

## Medical Database for the Atomic-Bomb Survivors at Nagasaki University

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**Abstract:** The Scientific Data Center for Atomic-Bomb Disasters at Nagasaki University was established in 1974. The database of atomic-bomb survivors has been in operation since 1977. The database is composed of following 6 physical database: (1) Fundamental information database, (2) Atomic-Bomb Hospital database, (3) Pathological database, (4) Household reconstruction database, (5) Second generation database, and (6) Address database. We review the current contents of the database for its further application.

### Introduction

The Atomic Bomb Medical Data Center at Nagasaki University was established in 1972 for the purpose to collect and maintain medical records of atomic-bomb disasters in Nagasaki city. The center was renamed the Scientific Data Center for Atomic-Bomb Disasters in 1974. The database of atomic-bomb survivors was established and has been in operation since 1977. The database has been updated monthly based on the data provided from the Nagasaki A-Bomb Casualty Council, Nagasaki City Hall and other related organizations.

Before the establishment of the database, each organization kept its data independently and it was difficult to relate these data to use. We have collected data from these organizations and recorded them into a computer in our Data Center. The data were linked with their handbook numbers in the computer.

After a lapse of 13 years since the establishment of the database, we review the current contents of the database for further application.

### Atomic-Bomb Survivors Database

The Atomic-Bomb Survivor Database is composed of following 6 physical database: (1) Fundamental information database which contains fundamental information (name, sex, date of birth and so on), health examination results,

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death certificate and others for about 120,000 atomic-bomb survivors in Nagasaki city since 1963, (2) Atomic-Bomb Hospital database which contains in-patient records of the Department of Internal Medicine at Nagasaki Atomic-Bomb Hospital from 1958 to 1986, (3) Pathological database which contains autopsy records since 1946 in Nagasaki City, (4) Household reconstruction database which has information of households at the time of the atomic-bomb detonation and were obtained from the House Reconstruction Project of Nagasaki performed in 1970s, (5) Second generation database which contains health examination results for the second generation of atomic-bomb survivors, and (6) Address database which contains the codes and names of towns.

Structure of the whole database is the so-called "hierarchy model," and DL/I, a software product of the IBM, is used as database management system. These 6 kinds of database are chained with logical pointers so that they are mutually accessible to each other as one logical database. Fig. 1 shows structure of the database. The number of records, or segments, is as of May 10th, 1991.

### Number of Survivors

The database covered atomic-bomb survivors who have held atomic-bomb handbook from Nagasaki City Hall since 1968. A number of 115,832 persons are recorded in the database including those who have moved out of the city or died. We also keep records of another 10,892 persons who held the handbook before 1968.

Fig. 2 (Table 1) shows the number of atomic-bomb survivors. The increase in the population of atomic-bomb survivors residing in Nagasaki city has been diminishing since 1974. Fig. 3 (Table 2) shows the number of atomic-bomb survivors, according to the distance from the hypocenter, including persons who have moved out of the city, died or been lost to follow as of May, 1991. About 10% of the survivors were bombed within 2.0 km of the hypocenter, 58% were between 2.0 and 4.9 km and 18% were "early entrants."

For 35% (5,294 persons) of the survivors bombed within

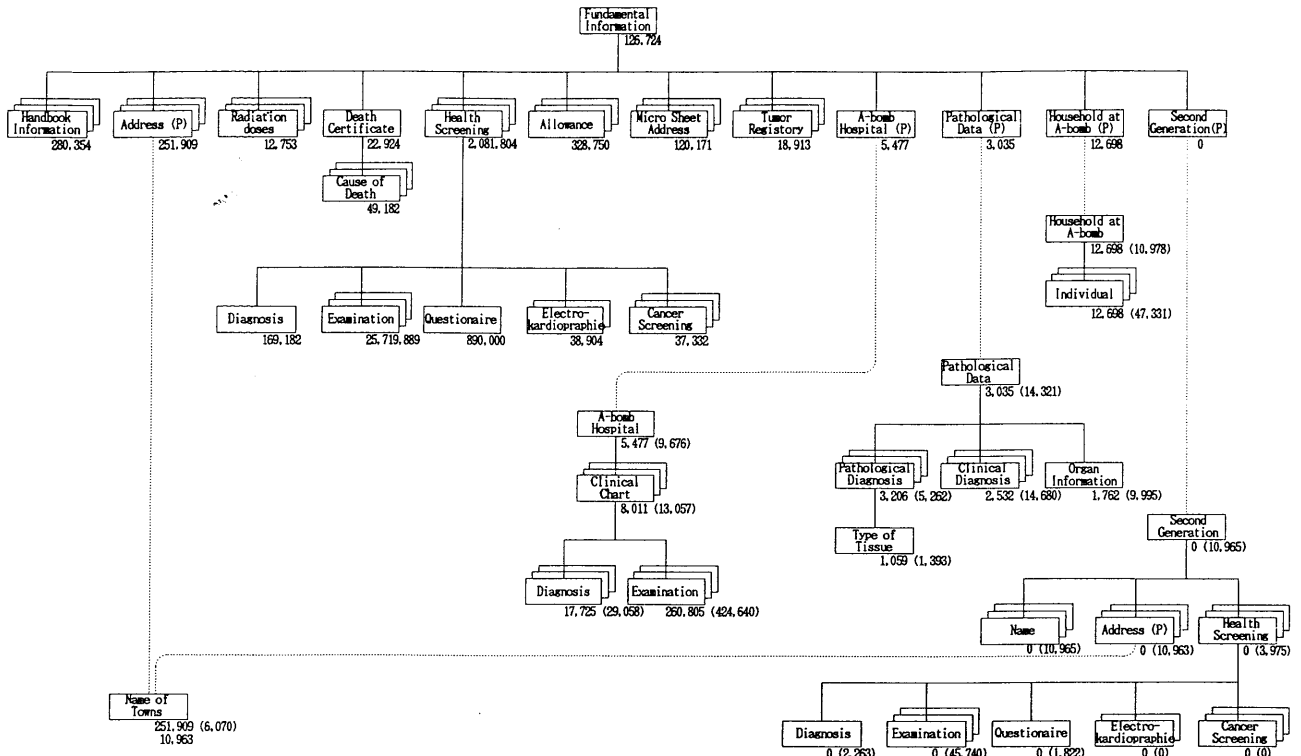


Fig. 1. Structure of the atomic-bomb survivors database. The number of segments cited in figure is as of May 10th, 1991. The number of segments in parentheses is not linked with the fundamental database.

2.0 km, their radiation dose was estimated. Fig. 4 (Table 3) shows the number of persons whose radiation dose is estimated.

Table 1. Number of atomic-bomb survivors at October 1st of the year.

Year	Sex	Resident	Moved out	Died	Lost to follow	Total
1968	Male	32,516	1,993	262	6	34,777
	Female	45,428	3,142	282	9	48,861
	Total	77,944	5,135	544	15	83,638
1969	Male	32,499	2,422	676	6	35,603
	Female	45,774	3,791	693	9	50,267
	Total	78,273	6,213	1,369	15	85,870
1970	Male	32,389	2,788	1,291	7	36,475
	Female	46,155	4,344	1,255	9	51,763
	Total	78,544	7,132	2,546	16	88,238
1971	Male	32,616	3,298	1,879	10	37,803
	Female	47,235	5,229	1,732	10	54,206
	Total	79,851	8,527	3,611	20	92,009
1972	Male	32,593	3,736	2,433	11	38,773
	Female	47,470	5,927	2,261	10	55,668
	Total	80,063	9,663	4,694	21	94,441
1973	Male	32,720	4,003	2,999	11	39,733
	Female	47,901	6,303	2,771	10	56,985
	Total	80,621	10,306	5,770	21	96,718
1974	Male	32,790	4,378	3,594	8	40,770
	Female	48,206	6,871	3,350	8	58,435
	Total	80,996	11,249	6,944	16	99,205
1975	Male	32,125	5,191	4,282	778	42,376
	Female	48,097	7,833	4,040	738	60,708
	Total	80,222	13,024	8,322	1,516	103,084

(to be continued)

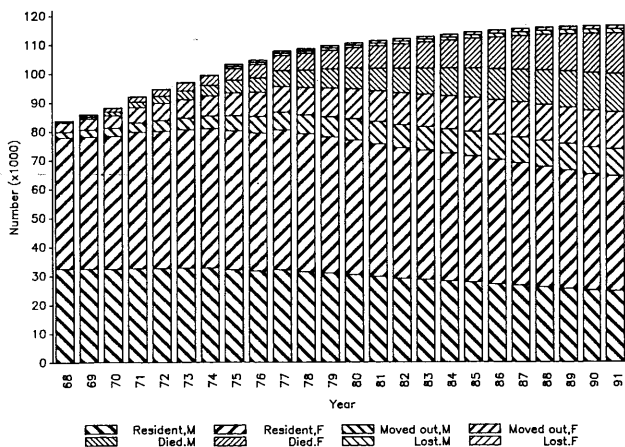


Fig. 2. Number of atomic-bomb survivors at October 1st of the year (at May 1st for 1991).

