Journal of Economics, No.19 (1994), Shimane University, 1－48

Workers' Health and Working Conditions in Japan, the United States and Europe : A Trial of Statistical Comparison

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Summary

Continuous overwork often results in the occurence of cardiovascular diseases that are typical work-related diseases. Karoshi, sudden death from overwork, is a possible end result. A direct factor leading to overwork is long working hours. Moreover, overwork is closely related to the wage level per hour, the pressure of unemployment or underemployment and high living costs. Both in Japan and the United States, working hours are very long when we compare them to Europe. Annual paid leave in both countries is exceedingly short. Earnings per hour in Japan are relatively low. The living standard in the U.S. is at a high level. The "unemploym ent-and-underemployment" rates in both countries are higher than the former F. R. of Germany. Regarding work-related diseases, occupational injury statistics turned out to be useless for the comparison between Japan, the U.S. and Europe. It is also difficult to use occupational mortality statistics for the comparison. General mortality statistics revealed that for the middle-aged male population, the highest death rate caused by heart diseases was in the U.S. and the highest rate caused by cerebrovascular disease was in Japan. Regarding these causes, the "ratio of middle-aged mortality" was at a high level in both countries. It means that some factors, which may be related to overwork, prevent a decrease in mortality in this age group.

Purpose

The employment structure changed rapidly during the 1980s in developed countries, and we can see a qualitative change in labour itself with

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high technological innovation and the internationalization of the economy. However, working conditions are not always apt for these changes.

Regarding workers' health, we have to be attentive to a new type of problem, which is work- or stress-related diseases. The ILO "World Labour Report" 1993 took up this issue as one of the biggest recent problems for workers. This report mentioned the increase in claims for occupational injury compensation on stress-related diseases in the United States. Moreover, it brought up the increase of Karoshi: death from overwork in Japan.[1]

There are four different facets to this research. The first is a statistical comparison between highly developed countries on working conditions related to workers' health. Second is an examination of the occupational injury statistics which can be compared. Third is checking on the possibility of using occupational mortality statistis. Finally, we will compare the question of mortality caused by cardiovascular diseases in the middle-aged population -- typical work-related diseases.

1 Work-related diseases and Karoshi: epidemiological research

1-1 Research on work-related diseases

Due to epidemiological research, we have been able to obtain important information on the relationship between work-related diseases and working conditions.

The term "work-related diseases" has been used as a new concept regarding workers' health, and was applied in both the report of the "WHO Expert Committee" in 1985 and the "WHO/ILO Joint Committee" in 1989.

It differs from "classical occupational diseases" that "exclusively affect working people exposed to the specific hazards". "Multifactorial 'work-related' diseases are often more common than occupational diseases".[2]

The "WHO and ILO Joint Committee" showed three major disease categories in the work-related diseases that are quite common and are of great importance to workers' health. These are: "chronic nonspecific respiratory disease, cardiovascular disease, and musculoskeletal disorders".[3]

'The Overworked American: The Unexpected Decline of Leisure' by

Professor J. B. Schor on workers' health and working conditions in the United States attracted a great deal of attention. The research was made in relation to overwork and stress-related diseases. In addition, the working attitude of white collar workers was analyzed in relation to the "work-and-spend cycle".[4]

The ILO "World Labour Report' (1993) mentioned Doctor T. Uehata's research on "Karoshi" in Japan. That by Uehata and others, clearly analyzed the relationship between working conditions, living situations, stress and sudden death from overwork among middle-aged workers.[5] It became obvious that long working hours is the strongest factor which ruins workers' health.

In this paper, we will deal with cardiovascular diseases as typical work-related diseases, because a lot of case studies showed the relationship between working conditions and these diseases.

1-2 Case studies on "Karoshi": death from overwork

The term "Karoshi" has appeared frequently as an international word since 1990.

On 28 August 1991, at a United Nations Meeting in Geneva, the question of Karoshi in Japan was discussed as an issue of human rights.[6]

'The New York Times' printed an article on Karoshi of white collar workers in Japan, in which it was stated white collar workers have arduous conditions due to commuting, extended workdays, and obligatory "after work" socializing, with difficulty in taking their annual leave.[7] Furthermore, 'The Sunday Times' (London) also gave a report on Karoshi among Japanese white collar workers.[8]

The case records of Karoshi by judicial precedent are presented in table 1. Victims' conditions of work were shown to be long working hours, overtime work, shift work, lack of days off and paucity of annual leave. Sudden death caused by cardiovascular diseases struck middle-aged workers as a result of overwork. Nevertheless, at first, the Labour Standard Inspection Office did not acknowledge these cases to be occupational diseases because of the very strict criterion for occupational injury compensation. Only a few cases were acknowledged by judicial decision afterwards. Therefore, we can presume that many Karoshi cases were not widely known and acknowledged.

The Karoshi victims do not consist only of blue collar workers, but also white collar workers (see chart 1). We can see the case records of Karoshi among white collar workers and managers in table 2. These cases show the relation between overwork, stress and Karoshi. Under continuous strain to achieve their business target and the heavy mental pressure due to big responsibilities, the victims accumulated stress which resulted in Karoshi. Even if they had some flexibility in controlling their work, they overworked themselves: overtime or holiday work and work at home.

