1 <=: '4291') |
('4293' <=: dthcause1 <=: '4299') then cause = '59';
if dthcause1 = '401' | dthcause1 = '403' then cause = '60';
if ('430 ' <=: dthcause1 <=: '4349') |
('436 ' <=: dthcause1 <=: '4389') then cause = '61';
if dthcause1 = '440' then cause = '62';
if dthcause1 = '441' then cause = '63';
if ('442 ' <=: dthcause1 <=: '4489') then cause = '64';
if ('451 ' <=: dthcause1 <=: '4599') then cause = '65';
if dthcause1 = '487' then cause = '66';
if ('480 ' <=: dthcause1 <=: '4869') then cause = '67';
if dthcause1 = '466' then cause = '68';
if ('490 ' <=: dthcause1 <=: '4919') then cause = '70';
if dthcause1 = '492' then cause = '71';
if dthcause1 = '493' then cause = '72';
if dthcause1 = '494' | dthcause1 = '496' then cause = '73';
if ('500 ' <=: dthcause1 <=: '5069') then cause = '74';
if dthcause1 = '507' then cause = '75';
if dthcause1 = '340' | dthcause1 = '495' |
('460 ' <=: dthcause1 <=: '4659') |
('470 ' <=: dthcause1 <=: '4789') |
('508 ' <=: dthcause1 <=: '5199') then cause = '76';
if ('531 ' <=: dthcause1 <=: '5349') then cause = '77';
if ('540 ' <=: dthcause1 <=: '5439') then cause = '78';
if ('550 ' <=: dthcause1 <=: '5539') then cause = '79';
if ('5710' <=: dthcause1 <=: '5713') then cause = '80';
if ('5714' <=: dthcause1 <=: '5719') then cause = '81';
if ('574 ' <=: dthcause1 <=: '5759') then cause = '82';
if ('580 ' <=: dthcause1 <=: '5819') then cause = '83';
if ('582 ' <=: dthcause1 <=: '5839') | dthcause1 = '587' then cause = '84';
if ('584 ' <=: dthcause1 <=: '5869') then cause = '85';
```

```
if ('588' <=: dthcause1 <=: '5899') then cause = '86';
if dthcause1 = '590' then cause = '87';
if dthcause1 = '600' then cause = '88';
if ('614' <=: dthcause1 <=: '6169') then cause = '89';
if ('630' <=: dthcause1 <=: '6399') then cause = '90';
if ('640' <=: dthcause1 <=: '6769') then cause = '91';
if ('760' <=: dthcause1 <=: '7712') |
('7714' <=: dthcause1 <=: '7799') then cause = '92';
if ('740' <=: dthcause1 <=: '7599') then cause = '93';
if ('780' <=: dthcause1 <=: '7999') then cause = '94';
if ('810' <=: dthcause1 <=: '8259') then cause = '96';
if ('800' <=: dthcause1 <=: '8079') |
('826' <=: dthcause1 <=: '8299') then cause = '97';
if ('830' <=: dthcause1 <=: '8489') |
dthcause1 = '9290' | dthcause1 = '9291' then cause = '98';
if ('880' <=: dthcause1 <=: '8889') then cause = '99';
if dthcause1 = '922' then cause = '100';
if dthcause1 = '910' then cause = '101';
if ('890' <=: dthcause1 <=: '8999') then cause = '102';
if ('850' <=: dthcause1 <=: '8699') |
dthcause1 = '9241' then cause = '103';
if ('900' <=: dthcause1 <=: '9099') |
('911' <=: dthcause1 <=: '9219') |
('923' <=: dthcause1 <=: '9240') |
('9248' <=: dthcause1 <=: '9289') |
('9292' <=: dthcause1 <=: '9299') then cause = '104';
if ('9550' <=: dthcause1 <=: '9554') then cause = '105';
if ('950' <=: dthcause1 <=: '9549') |
('9555' <=: dthcause1 <=: '9599') then cause = '106';
if ('9650' <=: dthcause1 <=: '9654') then cause = '107';
if ('960' <=: dthcause1 <=: '9649') |
('9655' <=: dthcause1 <=: '9699') then cause = '108';
if ('970' <=: dthcause1 <=: '9789') then cause = '109';
if ('9850' <=: dthcause1 <=: '9854') then cause = '110';
if ('980' <=: dthcause1 <=: '9849') |
('9855' <=: dthcause1 <=: '9899') then cause = '111';
if ('990' <=: dthcause1 <=: '9999') then cause = '112';
if ('870' <=: dthcause1 <=: '8799') |
('930' <=: dthcause1 <=: '9499') then cause = '113';
```

proc summary; (4)

```
where cause in (3,4,5); /*Certain Other Intestinal Infections, Respiratory
```

```
Tuberculosis, and Other Tuberculosis*/
```

```
var year cause trendent;
```

```
class year cause;
```

```
output out=temp sum(trendent)=;
```

```
run;
```