Table 1. (continued)

Year	Sex	Resident	Moved out	Died	Lost to follow	Total
1976	Male	31,668	5,684	4,883	793	43,028
	Female	47,755	8,334	4,618	751	61,458
	Total	79,423	14,018	9,501	1,544	104,486
1977	Male	32,022	6,079	5,452	818	44,371
	Female	48,475	8,811	5,212	757	63,255
	Total	80,497	14,890	10,664	1,575	107,626
1978	Male	31,405	6,524	6,009	825	44,763
	Female	47,747	9,347	5,800	763	63,657
	Total	79,152	15,871	11,809	1,588	108,420
1979	Male	30,931	6,960	6,580	834	45,305
	Female	47,148	9,844	6,420	769	64,181
	Total	78,079	16,804	13,000	1,603	109,486
1980	Male	30,341	7,404	7,156	845	45,746
	Female	46,609	10,264	7,034	766	64,673
	Total	76,950	17,668	14,190	1,611	110,419
1981	Male	29,702	7,750	7,736	945	46,133
	Female	45,900	10,573	7,701	869	65,043
	Total	75,602	18,323	15,437	1,814	111,176
1982	Male	29,035	8,024	8,388	985	46,432
	Female	45,198	10,947	8,373	900	65,418
	Total	74,233	18,971	16,761	1,885	111,850
1983	Male	28,666	8,180	8,918	1,006	46,770
	Female	44,702	11,151	8,992	917	65,762
	Total	73,368	19,331	17,910	1,923	112,532
1984	Male	28,168	8,395	9,506	1,019	47,088
	Female	44,106	11,439	9,611	923	66,079
	Total	72,274	19,834	19,117	1,942	113,167
1985	Male	27,725	8,567	10,080	1,128	47,500
	Female	43,582	11,648	10,241	1,006	66,477
	Total	71,307	20,215	20,321	2,134	113,977
1986	Male	27,062	8,798	10,651	1,299	47,810
	Female	42,935	11,890	10,840	1,095	66,760
	Total	69,997	20,688	21,491	2,394	114,570
1987	Male	26,613	8,954	11,175	1,332	48,074
	Female	42,291	12,080	11,516	1,107	66,994
	Total	68,904	21,034	22,691	2,439	115,068
1988	Male	26,047	9,107	11,778	1,358	48,290
	Female	41,557	12,326	12,154	1,115	67,152
	Total	67,604	21,433	23,932	2,473	115,442
1989	Male	25,475	9,223	12,358	1,396	48,452
	Female	40,858	12,516	12,781	1,132	67,287
	Total	66,333	21,739	25,139	2,528	115,739
1990	Male	24,941	9,297	12,900	1,445	48,583
	Female	40,058	12,701	13,484	1,155	67,398
	Total	64,999	21,998	26,384	2,600	115,981
1991*	Male	24,639	9,329	13,198	1,485	48,651
	Female	39,667	12,735	13,862	1,196	67,460
	Total	64,306	22,064	27,060	2,681	116,111

\*: at May 1st.

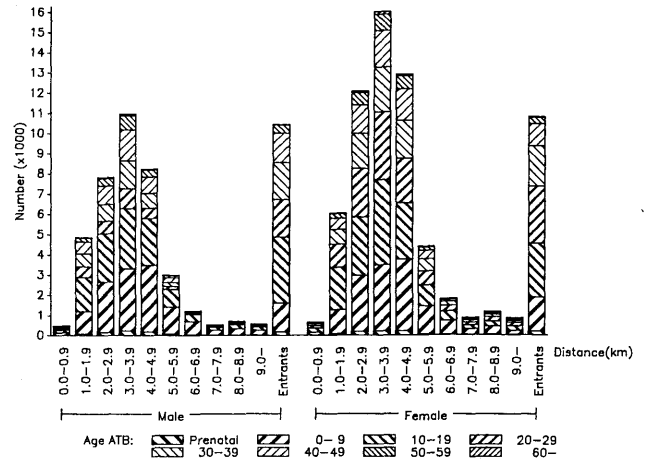


Fig. 3. Number of atomic-bomb survivors grouped by the distance from the hypocenter. The number includes persons who have moved out of the city, died or been lost to follow as of May, 1991.

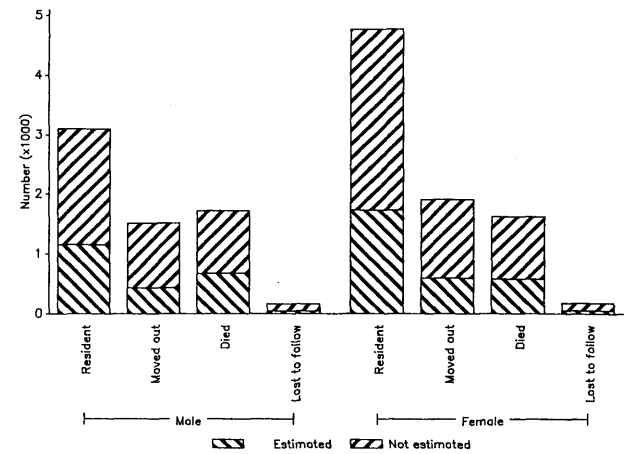


Fig. 4. Number of atomic-bomb survivors bombed within 2 km whose radiation dose was estimated.

Table 3. Number of atomic-bomb survivors bombed within 2 km whose radiation dose was estimated.

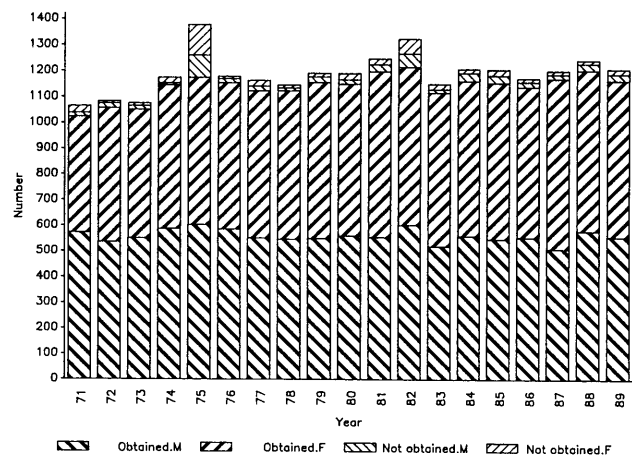
	Sex	Resident	Moved out	Died	Lost to Follow	Total
Exposed within 2km	Male	3,108	1,520	1,726	166	6,520
	Female	4,772	1,911	1,627	178	8,488
	Total	7,880	3,431	3,353	344	15,008
Dose estimated	Male	1,160	438	681	49	2,328
	Female	1,734	595	583	54	2,966
	Total	2,894	1,033	1,264	103	5,294

**Table 2.** Number of atomic-bomb survivors grouped by the distance from the hypocenter. The number includes persons who have moved out of the city, died or been lost to follow as of May, 1991.