TABLE 1 Cases of Karoshi for middle-aged male workers in Japan : Judicial precedents

•Court & Judgment date •Judicial decisions •Occupation & Age	Working conditions		Living conditions	Fundamental diseases & Death causes
	Regular	immediately preceding		
Osaka, 30-Apr-80 No Sightseeing bus driver, 37 *1	●5 M bD: • av. distance covered (skiing season); 1.5 T of an av. driver	• av. distance covered in Dec. & Jan.: 2.3 T of an av. driver •continuous Wg without days off: 21 Dec.-8 Jan. (19D), 12 Jan.-24 Jan. (13D) •total days off bD; 5 D in a M	•inverting daily life of day and night • irregular & unsatisfactory sleeping,	nothing Subarachnoid hemorrhage
Sapporo, 10-Mar-83 No Factory worker, 35 *2	●5 M bD: • overtime Wk; 50 H per M, av. 2 H per D • preparing Wk at home; 40-50 minutes per D •11.5 Wg H per D •2 commuting H per D • days off; Sunday & public holidays	• almost the same as usual Wg cond.	•usual daily life: 6 a.m.; get up 7:30 a.m.; leave for work 11 p.m.; return & go to bed	•Heart disease & Hypertension Cerebral hemorrhage
Tokyo, 1-Mar-89 No	●a few M bD: •excessive overwork: •overtime Wk; until 12 p.m. for 2 W •returning home at	●a W bD: •the same as usual Wg cond. • sometimes, midnight Wk & overnight stay	•unsatisfactory sleeping due to midnight Wk •overweight	Diabetes & Hypertension

Electronic construction engineer,34 *3	after midnight •holiday Wk long distance driving	at construction site •just bD: returned to hometown to attend wedding ceremony	•drinking & smoking habits	Subarachnoid hemorrhage
Wakayama, 30-Nov-88 Yes Truck driver, 48 *4	●3 M bD (av.): •strong strain due to long distance driving •irregular Wg time zone due to night or early morning Wk •Wg alone; driving, loading & checking etc. (av.22 door to door H) •Wg D; 22 D per M •days off; 8 D per M •door to door H; 12.5 H •Wg alone; 5 T •night or early morning Wk; 14 T	●a M just bD: •worked 23 D with 8 days off •12 H door to door •Wg alone; 10 T •night or early morning Wk; 17 T ●a W bD: •worked 5 D with 2 days off •12.3 H door to door •driving alone; twice •2 D long H Wg,No sleep •night or early morning Wk; 4 T	•accumulation of mental & physical fatigue due to a lot of night or early morning Wk, • sleepless cond.	Asthma Cardiac Insufficiency
Tsu, 31-Oct-88 Yes Truck driver, 49 *5	●usual Wg cond.: •driving & loading Wk, night or ealry morning Wk (sometimes), long Wg H,irregular & extra Wk, •average distance covered per M; 4-6,000 km ●3 M bD: Mar.; 24 Wg D, 4 D off Apr.; 24 Wg D, 7 D off May; 21 Wg D, 7 D off	●2 W bD: •14 D Wg, No days off •night Wk; 10 T •14 H door to door •continuous driving; 4H ●just bD: •long distance driving over 2000 km •driving H per D; 12 H •5 H continuous night driving •heavy loading Wk & returning without rest	•nothing worse in his living cond. •drinking; a little •tobacco; 30 per D	Hypertension Cerebral hemorrhage
Osaka, 27-May-86 No Boiler installation work, foreman,50 *6	●5 M bD (av.): •5 days off per M, •overtime Wk; 4.6 H per D •holiday Wk; 2 - 3 T • heavy responsibility as a foreman	●just bD: •9 D Wg, No days off	attending a hospital: 2 or 3 T in a M	severe heart muscle disease Cardiac insufficiency

Code:

M; month(s), W; week(s), D; day(s), H; hour(s), T; time(s)
Wk; work, Wg; working, av.; average, cond.; condition(s), bD; before his death
Yes; A court judgement acknowledged the death to be occupational injury.
No; A court judgement didn't acknowledge the death to be occupational injury. (At first, all cases were not acknowledged to be an occupational diseases by the Labour Standard Inspection Office of Labour Ministry.)

Sources:

1, 'Hanrei Jiho', No.984, p.105
2, 'Hanrei Soran', 1987, p.402
3, 'Hanrei Jiho', No.1302, p.150
4, 'Sosho Geppo', No.35-5, p.830
5, 'Sosho Geppo', No.35-4, p.730
6, 'Hanrei Soran', 1987, p.263

TABLE 2 Cases of Karoshi from stress-related disease: White collar male workers

•Death date •occupation & Age	Working conditions	
	Regular	immediately preceding
29-Nov-82 Adminstrator 45 (Group leader of research institute in chemistry company)	•his group's Wk; research for development of new products •his Wk; leading and directing research to members, & management, sales etc. •stressful situation: big expectations of company, complex human relationships, heavy responsibilities •Wk at home; always thought of group's research.	• a W just bD: •change of staff composition in his research group & increase in number of staff; from 19 to 30 •work preparing term-end meeting; report on results and plans •the amount of work; increased rapidly • several D just bD: His work put a lot of stress on him.
11-Nov-80 acting branch manager, 42 (nonlife insurance company)	• change of job situation: •He was transferred to new branch 1 year & 7 M bD. •regular Wk; service Wk for agencies and financial institutions, Had to keep contacts with them. •extra Wk; Wg as proxy of the branch manager •using a car for his Wk: distance covered per M; 1,372 km (min.) to 3,235 km (max.) (before transfer; 500 to 800 km) •long distance driving and long Wg H due to pressure of his Wk quota & shortage of staff	• a M bD: •the period of a campaign for an increase in revenue •overtime Wg H; about 100 H in a M av. about 3 H per D •holiday work •the distance covered by his driving; 3,128 km • just bD: •long distance driving to go to the agency, with strong strain, insecurity and haste

TABLE 2 (cont.)

Livingand health conditions	Fundamental diseases	Inducement of diseases	Death causes & Place occurred
•character:faithful to his Wk & research •smoking; 17-18 per D •drinking: 1 bottle of whisky per W •sports: He stopped playing tennis from 1982 due to his disease. •attended a clinic: 29 T in 1982 •taking a hypertensive drug regularly	Hypertension •7 M bD; 198-120 mmHg (blood pressure) •normal weight;59 kg, 161 cm	•A lot of stress bD made his health cond. worse. • high blood pressure	•Cerebral hemorrhage •in his room of institute
• before transfer; •very healthy, a lot of exercise • after transfer: •excessive stress •lumbago,stomachache,heavy fatigue •incomplete sleeping; He often fell into a elirium at night. •He stopped drinking and started taking medicine • just bD:heavy bloodshot eyes and unusual fatigue	• healthy • blood pressure; normal in 1976 •no medical examination since 1976 •Possible gradual change to Hypertention	•due to excessive stress, health cond. worsened • Strong strain, insecurity, & haste suddenly raised his blood pressure.	•Subarachnoid hemorrhage •when returning to his office

TABLE 2 (cont.)

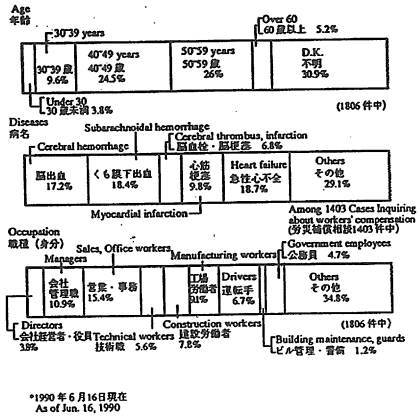
•Death date • occupation & Age	Working conditions	
	Regular	immediately preceding
12-Mar-82 Section chief, 45 (sales promotion in big publishing company)	• change of job situation: •transference to a newly-organized section (sales promotion) in Oct. 1981 (half a year bD). •alone in charge of sales promotion •frequent business travel; by plane, & using rent-a-cars to visit book stores, schools, etc. • business trips: •before his transfer (period); 3 D in 4 M (16 Nov. 1980 - 12 Mar. 1981) •after his transfer; 41 D in 4 M(16 Nov.1981 - 12 Mar. 1981) •the length of each business trip; 1 - 2 W (av.) •the distance covered by his driving; av. 150 km in a D •by records; 420 km in 2 D, 480 km in 3 D, 705 km in 6 D •long distance driving & promoting	• Jan. - Mar.: •desperate efforts to achieve sales targets; Mar. was the end of the business year. (He died in March.) •a great many business trips •long distance driving •sales activity without support •continuous strong strain to achieve sales target (After his death,it was announced that he had had an exceptionally good business result.) •These working cond. had been putting stress on him continuously.
21-Sep-81 Chief director TV station, 49	•Veteran director with professional experience of about 20 years. •Promotion to chief director: 3 years bD •accumulation of fatigue: overtime Wk, & midnight Wk • business traveling to U.S.A: •collecting news for 2 M from 17 Feb. to 18 Apr. 1981 (8 M bD) •terrible Wk stress there. • several M bD: •overtime Wk H per M; Apr; 11 H, Mar; 35 H, Jun; 32 H, Jul; 70 H, Aug; 35 H	• several W bD: •He had to carry out the work for his superior producer who traveled abroad on business from 5 Sep.. •overtime Wg H; 35 H (5 - 20 Sep, 16D) •overwork; He had no experince as a chief producer. •big responsibilties & heavy stress •overtime Wk; until midnight •continuous strong strain for 2 W

TABLE 2 (cont.)

Livingand health conditions	Fundamental diseases	Inducement of diseases	Death causes & Place occurred
•drinking: 1 bottle of beer a D •smoking: 20 a D •sports: playing golf •character: eager in his work, strong sense of responsibility, serious & diligent, very loyal to his company •He always arrived at his office 30 minutes before fixed time •He had confidence in his health. •His health condition became worse and worse after his transfer. •symptom: a dull pain in hands and feet, shoulderache, nausea	•nothing by medical examination (14 May 1981, 1 year bD) •normal blood pressure; 132-82 mmHg •angina pectoris (presumed)	•overwork, strong mental strain, desperate effort to achieve target etc. Due to these factors he accumulated stress. •Continuous stress caused blood to solidify.	• Myocardial infarction •in toilet at his company
● 1 year bD: •blood pressure; rising gradually under strong physical & mental strain ● since 5 Sep. (just bD): •less and restless sleep due to overtime Wk until midnight •continuous strong strain	Hypertension 1975; 116-66 mmHg 1977; 140-70 mmHg 1979; 136-87 mmHg 1980; 150-108 mmHg Jan.1981; 150-98 mmHg 8 Sep.1981; 162-108 mmHg	•His blood pressure rose due to long business trip and overtime Wk. •violent rise of blood pressure due to strong stress	•Subarachnoidal hemorrhage •collapsed at TV station and finally died in hospital

Notes:
M; month(s), W; week(s), D; day(s), H; hour(s),
Wk; work, Wg; working, av.; average, bD; before his death
Source: T.Uehata, 'The Study of Karoshi', Japan Planning Center, 1993, (in Japanese),pp.34-45, pp.43-45, pp.52-54, pp.62-66. This chart was made by Fujioka based on 'The Study of Karoshi'.