Distance	Sex	Age ATB								Total
		Prenatal	0 - 9	10-19	20-29	30-39	40-49	50-59	60-	
0.0-0.9km	Male	12	128	138	68	58	46	26	1	477
	Female	12	143	211	116	90	52	25	2	651
	Total	24	271	349	184	148	98	51	3	1,128
1.0-1.9km	Male	77	1,115	1,690	532	640	586	191	17	4,848
	Female	87	1,189	2,103	1,147	716	554	224	25	6,045
	Total	164	2,304	3,793	1,679	1,356	1,140	415	42	10,893
2.0-2.9km	Male	162	2,494	2,382	620	824	900	363	56	7,801
	Female	190	2,788	2,884	2,387	1,735	1,404	607	81	12,076
	Total	352	5,282	5,266	3,007	2,559	2,304	970	137	19,877
3.0-3.9km	Male	224	3,083	2,958	975	1,375	1,542	697	79	10,933
	Female	217	3,282	4,185	3,351	2,214	1,812	806	128	15,995
	Total	441	6,365	7,143	4,326	3,589	3,354	1,503	207	26,928
4.0-4.9km	Male	187	3,286	2,309	499	731	802	342	41	8,197
	Female	215	3,560	2,769	2,189	1,881	1,548	637	86	12,885
	Total	402	6,846	5,078	2,688	2,612	2,350	979	127	21,082
5.0-5.9km	Male	74	1,336	882	149	189	238	106	12	2,986
	Female	58	1,394	1,031	693	609	417	169	35	4,406
	Total	132	2,730	1,913	842	798	655	275	47	7,392
6.0-6.9km	Male	34	659	371	40	36	37	11	3	1,191
	Female	20	701	464	278	206	97	28	2	1,796
	Total	54	1,360	835	318	242	134	39	5	2,987
7.0-7.9km	Male	9	247	148	22	27	46	17	1	517
	Female	12	278	194	139	106	79	28	11	847
	Total	21	525	342	161	133	125	45	12	1,364
8.0-8.9km	Male	11	326	209	26	40	59	22	3	696
	Female	21	404	257	215	120	87	38	7	1,149
	Total	32	730	466	241	160	146	60	10	1,845
9.0-9.9km	Male	13	242	164	33	46	44	15	0	557
	Female	15	206	227	178	98	83	33	1	841
	Total	28	448	391	211	144	127	48	1	1,398
Entrants	Male	181	1,431	3,265	1,842	1,818	1,464	414	33	10,448
	Female	184	1,681	2,667	2,803	1,981	1,099	318	36	10,769
	Total	365	3,112	5,932	4,645	3,799	2,563	732	69	21,217
Total	Male	984	14,347	14,516	4,806	5,784	5,764	2,204	246	48,651
	Female	1,031	15,626	16,992	13,496	9,756	7,232	2,913	414	67,460
	Total	2,015	29,973	31,508	18,302	15,540	12,996	5,117	660	116,111

**Death Certificates**

The death certificates have been recorded into the database since 1970. Fig. 5 (Table 4) shows the numbers of deaths whose certificates are obtained. Death certificates have been obtained for 96% (21,667 persons) of the total deaths (22,593 persons). The number of noncertification was remarkably high in 1975 and 1982 when highly aged loss-to-follow persons were treated as death en bloc.



**Fig. 5.** Number of deaths and obtained death certificates.

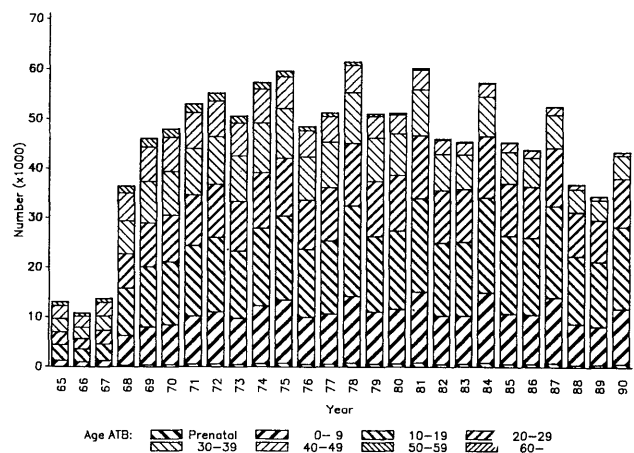
**Table 4.** Number of deaths and obtained death certificates.

Year	Male		Female		Total	
	Death	Death certificates	Death	Death certificates	Death	Death certificates
1971	588	573	477	451	1,065	1,024
1972	554	536	529	521	1,083	1,057
1973	566	551	510	500	1,076	1,051
1974	595	587	579	558	1,174	1,145
1975	688	602	690	572	1,378	1,174
1976	601	585	578	569	1,179	1,154
1977	569	551	594	572	1,163	1,123
1978	557	546	588	577	1,145	1,123
1979	571	549	620	606	1,191	1,155
1980	576	559	614	590	1,190	1,149
1981	580	553	667	645	1,247	1,198
1982	652	600	672	615	1,324	1,215
1983	530	517	619	599	1,149	1,116
1984	588	557	619	603	1,207	1,160
1985	574	545	630	607	1,204	1,152
1986	571	552	599	585	1,170	1,137
1987	524	507	676	662	1,200	1,169
1988	603	577	638	625	1,241	1,202
1989	580	555	627	608	1,207	1,163

**Examinees of Health Screening**

Over 2,000,000 medical records were obtained from the health screening performed by the Health Administration Center for Atomic-Bomb Survivors, the Adult Disease Center, the Health Screening Center at the Medical Association and the Radiation Effects Research Foundation. The

medical records include the general health check, the detailed examination and cancer test. Fig. 6 (Table 5) shows the number of examinees of the general health check. The number increased every three years when the renewal of atomic-bomb handbook was made. There is, however, a decreasing trend in the number of examinees since 1981. This might be mainly due to death of the survivors by aging. Fig. 7 (Table 6) shows the number of examinees of the detailed examination. The figures temporally increased since 1978 because the Health Administration Center for Atomic-Bomb Survivors, which performs about 85% of the health screening, started the detailed examination with the general health check. Introduction of



**Fig. 6.** Number of examinees of the general health check.

**Table 5.** Number of examinees of the general health check.

Year	Sex	Age ATB								Total
		Prenatal	0 - 9	10-19	20-29	30-39	40-49	50-59	60-	
1965	Male	12	418	1,007	450	847	1,063	325	14	4,136
	Female	21	799	2,163	2,129	1,823	1,521	419	14	8,889
	Total	33	1,217	3,170	2,579	2,670	2,584	744	28	13,025
1966	Male	14	291	797	343	715	899	265	11	3,335
	Female	16	667	1,814	1,735	1,552	1,320	340	10	7,454
	Total	30	958	2,611	2,078	2,267	2,219	605	21	10,789
1967	Male	16	359	958	415	911	1,136	352	15	4,162
	Female	26	903	2,383	2,336	1,951	1,570	382	14	9,565
	Total	42	1,262	3,341	2,751	2,862	2,706	734	29	13,727
1968	Male	150	2,408	3,492	1,372	2,274	2,419	620	20	12,755
	Female	203	3,561	5,977	5,574	4,397	3,206	743	26	23,687
	Total	353	5,969	9,469	6,946	6,671	5,625	1,363	46	36,442
1969	Male	172	2,987	4,396	1,655	2,802	2,922	750	26	15,710
	Female	219	4,658	7,707	7,205	5,608	4,023	949	27	30,396
	Total	391	7,645	12,103	8,860	8,410	6,945	1,699	53	46,106
1970	Male	200	3,213	4,718	1,949	3,048	2,928	720	27	16,803
	Female	267	4,821	7,951	7,469	5,779	3,990	913	27	31,217
	Total	467	8,034	12,669	9,418	8,827	6,918	1,633	54	48,020
1971	Male	230	4,072	5,449	2,199	3,246	3,044	752	27	19,019
	Female	335	5,609	8,743	8,035	6,135	4,191	944	25	34,017
	Total	565	9,681	14,192	10,234	9,381	7,235	1,696	52	53,036