CHART 1 Summary of 1806 cases reported to the Karoshi Hotline



*1990年6月16日現在
As of Jun. 16, 1990

Source: National Defence Councel for Victims of Karoshi, 'Karoshi; When the "Corporate Warrior" Dies', Tokyo, Mado-Sha, 1990.

1-3 Mechanism of disease or death from overwork

"Type A Behavior Pattern" outlined by Friedman and "Work Characteristic model" by Karasek, are very important models in considering the relationship between cardiovascular diseases and work. "Type A Behavior Pattern" is characterized by the coronary-prone behavior pattern such as challenge to reach an excessive target, aggressive competition, strong sense of responsibility, fretfulness and so on.[9] Karasek's extended occupational stress model, showed risk factors on cardiovascular diseases characterized by low latitude for work control and high responsibility for outputs.[10]

The ILO 'World Labour Report' pointed out "Job burnout" syndrome which consisted of five stages -- "the end result of unmanaged work stress".

"1. The honeymoon stage -- when the youthful novice has an abundance of energy and enthusiasm.
2. The fuel shortage -- when the first symptoms of burnout appear.
3. The chronic stage -- when symptoms of exhaustion, anger, illness and depression are constantly evident.
4. The crisis stage -- when the symptoms are so severe that the

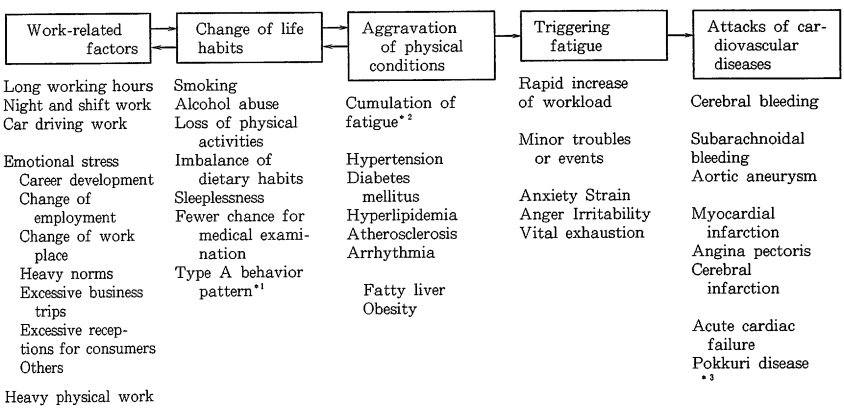
sufferer feels his or her life is falling apart.

5. Hitting the wall -- when the person can no longer function and faces signs of serious deterioration."

"Job burnout is frequently associated with people who have become 'workaholics', working up to 80 hours a week. Such long hours can strain the physical system even though the damage may not be evident until later."[11]

In the epidemiological research on Karoshi in Japan, Doctor Uehata explained the process leading from overwork to Karoshi. For easy understanding, we use chart 2 that he made. Briefly saying, uninterrupted overwork such as working for many hours, overtime work, a paucity of holidays, often result in unhealthy life styles, i.e., irregular sleeping hours, bad dietary habits, alcohol and tobacco abuse and so on. As a result, fatigue and stress gradually accumulated. These factors make it difficult for workers to keep their normal health condition. Finally, health disorders such as "high blood pressure", "damage in arterial walls" and "increase in cardiac activity" etc., will tend to appear. When workers overwork themselves beyond their physiological limits, sudden death from overwork may occur.[12]

CHART 2 A concept on progress of Karoshi as work-related



Notes: *1 See page 10 by Friedman
*2 Accumulation of fatigue
*3 Sudden death

Source: T. Uehata, "Long working hours and occupational stress-related cardiovascular attacks among middle-aged workers in Japan", Jounal of Human Ergol., No.20, Center for Academic Publication Japan, 1991, p.151

1-4 Factors which cause overwork

Through research by Prof. Schor in the United States, and by Dr. Uehata, Prof. Morioka and others in Japan, we found factors which cause overwork such as long working hours, unemployment rate, a relatively low wage level per hour, high living costs, labour attitude and so on. The results of research depended on the cooperation among epidemiologists, economists, lawyers and others.

Long working hours is the most important factor in overwork.

Enterprises have taken the steps to reduce workers and labour costs since the end of the 1970's in the United States and Japan. Employers preferred paying workers additional salaries rather than keeping a higher number of workers employed. Long working hours with a relatively high level of annual earnings per worker resulted in low overall labour costs. The big Japanese companies got over the oil crisis and won the international economic competition among developed countries due to relatively low labour costs and high level technology. Companies in the United States had to reduce overall labour costs due to competition with Japanese companies.

The Labour Union in both countries did not make a choice to reduce working hours and for work-sharing such as typical European countries. The Labour Unions gave the priority to salary increases because of strong protest from employers.

Furthermore, high unemployment or underemployment rate puts high pressure on workers who then overwork themselves to keep their occupational position. Blue collar workers, having a relatively low wage level per hour, have to work more to increase their total income. The high level of living standards among white collar workers in the United States compel them to work extra hours to earn a higher income. In Japan, white collar workers are obliged to overwork themselves due to high living costs, high housing costs, expensive educational costs and so on.

Fatigue and stress are accumulated, and accordingly diseases tend to appear because of the long working hours, with a high density of work in modern high technological innovation. Without the prevention of the government or the Labour Union, working hours would increase above the physiological limits of workers.[13]

The Illustration drawn by Miss Yumi Yamane clearly shows the arduous working and living conditions of middle-aged workers in Japan: with long commuting hours, overtime work, frequent obligatory "after work" socializing, paucity of holidays, lack of leisure, and high level of housing and educational cost (see charts 3 and 4).

CHART 3 Daily life of Workers in Japan

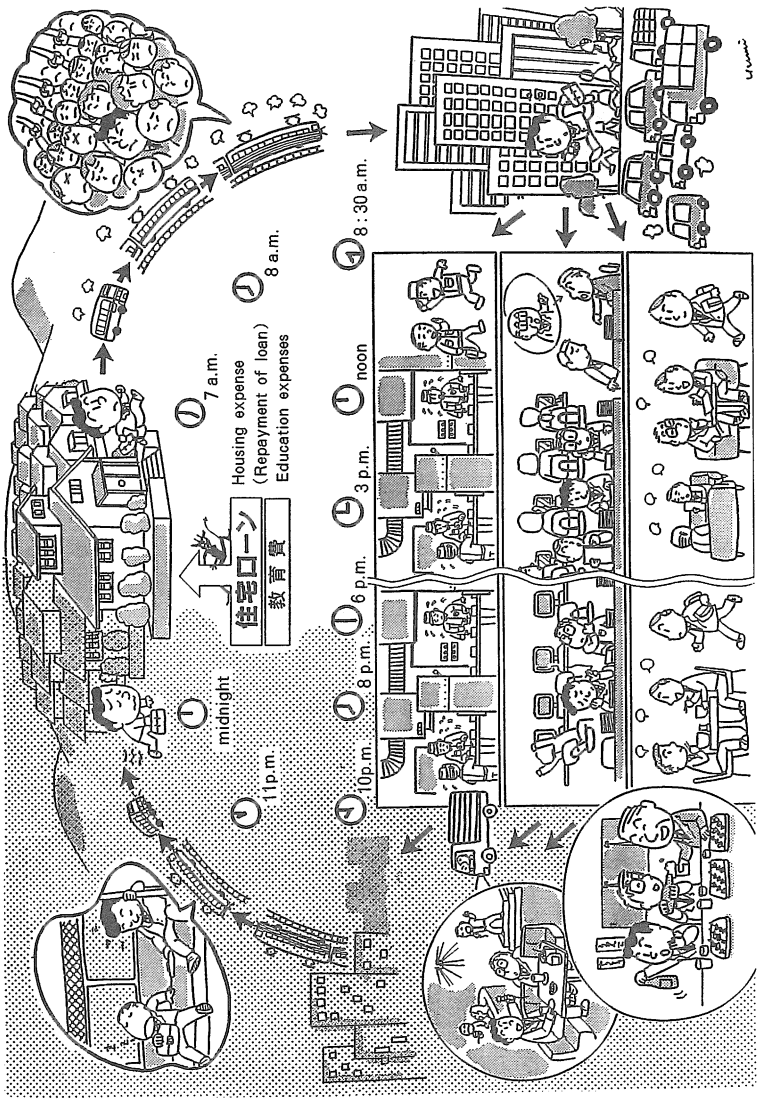
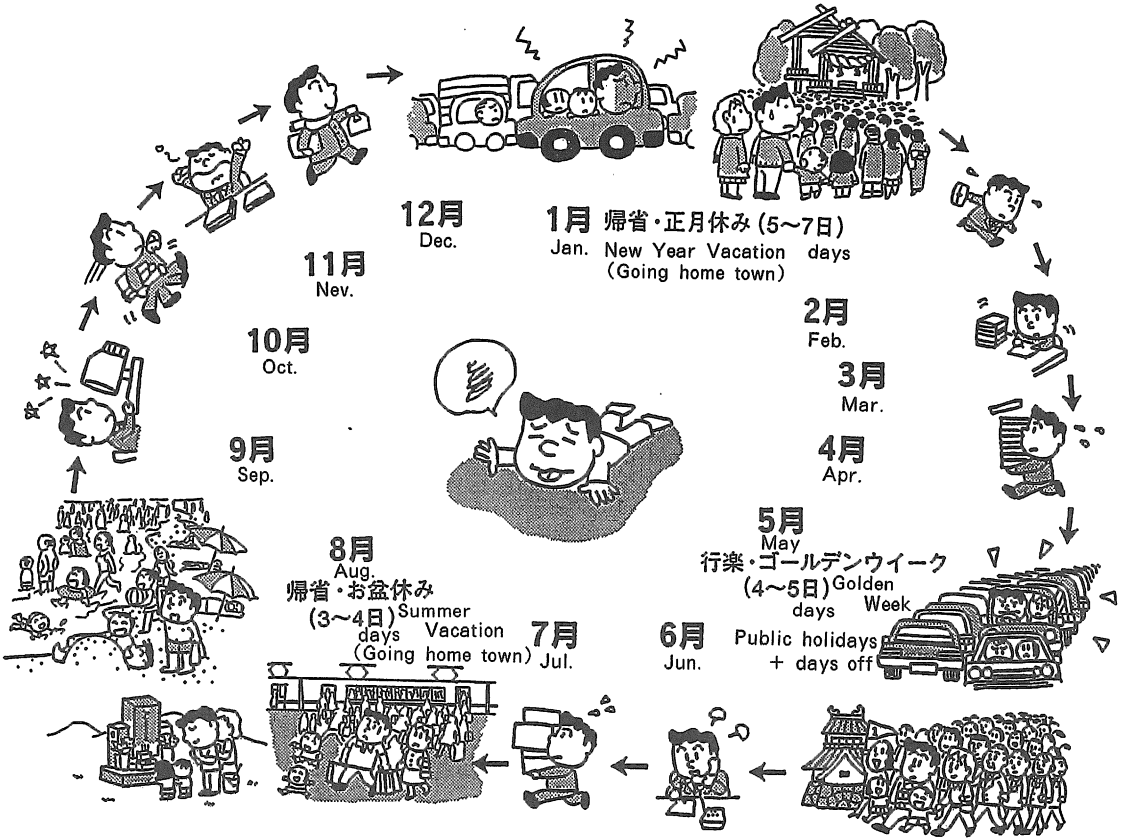