(to be continued)

Table 5. (continued)

Year	Sex	Age ATB								Total
		Prenatal	0 - 9	10-19	20-29	30-39	40-49	50-59	60-	
1972	Male	263	4,282	5,762	2,305	3,332	3,009	707	26	19,686
	Female	350	6,178	9,279	8,436	6,299	4,138	848	23	35,551
	Total	613	10,460	15,041	10,741	9,631	7,147	1,555	49	55,237
1973	Male	210	3,584	5,089	2,148	3,167	2,849	616	25	17,688
	Female	317	5,682	8,485	7,883	6,007	3,782	725	14	32,895
	Total	527	9,266	13,574	10,031	9,174	6,631	1,341	39	50,583
1974	Male	271	4,642	6,065	2,385	3,443	2,840	597	22	20,265
	Female	399	6,965	9,590	8,864	6,558	3,938	704	15	37,033
	Total	670	11,607	15,655	11,249	10,001	6,778	1,301	37	57,298
1975	Male	331	5,274	6,787	2,605	3,543	2,710	516	15	21,781
	Female	442	7,376	10,169	9,100	6,475	3,652	581	12	37,807
	Total	773	12,650	16,956	11,705	10,018	6,362	1,097	27	59,588
1976	Male	229	3,698	5,220	2,148	2,993	2,212	362	10	16,872
	Female	324	5,742	8,458	7,830	5,730	3,082	418	7	31,591
	Total	553	9,440	13,678	9,978	8,723	5,294	780	17	48,463
1977	Male	274	3,984	5,604	2,279	3,172	2,154	311	6	17,784
	Female	339	6,071	9,123	8,492	6,014	2,995	362	5	33,401
	Total	613	10,055	14,727	10,771	9,186	5,149	673	11	51,185
1978	Male	370	5,593	7,179	2,831	3,473	2,218	305	4	21,973
	Female	451	7,795	11,071	9,822	6,716	3,225	355	4	39,439
	Total	821	13,388	18,250	12,653	10,189	5,443	660	8	61,412
1979	Male	286	4,295	5,997	2,507	3,004	1,752	205	2	18,048
	Female	336	6,176	9,199	8,627	5,808	2,553	239	4	32,942
	Total	622	10,471	15,196	11,134	8,812	4,305	444	6	50,990
1980	Male	308	4,589	6,268	2,553	2,859	1,524	138	1	18,240
	Female	347	6,365	9,507	8,714	5,547	2,254	173	2	32,909
	Total	655	10,954	15,775	11,267	8,406	3,778	311	3	51,149
1981	Male	378	6,119	7,600	2,909	3,095	1,553	143	2	21,799
	Female	477	8,121	11,266	9,822	6,131	2,368	171	3	38,359
	Total	855	14,240	18,866	12,731	9,226	3,921	314	5	60,158
1982	Male	274	4,125	5,859	2,449	2,506	1,149	95	1	16,458
	Female	293	5,571	8,829	8,191	4,831	1,708	95	3	29,521
	Total	567	9,696	14,688	10,640	7,337	2,857	190	4	45,979
1983	Male	278	4,117	5,885	2,471	2,378	972	73	1	16,175
	Female	307	5,501	8,981	8,151	4,595	1,461	75	2	29,073
	Total	585	9,618	14,866	10,622	6,973	2,433	148	3	45,248
1984	Male	372	6,093	7,834	2,910	2,610	1,000	66	0	20,885
	Female	445	7,975	11,256	9,529	5,339	1,610	72	2	36,228
	Total	817	14,068	19,090	12,439	7,949	2,610	138	2	57,113
1985	Male	283	4,343	6,397	2,525	2,133	699	38	0	16,418
	Female	324	5,710	9,282	8,017	4,227	1,126	41	2	28,729
	Total	607	10,053	15,679	10,542	6,360	1,825	79	2	45,147
1986	Male	269	4,330	6,375	2,439	1,927	575	25	0	15,940
	Female	307	5,534	9,093	7,884	3,904	924	38	2	27,686
	Total	576	9,864	15,468	10,323	5,831	1,499	63	2	43,626
1987	Male	352	5,537	7,531	2,757	2,107	576	21	0	18,881
	Female	430	7,599	10,894	8,965	4,601	965	33	0	33,487
	Total	782	13,136	18,425	11,722	6,708	1,541	54	0	52,368
1988	Male	217	3,470	5,569	2,120	1,538	353	8	0	13,275
	Female	246	4,711	8,020	6,771	3,105	577	19	0	23,449
	Total	463	8,181	13,589	8,891	4,643	930	27	0	36,724
1989	Male	221	3,243	5,327	1,959	1,310	286	4	0	12,350
	Female	233	4,419	7,684	6,378	2,757	445	13	0	21,929
	Total	454	7,662	13,011	8,337	4,067	731	17	0	34,279
1990	Male	294	4,679	6,786	2,255	1,449	251	5	0	15,719
	Female	352	6,364	9,655	7,508	3,173	410	12	0	27,474
	Total	646	11,043	16,441	9,763	4,622	661	17	0	43,193

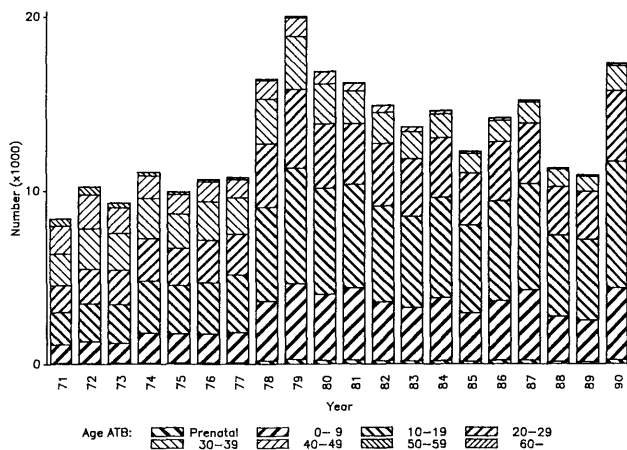


Fig. 7. Number of examinees of the detailed examination.

specially equipped cars also contributed to the increase in the detailed examination available with the health screening examination performed at local areas. Fig. 8 (Table 7) shows the number of person who have no health screening result, which indicates decreasing since 1968.

The health screenings have been performed twice a year. The number of consecutive years which one has taken the health screening by retracing his/her past records from the latest one is shown in Fig. 9 (Table 8). 23,099 have no records and 31,894 have one examination for a whole follow-up period. 9,360 have taken the screenig over 20 examination for the follow-up period. Fig. 10 (Table 9) shows the number of examinees who have consecutively taken the screenings at least once every three years. 15,724 person have the maximum count of 8 times of three year

Table 6. Number of examinees of the detailed examination.