CHART 4 Annual life of Workers in Japan



2 Working conditions

2-1 former research on international comparison of Labour statistics

At the start of our statistical research, we will attempt to make a comparison on working conditions which cause overwork.

'International Labour Statistics'[14] published by Prof. R. Bean is a research concerning an examination into the availability and an international comparison. Nevertheless, this research did not indicate enough tables and indices for our research.

Prof. Ralph Turvey and others published 'Developments in International Labour Statistics'[15] in 1989. It was a research regarding availability of international comparison of Labour Statistics. They made comparable tables on some parts of labour statistics in later research.[16]

Prof. Ito and others published 'International Comparison of Labour Statistics'[17] in 1993 as a result of a joint project that I participated in. It includes European countries, the United States and Japan. This research, covering 14 fields of labour statistics, included 99 kinds of tables for comparison.

I will use some of these tables in order to compare working conditions relating to workers' health.

2-2 Comparison of Working Conditions

2-2-1 Working hours

When we make a comparison on working hours, we should use the statistics including both paid and unpaid hours worked which are closely related to a workers' health condition.[18] We have to pay attention to the very big difference of working hours in developed countries. Annual working hours in the former Federal Republic of Germany is 1598 hours and annual leave is 5.5-6 weeks. By contrast, the former in Japan is 2239 hours and the latter is 15 days. In the United States, we find similar characteristics: i.e. long working hours (1951 hours) and paucity of annual leave (9.9 days) (see table 3).

Regarding overtime work, it is exceedingly high in Japan. Average overtime working hours per month in Japan is 35.8 hours, whereas it is only 6.2 hours in the former Federal Republic of Germany (see table 4).

TABLE 3 Working Hours (Manufacturing)

	Working hours incl. unpaid working hours (annual hours) *2				Labour Ministry (Jap) *3	ILO, Annual hours *4	Weekly hours *5	Anuual leave *6	
								by law	by agreement
	1975	1980	1985	1990	1990	1990	1990		
U.S.A.	1894	1901	1930	1951	1948	1904	37.5	-	9.9 Days
Japan	2187	2258	2227	2239	2124	2143	40.8	6 Days	15 Days
U.K.	1923	1894	1906	1893	1953	1769	37.6	-	4-6 Weeks
Germany *1	1678	1695	1651	1598	1598	1648	30.7	3 Weeks	5.5-6 Weeks
France	1830	1747	1646	1678	1683	1755	32.4	5 Weeks	5-6 Weeks
Sweden	1632	1593	1623	*7	-	1800	-	5 Weeks	5-8 Weeks

Notes: 1,Throughout, please note that figures for Germany relate to the former Federal Republic of Germany.
2,Estimate by Prof.Fukushima; incl. unpaid working hours
3,EC, Eurostat, 'Labour Costs, Hours of Works', U.S.A., 'Handbook of Labour Statistics', Japan, 'Maitsuki Kinrou Tokei Chousa', Data estimated by Ministry of Labour (Japan); paid working hours
4,ILO, 'World Labour Report', 1992
5,Data estimated by Japan Productivity Headquarters
6,T.Fujimoto, 'Workers in Japan - International Comparison -', (in Japanese), Sin-nihon publisher, Tokyo, 1990, p.65
7,Kazuhiko Nakao, "International Comparison of Wage and Working Hours", 'Chingin to Syakaihosyo', (Japanese), No.982, p.22, (Imcomparable directly)
Source: T. Fukushima, "Working hours", Ito, Iwai ed., 'International Comparison of Labour Statistics',Azusa publishers, Tokyo, 1993, p.139,144,147,150,152.

TABLE 4 Overtime per Month (Electrical workers,1985)

	Total		Male		Female	
	Average number of hours	No overtime (%)	Average number of hours	No overtime (%)	Average number of hours	No overtime (%)
Japan	35.8	3.3	39.1	2.1	12.6	12.1
U.K.	6.1	68.5	9.4	52.0	2.9	84.3
Germany	6.2	60.5	7.9	51.0	1.9	86.0
France	5.1	69.7	7.5	60.4	1.5	83.7
Sweden	5.5	44.4	6.6	34.9	3.2	62.2

Note: No overtime (%) means the percentage of those who do no overtime.
Source: 'Survey of Labour Research', No.212,June,1986,edited by the Japanese Federation of Electrical Workers.

2-2-2 Earnings and Labour costs

We will use earnings and labour costs per hour for comparison of wage level.[19] In the calculation of earnings and labour costs per hour, it is better to use statistics on working hours that include both paid and unpaid hours worked for analyzing the working attitude. If we use this data, we can observe a big difference of earnings and of labour costs between Japan and Germany. An index number of real earnings in Germany is 170.4 in the case of Japan = 100 (tables 5 and 6). Moreover, the index in the United States is at a high level.

Workers in Japan have to work more to get an indispensable higher income due to a relatively low wage level per hour. White collar workers who get a higher income in the middle or upper classes in the United states, tend to work more in order to keep their high living standard. They are trapped in an "insidious cycle of work-and-spend".[20] Lower class workers there have to work for extra hours or have to have several jobs to keep up a minimum living standard.[21]

TABLE 5 Earnings (1990)

(per hour)

	Nominal earnings				Real earnings			
	US $ *1	Japan A =100	Japan B =100	SWEDEN *2	US $ *3	Japan A =100	Japan B =100	SWEDEN *2
Germany	16.78	180.4	154.5	166.8	11.96	170.4	145.9	157.5
France	12.00	129.0	110.5	113.0	9.06	129.1	110.5	113.1
U.K.	11.54	124.1	106.3	124.2	9.96	141.9	121.5	142.1
Sweden	-	-	-	168.9	-	-	-	133.9
U.S.A.	11.66	125.4	107.4	147.0	11.66	166.1	142.2	194.7
Korea *4	3.05	32.8	28.1	-	-	-	-	-
Japan A *5	9.30	100.0		100.0	7.02	100.0		100.0
Japan B *6	10.86		100.0		8.20		100.0	

Notes: 1,Data estimated by Prof. Ito.

2, SWEDEN; Swedish Employer's Confederation, 'Wages and total labour costs for workers-international survey 1980-1990', 1992

3, Adjusted by CPPP (Consumer Purchasing Power Parities)

4, Throughout, please note that figures for Korea to the Republic of Korea

5, Japan A; 'Labour Survey' (incl. unpaid working hours)

6, Japan B; 'Monthly Labour Statistics' (paid working hours)

Source: Y.Ito, "Earnings and labour costs", in 'International Comparison of Labour Statistics', op.cit., pp.95-126

TABLE 6 Labour Costs (1990)

(per hour)

	Nominal labour costs				Real labour costs			
	US $ *1	Japan A =100	Japan B =100	SWEDEN *2	US $ *3	Japan A =100	Japan B =100	SWEDEN *2
Germany	21.84	196.5	172.3	170.0	15.57	185.5	162.8	160.7
France	18.05	162.4	142.4	120.5	13.63	162.5	142.6	120.5
U.K.	13.56	122.0	107.0	98.1	11.71	139.5	122.4	112.4
Sweden	-	-	-	169.0	-	-	-	134.3
U.S.A.	14.94	134.4	117.9	116.3	14.94	178.0	156.2	154.6
Korea	2.32	20.9	18.3	-	-	-	-	-
Japan A	11.11	100.0		100.0	8.39	100.0		100.0
Japan B	12.67		100.0		9.55		100.0	

Notes: see table 5
Source: Ito, ibid., pp.95-126

2-2-3 Unemployment and Underemployment

Tables 7 and 8 show us the rates of unemployment and underemployment in Europe, the United States and Japan. Although it is impossible to compare the two tables directly due to the difference in data collecting methods and coverage of these statistics, we can make a rough comparison. The concept of unemployment in the United States includes persons of "layoff" and those "in readiness for work". However, the unemployment rate in Japan excludes the persons on temporary layoff or temporary employees not at work, and persons in readiness for work. Professor Iwai adjusted the rates of Japan to the concept of the United States.[22] Accordingly, although the official unemployment rate was very low in Japan and the rate in the U.S. is smillar to that in Germany, the rates of "unemployment-and-underemployment" which Prof. Iwai estimated were at a relatively high level in Japan and the United States.

TABLE 7 Unemployment and Underemployment (1988)

(%)

		Germany	France	U.K
Total	A Labour force	100.0	100.0	100.0
	B Not currently active	81.1	80.8	64.0
	C Workes	93.7	89.8	91.0
	C2 Employee	82.9	75.3	79.2
	D Unemployment	6.3	10.2	9.0
	E Part time woker	12.4	10.8	19.0
	E2 Part time employee	10.5	9.0	18.0
	F Hope to change, additional job	0.9	2.0	1.2
Male	A Labour force	100.0	100.0	100.0
	B Not currently active	42.5	52.2	37.2
	C Workes	94.7	91.8	90.7
	C2 Employee	83.5	75.2	75.3
	D Unemployment	5.3	8.2	9.3
	E Part time woker	2.0	3.1	4.9
	E2 Part time employee	1.2	2.4	4.0
	F Hope to change, additional job	0.8	1.8	1.3
Female	A Labour force	100.0	100.0	100.0
	B Not currently active	139.8	80.8	64.0
	C Workes	92.1	38.0	38.7
	C2 Employee	82.0	32.9	35.7
	D Unemployment	7.9	5.6	3.7
	E Part time woker	28.2	9.0	17.0
	E2 Part time employee	24.6	7.7	15.7
	F Hope to change, additional job	1.1	1.0	0.5
Total	G' Rate of unemployment and underemployment (Worker)	19.6	23.0	29.2
	H' Rate of unemployment and underemployment (Employee)	19.9	24.8	32.0
Male	G' Rate of unemployment and underemployment (Worker)	8.0	13.1	15.5
	H' Rate of unemployment and underemployment (Employee)	8.3	14.8	17.2
Female	G' Rate of unemployment and underemployment (Worker)	37.2	15.6	21.2
	H' Rate of unemployment and underemployment (Employee)	37.4	37.1	53.0