Year	Sex	Age ATB								Total
		Prenatal	0 - 9	10-19	20-29	30-39	40-49	50-59	60-	
1971	Male	10	298	592	275	618	673	186	8	2,660
	Female	50	778	1,279	1,282	1,198	929	228	6	5,747
	Total	60	1,073	1,871	1,557	1,816	1,602	414	14	8,407
1972	Male	15	375	755	377	786	788	218	6	3,320
	Female	46	875	1,432	1,625	1,551	1,153	241	8	6,931
	Total	61	1,250	2,187	2,002	2,337	1,941	459	14	10,251
1973	Male	16	324	744	391	797	628	122	4	3,026
	Female	51	810	1,496	1,595	1,329	853	144	1	6,279
	Total	67	1,134	2,240	1,986	2,126	1,481	266	5	9,305
1974	Male	20	507	1,032	440	766	552	98	4	3,419
	Female	55	1,206	1,993	2,011	1,540	746	103	0	7,654
	Total	75	1,713	3,025	2,451	2,306	1,298	201	4	11,073
1975	Male	28	596	977	398	681	460	82	4	3,226
	Female	52	1,078	1,822	1,749	1,288	665	64	0	6,718
	Total	80	1,674	2,799	2,147	1,969	1,125	146	4	9,944
1976	Male	30	593	1,023	487	730	506	59	4	3,432
	Female	58	1,078	1,941	1,962	1,486	645	62	0	7,232
	Total	88	1,671	2,964	2,449	2,216	1,151	121	4	10,664
1977	Male	37	741	1,299	530	823	493	67	0	3,990
	Female	53	1,002	2,033	1,815	1,275	551	68	0	6,797
	Total	90	1,743	3,332	2,345	2,098	1,044	135	0	10,787
1978	Male	98	1,627	2,332	915	980	504	39	0	6,495
	Female	89	1,821	3,089	2,741	1,568	556	38	0	9,902
	Total	187	3,448	5,421	3,656	2,548	1,060	77	0	16,397
1979	Male	138	2,015	2,773	1,140	1,173	516	50	1	7,806
	Female	140	2,358	3,869	3,364	1,887	552	23	0	12,193
	Total	278	4,373	6,642	4,504	3,060	1,068	73	1	19,999
1980	Male	117	1,846	2,616	981	858	311	20	0	6,749
	Female	110	1,962	3,496	2,713	1,414	378	12	0	10,085
	Total	227	3,808	6,112	3,694	2,272	689	32	0	16,834
1981	Male	126	2,142	2,642	922	705	202	10	0	6,749
	Female	108	2,024	3,306	2,575	1,145	242	5	0	9,405
	Total	234	4,166	5,948	3,497	1,850	444	15	0	16,154
1982	Male	102	1,542	2,244	921	684	168	11	0	5,672
	Female	90	1,847	3,268	2,684	1,083	219	3	0	9,194
	Total	192	3,389	5,512	3,605	1,767	387	14	0	14,866

(to be continued)

Table 6. (continued)

Year	Sex	Age ATB								Total
		Prenatal	0 - 9	10-19	20-29	30-39	40-49	50-59	60-	
1983	Male	103	1,488	2,167	922	614	126	4	0	5,424
	Female	73	1,588	3,082	2,371	961	134	3	0	8,212
	Total	176	3,076	5,249	3,293	1,575	260	7	0	13,636
1984	Male	98	1,657	2,548	915	526	88	4	0	5,836
	Female	101	1,962	3,228	2,509	824	95	4	0	8,723
	Total	199	3,619	5,776	3,424	1,350	183	8	0	14,559
1985	Male	84	1,301	2,224	821	439	61	1	0	4,931
	Female	69	1,478	2,848	2,157	670	66	1	0	7,289
	Total	153	2,779	5,072	2,978	1,109	127	2	0	12,220
1986	Male	121	1,657	2,532	940	482	64	1	0	5,797
	Female	96	1,760	3,215	2,455	736	85	1	0	8,348
	Total	217	3,417	5,747	3,395	1,218	149	2	0	14,145
1987	Male	112	1,837	2,673	900	455	70	2	0	6,049
	Female	110	2,213	3,420	2,584	727	45	0	0	9,099
	Total	222	4,050	6,093	3,484	1,182	115	2	0	15,148
1988	Male	68	1,143	2,044	760	386	45	1	0	4,447
	Female	64	1,455	2,635	2,026	605	23	0	0	6,808
	Total	132	2,598	4,679	2,786	991	68	1	0	11,255
1989	Male	58	1,049	2,003	687	333	43	0	0	4,173
	Female	60	1,347	2,662	2,054	533	42	0	0	6,698
	Total	118	2,396	4,665	2,741	866	85	0	0	10,871
1990	Male	99	1,775	3,119	1,040	496	66	1	0	6,596
	Female	129	2,375	4,139	3,009	954	65	1	0	10,672
	Total	228	4,150	7,258	4,049	1,450	131	2	0	17,268

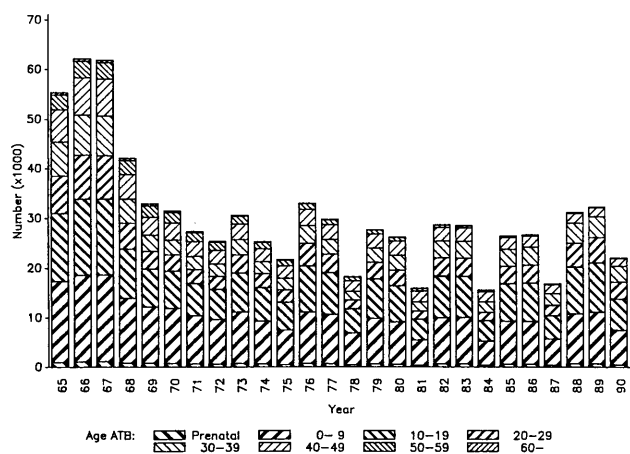


Fig. 8. Number of Atomic-bomb survivors who have no health examination result.

Table 7. Number of atomic-bomb survivors who have no health examination result.

Year	Sex	Age ATB								Total
		Prenatal	0 - 9	10-19	20-29	30-39	40-49	50-59	60-	
1965	Male	504	8,301	6,631	2,090	2,739	3,043	1,279	162	24,749
	Female	512	8,076	6,970	5,417	4,180	3,458	1,698	301	30,612
	Total	1,016	6,377	13,601	7,507	6,919	6,501	2,977	463	55,361
1966	Male	536	8,838	7,313	2,409	3,224	3,503	1,448	173	27,444
	Female	569	8,678	7,913	6,459	4,928	3,986	1,905	316	34,754
	Total	1,105	17,516	15,226	8,868	8,152	7,489	3,353	489	62,198
1967	Male	555	8,956	7,411	2,437	3,225	3,440	1,426	171	27,621
	Female	569	8,566	7,766	6,317	4,858	3,962	1,931	312	34,281
	Total	1,124	17,522	15,177	8,754	8,083	7,402	3,357	483	61,902

(to be continued)



Table 7. (continued)

Year	Sex	Age ATB								Total
		Prenatal	0 - 9	10-19	20-29	30-39	40-49	50-59	60-	
1968	Male	431	7,025	5,150	1,609	2,033	2,335	1,200	164	19,947
	Female	415	6,089	4,735	3,584	2,784	2,601	1,608	291	22,107
	Total	846	13,114	9,885	5,193	4,817	4,936	2,808	455	42,054
1969	Male	409	6,443	4,375	1,368	1,523	1,774	981	134	17,007
	Female	410	4,952	3,260	2,171	1,731	1,801	1,317	244	15,886
	Total	819	11,395	7,635	3,539	3,254	3,575	2,298	378	32,893
1970	Male	397	6,285	4,198	1,132	1,288	1,635	866	94	15,895
	Female	369	4,862	3,306	2,121	1,684	1,812	1,213	202	15,569
	Total	766	11,147	7,504	3,253	2,972	3,447	2,079	296	31,464
1971	Male	377	5,577	3,652	939	1,103	1,375	683	71	13,777
	Female	298	4,145	2,864	1,898	1,497	1,601	1,092	177	13,572
	Total	675	9,722	6,516	2,837	2,600	2,976	1,775	248	27,349
1972	Male	353	5,405	3,492	905	1,072	1,246	581	56	13,110
	Female	274	3,600	2,573	1,731	1,387	1,541	1,017	148	12,271
	Total	627	9,005	6,065	2,636	2,459	2,787	1,598	204	25,381
1973	Male	411	6,154	4,350	1,120	1,284	1,287	580	43	15,229
	Female	318	4,221	3,562	2,515	1,775	1,795	1,006	122	15,314
	Total	729	10,375	7,912	3,635	3,059	3,082	1,586	165	30,543
1974	Male	371	5,352	3,828	948	1,029	1,098	441	31	13,098
	Female	257	3,301	2,925	1,879	1,379	1,490	858	83	12,172
	Total	628	8,653	6,753	2,827	2,408	2,588	1,299	114	25,270
1975	Male	313	4,347	3,171	788	875	964	361	19	10,838
	Female	184	2,615	2,460	1,752	1,435	1,550	784	46	10,826
	Total	497	6,962	5,631	2,540	2,310	2,514	1,145	65	21,664
1976	Male	423	5,952	4,878	1,286	1,354	1,237	379	12	15,521
	Female	287	4,440	4,439	3,206	2,235	1,971	799	32	17,409
	Total	710	10,392	9,317	4,492	3,589	3,208	1,178	44	32,930
1977	Male	382	5,831	4,578	1,158	1,085	1,062	318	10	14,424
	Female	271	4,184	3,823	2,535	1,880	1,853	715	23	15,284
	Total	653	10,015	8,401	3,693	2,965	2,915	1,033	33	29,708
1978	Male	285	4,106	3,002	630	666	735	240	5	9,669
	Female	149	2,334	1,882	1,184	1,054	1,387	577	16	8,583
	Total	434	6,440	4,884	1,814	1,720	2,122	817	21	18,252
1979	Male	355	5,326	4,261	978	1,021	970	252	2	13,165
	Female	253	3,889	3,746	2,376	1,820	1,832	547	14	14,477
	Total	608	9,215	8,007	3,354	2,841	2,802	799	16	27,642
1980	Male	322	4,898	3,911	918	1,039	967	230	3	12,288
	Female	241	3,655	3,400	2,258	1,940	1,863	501	13	13,871
	Total	563	8,553	7,311	3,176	2,979	2,830	731	16	26,159
1981	Male	244	3,220	2,580	559	679	708	158	0	8,148
	Female	107	1,840	1,657	1,112	1,198	1,455	389	9	7,767
	Total	351	5,060	4,237	1,671	1,877	2,163	547	9	15,915
1982	Male	337	5,010	4,318	999	1,091	838	152	1	12,746
	Female	295	4,303	4,087	2,683	2,288	1,840	362	7	15,865
	Total	632	9,313	8,405	3,682	3,379	2,678	514	8	28,611
1983	Male	321	5,011	4,337	951	1,064	829	124	1	12,638
	Female	276	4,369	3,984	2,658	2,353	1,821	312	6	15,779
	Total	597	9,380	8,321	3,609	3,417	2,650	436	7	28,417
1984	Male	219	2,955	2,419	483	697	574	85	1	7,433
	Female	133	1,878	1,729	1,204	1,453	1,430	235	6	8,068
	Total	352	4,833	4,148	1,687	2,150	2,004	320	7	15,501
1985	Male	303	4,592	3,862	854	1,017	673	80	0	11,381
	Female	253	4,075	3,710	2,638	2,390	1,661	196	4	14,927
	Total	556	8,667	7,572	3,492	3,407	2,334	276	4	26,308
1986	Male	293	4,459	3,828	914	1,076	601	65	0	11,236
	Female	267	4,191	3,867	2,705	2,532	1,616	158	3	15,339
	Total	560	8,650	7,695	3,619	3,608	2,217	223	3	26,575

(to be continued)

Table 7. (continued)

Year	Sex	Age ATB								Total
		Prenatal	0 - 9	10-19	20-29	30-39	40-49	50-59	60-	
1987	Male	210	3,175	2,696	564	729	456	47	0	7,877
	Female	148	2,113	2,039	1,527	1,614	1,332	122	3	8,898
	Total	358	5,288	4,735	2,091	2,343	1,788	169	3	16,775
1988	Male	345	5,143	4,585	1,126	1,118	520	41	0	12,878
	Female	333	4,932	4,843	3,615	2,883	1,457	109	1	18,173
	Total	678	10,175	9,428	4,741	4,001	1,977	150	1	31,051
1989	Male	343	5,274	4,728	1,190	1,165	443	23	0	13,166
	Female	344	5,171	5,129	3,869	3,020	1,363	81	0	18,977
	Total	687	10,445	9,857	5,059	4,185	1,806	104	0	32,143
1990	Male	267	3,787	3,234	801	850	361	17	0	9,317
	Female	225	3,158	3,099	2,601	2,320	1,187	54	0	12,644
	Total	492	6,945	6,333	3,402	3,170	1,548	71	0	21,961

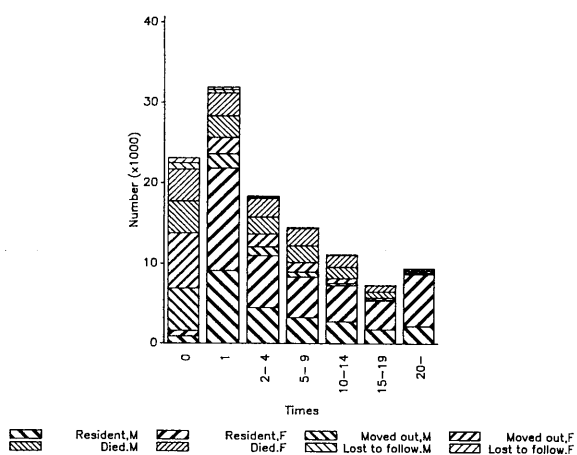


Fig. 9. Number of consecutive years one has taken the health screening.

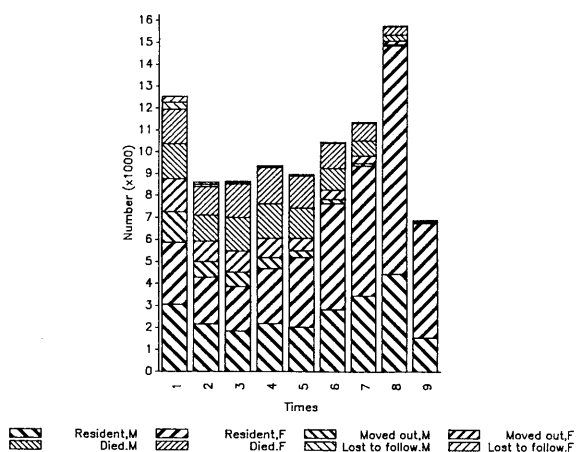


Fig. 10. Number of examinees who have consecutively taken the screenings at least once every three years.

Table 8. Number of consecutive years one has taken the health screening.

Times	Sex	Resident	Moved out	Died	Lost to follow	Total
0	Male	933	5,320	3,959	783	10,995
	Female	674	6,858	3,959	613	12,104
	Total	1,607	12,178	7,918	1,396	23,099
1	Male	9,107	1,773	2,676	422	13,978
	Female	12,723	2,036	2,849	308	17,916
	Total	21,830	3,809	5,525	730	31,894
2- 4	Male	4,493	1,111	2,079	147	7,830
	Female	6,474	1,603	2,285	156	10,518
	Total	10,967	2,714	4,364	303	18,348
5- 9	Male	3,255	634	2,058	41	5,988
	Female	5,067	1,189	2,173	47	8,476
	Total	8,322	1,823	4,231	88	14,464
10-14	Male	2,762	271	1,402	20	4,455
	Female	4,529	584	1,501	23	6,637
	Total	7,291	855	2,903	43	11,092
15-19	Male	1,776	82	753	7	2,618
	Female	3,612	266	782	4	4,664
	Total	5,388	348	1,535	11	7,282
20-	Male	2,195	34	250	0	2,479
	Female	6,485	112	277	7	6,881
	Total	8,680	146	527	7	9,360

Table 9. Number of examinees who have consecutively taken the screenings at least once every three years.

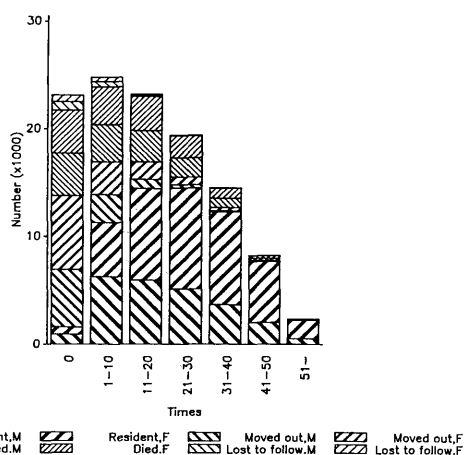
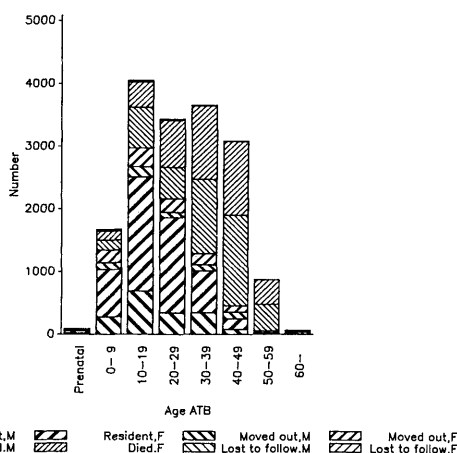
Times	Sex	Resident	Moved out	Died	Lost to follow	Total
1	Male	3,060	1,380	1,610	321	6,371
	Female	2,816	1,502	1,578	263	6,159
	Total	5,876	2,882	3,188	584	12,530
2	Male	2,173	710	1,178	105	4,166
	Female	2,115	925	1,297	99	4,436
	Total	4,288	1,635	2,475	204	8,602
3	Male	1,850	650	1,514	73	4,087
	Female	2,020	964	1,512	54	4,550
	Total	3,870	1,614	3,026	127	8,637

(to be continued)

period, 24 years of follow-up period. Fig. 11 (Table 10) summarizes the total number of health screenings taken by each individual in the follow-up period. Most of the 23,099

**Table 9.** (continued)

Year	Sex	Resident	Moved out	Died	Lost to follow	Total
4	Male	2,195	503	1,560	48	4,306
	Female	26,487	875	1,647	40	5,049
	Total	4,682	1,378	3,207	88	9,355
5	Male	2,030	307	1,368	28	3,733
	Female	3,165	563	1,454	33	5,215
	Total	5,195	870	2,822	61	8,948
6	Male	2,833	183	988	22	4,026
	Female	4,799	427	1,153	20	6,399
	Total	7,632	610	2,141	42	10,425
7	Male	3,458	113	696	26	4,293
	Female	5,898	341	800	16	7,055
	Total	9,356	454	1,496	42	11,348
8	Male	4,438	55	273	12	4,778
	Female	10,399	164	371	12	10,946
	Total	14,837	219	644	24	15,724
9	Male	1,551	4	31	2	1,588
	Female	5,191	29	55	8	5,283
	Total	6,742	33	86	10	6,871

**Fig. 11.** Number of health screenings taken by each individual in the follow-up period.**Fig. 12.** Number of the tumor registry data at May, 1991, identified as of the survivors.

person with no screening results are moved out or died. On the other hand, most of person who count over 31 times currently reside in Nagasaki city.

### Tumor Registry

Tumor registry data are collected from the Nagasaki Medical Association, whose office is in the Radiation Effect Research Foundation. These data have been linked with the database. Out of the 88,905 tumor registry data obtained up to 1989, 16,926 have been identified as of the survivors by linkage at the end of 1991. Fig. 12 (Table 11) shows the identified number. The number of age 10-49 at the time of the bomb is dominating.

**Table 10.** Number of health screenings taken by each individual in the follow-up period.

Times	Sex	Resident	Moved out	Died	Lost to follow	Total
0	Male	933	5,320	3,959	783	10,995
	Female	674	6,858	3,959	613	12,104
	Total	1,607	12,178	7,918	1,396	23,009
1-10	Male	6,259	2,612	3,444	487	12,802
	Female	5,015	3,058	3,471	403	11,947
	Total	11,274	5,670	6,915	890	24,749
11-20	Male	5,946	859	2,891	104	9,800
	Female	8,510	1,618	3,146	96	13,370
	Total	14,456	2,477	6,037	200	23,170
21-30	Male	5,136	309	1,802	33	7,280
	Female	9,377	707	2,032	24	12,140
	Total	14,513	1,016	3,834	57	19,420
31-40	Male	3,682	100	849	11	4,642
	Female	8,625	302	946	16	9,889
	Total	12,307	402	1,795	27	14,531
41-50	Male	2,034	19	209	2	2,264
	Female	5,646	88	241	4	5,979
	Total	7,680	107	450	6	8,243
51-	Male	531	9	23	0	563
	Female	1,717	18	31	2	1,768
	Total	2,248	27	54	2	2,331

**Table 11.** Number of the tumor registry data at May, 1991, identified as of the survivors.

Age at ATB	Sex	Resident	Moved out	Died	Lost to follow	Total
Prenatal	Male	24	5	3	2	34
	Female	36	14	6	1	57
	Total	60	19	9	3	91
0-9	Male	281	108	158	14	561
	Female	751	201	141	16	1,109
	Total	1,032	309	299	30	1,670
10-19	Male	690	166	651	10	1,517
	Female	1,815	302	404	18	2,539
	Total	2,505	468	1,055	28	4,056

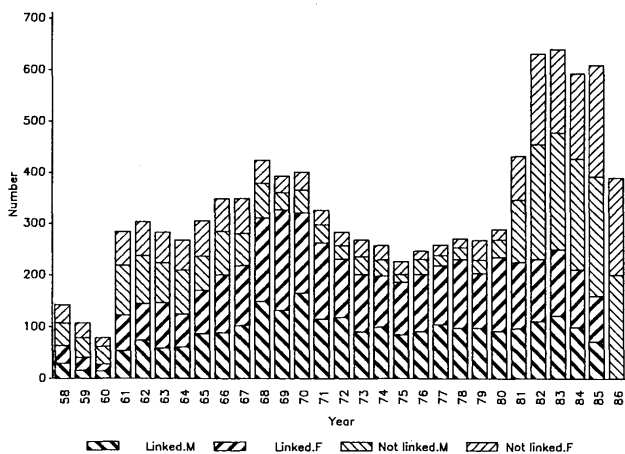
(to be continued)

**Table 11.** (continued)

Age at ATB	Sex	Resident	Moved out	Died	Lost to follow	Total
20-29	Male	345	84	503	3	935
	Female	1,515	215	754	15	2,499
	Total	1,860	299	1,257	18	3,434
30-39	Male	346	96	1,189	4	1,635
	Female	663	177	1,178	3	2,021
	Total	1,009	273	2,367	7	3,656
40-49	Male	81	106	1,445	1	1,633
	Female	170	100	1,183	2	1,455
	Total	251	206	2,628	3	3,088
50-59	Male	2	21	423	0	446
	Female	4	27	390	0	421
	Total	6	48	813	0	867
60-	Male	0	2	36	0	38
	Female	0	0	26	0	26
	Total	0	2	62	0	64
Total	Male	1,769	588	4,408	34	6,799
	Female	4,954	1,036	4,082	55	10,127
	Total	6,723	1,624	8,490	89	16,926

**In-Patient Records of The Atomic-Bomb Hospital**

Laboratory test results at admission and diagnosis for inpatients of the internal department of the Atomic-Bomb Hospital have been stored to and linked with the database. Fig. 13 (Table 12) shows the number of the patients at the first admission year. Before 1980, in-patients who were not seemed atomic-bomb survivors were excluded from the registration, however, all of the in-patients have been registered since 1981.



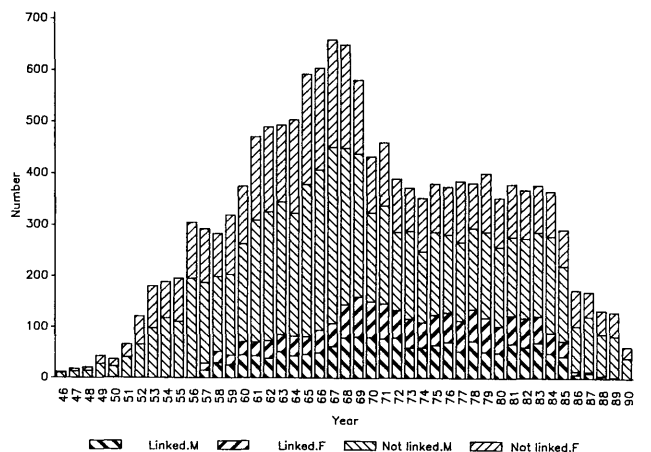
**Fig. 13.** Number of the in-patients at the first admission year which are linked with the database.

**Table 12.** Number of the in-patients at the first admission year which are linked with the database.

Year	Linked			Not linked			Total
	Male	Female	Total	Male	Female	Total	
1958	30	34	64	44	35	79	143
1959	16	25	41	38	29	67	108
1960	15	13	28	34	17	51	79
1961	54	69	123	96	65	161	284
1962	74	71	145	93	65	158	303
1963	59	88	147	77	59	136	283
1964	61	64	125	85	58	143	268
1965	87	84	171	66	68	134	305
1966	89	112	201	84	63	147	348
1967	103	116	219	62	67	129	348
1968	150	161	311	67	45	112	423
1969	133	194	327	33	32	65	392
1970	166	155	321	44	35	79	400
1971	116	147	263	35	28	63	326
1972	119	113	232	26	26	52	284
1973	91	111	202	35	32	67	269
1974	100	99	199	31	28	59	258
1975	85	102	187	15	25	40	227
1976	91	111	202	29	16	45	247
1977	105	114	219	20	20	40	259
1978	98	133	231	23	17	40	271
1979	98	106	204	26	38	64	268
1980	92	143	235	34	20	54	289
1981	97	128	225	120	85	205	430
1982	111	120	231	222	176	398	629
1983	122	128	250	226	162	388	638
1984	100	111	211	214	166	380	591
1985	72	88	160	230	217	447	607
1986	1	0	1	200	187	387	388
Total	2,535	2,940	5,475	2,309	1,881	4,190	9,665

**Pathological Autopsy**

Pathological autopsy records have been stored in the database since 1946. Fig. 14 (Table 13) shows the number of the autopsy records which were identified as survivors by linkage. As each hospital has been keeping autopsy records



**Fig. 14.** Number of the autopsy records which are linked with the database.

**Table 13.** Number of the autopsy records which are linked with the database.

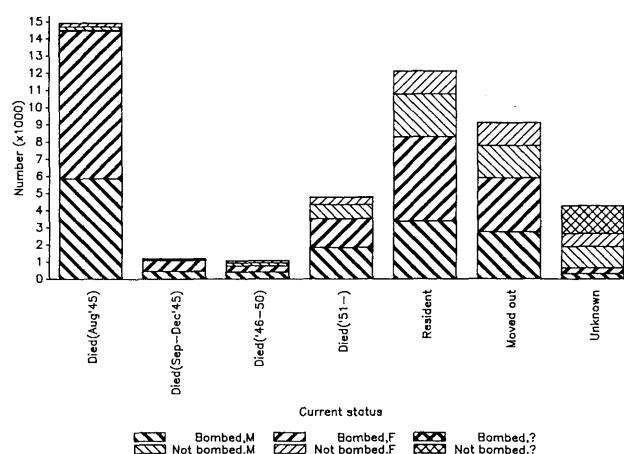
Year	Linked			Not linked			Total
	Male	Female	Total	Male	Female	Total	
1946	0	0	0	10	2	12	12
1947	0	0	0	13	5	18	18
1948	0	0	0	14	7	21	21
1949	0	0	0	28	15	43	43
1950	0	1	1	22	14	36	37
1951	0	0	0	41	25	66	66
1952	0	0	0	66	55	121	121
1953	0	0	0	98	82	180	180
1954	1	0	1	117	70	187	188
1955	0	0	0	111	84	195	195
1956	0	0	0	195	109	304	304
1957	15	14	29	158	105	263	292
1958	30	22	52	147	84	231	283
1959	26	19	45	158	116	274	319
1960	45	26	71	192	112	304	375
1961	43	27	70	239	161	400	470
1962	38	35	73	252	164	416	489
1963	51	34	85	259	149	408	493
1964	43	39	82	240	181	421	503
1965	46	35	81	297	213	510	591
1966	49	45	94	312	197	509	603
1967	62	45	107	343	208	551	658
1968	79	65	144	304	200	504	648
1969	81	78	159	278	143	421	580
1970	80	70	150	173	109	282	432
1971	77	68	145	191	122	313	458
1972	79	54	133	152	103	255	388
1973	59	57	116	171	84	255	371
1974	59	50	109	138	104	242	351
1975	64	59	123	162	94	256	379
1976	70	58	128	152	93	245	373
1977	52	60	112	153	119	272	384
1978	72	62	134	158	88	246	380
1979	51	67	118	167	114	281	399
1980	49	52	101	154	96	250	351
1981	67	55	122	153	102	255	377
1982	60	57	117	155	94	249	366
1983	69	52	121	163	91	254	375
1984	48	40	88	188	87	275	363
1985	42	30	72	146	71	217	289
1986	7	7	14	87	70	157	171
1987	10	3	13	107	48	155	168
1988	4	1	5	81	46	127	132
1989	2	0	2	80	47	127	129
1990	0	0	0	40	21	61	61
Total	1,630	1,387	3,017	6,865	4,304	11,169	14,186

individually since 1970, only autopsy records performed at Nagasaki University have been stored in the database. As input work is now under way, only a small portion of records have been linked with the database.

### Household Reconstruction

During 1970-1979, Nagasaki City Hall, the press, TV stations, radio stations and volunteers investigated the

households at the time of the bombing at the area within 2km from the hypocenter and reconstructed 10,978 (90%) households. By linking them with the database, their status after the bombing were examined. Fig. 15 (Table 14) shows the number of the household members by the year of death and current status. Out of 47,331 members, 14,919 members (31.5%) died in August 1945, 12,070 members resided in Nagasaki city during the investigation and 8,281 members had the handbooks.

**Fig. 15.** Number of the household members.**Table 14.** Number of the household members.

Status		Sex			Total
		Male	Female	Unknown	
Died Aug. '45	Bombed	5,857	8,603	50	14,510
	Not bombed	208	198	3	409
	Total	6,065	8,801	53	14,919
Died Sep.- Dec. '45	Bombed	464	631	0	1,095
	Not bombed	46	52	0	98
	Total	510	683	0	1,193
Died '46-'50	Bombed	412	358	0	770
	Not bombed	177	126	0	303
	Total	589	484	0	1,073
Died '51-	Bombed	1,843	1,670	0	3,513
	Not bombed	813	423	4	1,240
	Total	2,656	2,093	4	4,753
Resident	Bombed	3,375	4,906	0	8,281
	Not bombed	2,464	1,322	3	3,789
	Total	5,839	6,228	3	12,070
Moved out	Bombed	2,744	3,125	0	5,869
	Not bombed	1,878	1,310	4	3,192
	Total	4,622	4,435	4	9,061
Lost to follow	Bombed	322	334	0	656
	Not bombed	1,235	766	1,605	3,606
	Total	1,557	1,100	1,605	4,262
Total	Bombed	15,017	19,627	50	34,694
	Not bombed	6,821	4,197	1,619	12,637
	Total	21,838	23,824	1,669	47,331

### Final Remark

Since the beginning of the service with the medical record database for atomic-bomb survivors, various kinds of research have been performed on late effect of radiation and medical aspects of the survivors, such as (1) theoretical and technical problems for constructing the large scale and multi-purpose medical database, (2) mortality, (3) health promotion and administration using the health screening results, (4) trend analysis of longitudinal data, and so on.

To protect the privacy of individuals, a regulation has been prescribed so that only academic purpose may be granted for the use of the database.

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