Notes: $G' = (D+E+F) \div (C+D)$

$H' = (D+E2+F) \div (C2+D)$

Source: EC(1988), 'Labour Force Survey', Iwai, "Umemployment and Underemployment", in 'International Comparison of Labour Statistics', op.cit., p.58

TABLE 8 Unemployment and Underemplyment in Japan and the United States (1988)

(%)

	U.S.A.			Japan		
	Total	Male	Female	Total	Male	Female
A AI Labour Fource	100.0	100.0	100.0	100.0	100.0	100.0
AII	98.2	98.4	98.0	94.4	96.9	91.4
B Employed	89.5	90.6	87.7	81.8	91.3	70.3
B1 Employee	82.7	82.4	87.0	65.6	76.1	52.9
B2 Self-employment	6.6	8.2	0.3	10.3	12.3	7.8
B3 Family workers	0.2	0.0	0.3	4.8	1.7	8.6
B4 With a job but not at work	0.0	0.0	0.0	1.1	1.2	1.1
C CI Unemployed	10.5	9.4	12.3	18.2	8.7	29.7
CII	8.7	7.8	10.3	12.6	5.5	21.1
C1 Unemployed (Visible)	6.1	6.4	6.0	2.7	2.6	2.8
C2 Without Work,hope to work	4.4	3.0	6.3	15.4	6.1	26.9
C2-1 Not seeking work,hope to work	2.6	1.3	4.3	9.9	2.9	18.3
D Part time worker(under 35H/W)	16.5	10.6	24.3	11.3	5.1	19.0
D1 Part time employee	14.7	-	-	7.3	3.4	12.0
D1-1 For economic reasons	3.6	-	-	-	-	-
D1-2 For other reasons	11.2	-	-	-	-	-
D2 Part time self-employment	1.6	-	-	2.6	1.5	4.0
D2-1 For economic reasons	0.6	-	-	-	-	
D2-2 For other reasons	1.1	-	-	-	-	
D3 Part time family workers	0.1	-	-	1.4	0.2	2.9
D3-1 For economic reasons	0.0	-	-	-	-	
D3-2 For other reasons	0.1	-	-	-	-	-
D' Part time worker (incl. not at work)	16.5	10.6	24.3	16.0	9.8	23.6
D'-1 For economic reasons	4.2	3.7	5.0	5.6	5.9	5.3
D'-2 For other reasons	12.2	6.9	19.3	10.4	3.9	18.2
E'I Unemployment,underemployment	26.9	20.0	36.6	29.5	13.8	48.6
E'II (Worker)	25.2	18.4	34.6	23.9	10.6	40.1
F'I Unemployment,underemployment	27.1	-	-	30.4	14.3	50.6
F'II (Employee)	25.7	-	-	25.4	11.0	44.8

Notes: A I=B+CI, AII=B+CII, C I=C1+C2, CII=C1+C2-1
C1 Unemployment (visible) ; adjusted to U.S.A.'s concepts
C2-1 Not seeking work, hope to work;
(C1) - (Temporary illness, School attendance, Household duties)
D Part time employee; excluding 'With job but not at work'
E' I = (CI + D) ÷ (B + CI), E'II = (CII + D) ÷ (B + CII)
F' I = (CI + D1) ÷ (B1 + CI), F' II = (CII + D1) ÷ (B1 + CII)

Sources: Bureau of Labor Statistics (U.S.A.), 'Employment and Earnings' (Monthly), Ministry of Labour Japan, 'Employment Survey' (Monthly), 'Special Employment Survey' (Annual), Iwai, ibid., pp.66-67.

Additionally, we have to pay attention to invisible underemployment. In Japan, although big unemployment problems did not appear during the 1970's and 1980's, after the oil crisis a lot of middle aged male workers moved to other sections. The number of "Production related workers" decreased very much in the "construction" and "manufacturin g" industry. The number of "transport equipment operators and labourers" in the "transport" industry and "sales workers" in the "who lesale retail trade" industry also diminished (see table 9). Moreover, the decreasing rate in the number of "administrative and managerial workers" was at a high level.[23]

TABLE 9 Change of Cohort Number by Industry, Occupation, and Age
(Male workers 1980-1985, Japan)
(persons;hundred)

Occupation	Total	Profes.	Clerical	Sales.	Transp.	Product.	Service.
Industry	40-44 years(1980) ⇒ 45-49 years(1985)						
Total	-668	501	71	-125	-273	-479	26
Construction	-138	140	-14	70	-54	-265	0
Manufacturing	-275	227	16	60	-44	-298	-2
Transportation	-17	3	17	37	-102	15	3
Wholesale/retail,	-474	14	-10	-358	-47	114	-12
Financial	16	3	-7	21	1	1	0
Service	288	99	65	37	-5	5	35
	45-49 years(1980) ⇒ 50-54 years(1985)						
Total	-1037	356	175	-187	-287	-661	51
Construction	-278	111	-4	53	-44	-377	0
Manufacturing	-403	147	38	37	-34	-357	-2
Transportation	-126	1	1	30	-157	-18	2
Wholesale/retail,	-428	9	23	-371	-33	101	-5
Financial	0	5	36	27	1	1	1
Service	425	99	105	27	2	47	47
	50-54 years(1980) ⇒ 55-59 years(1985)						
Total	-2906	150	-345	-177	-661	-1435	107
Construction	-300	93	25	53	-32	-439	0
Manufacturing	-1034	64	-25	4	-32	-805	-3
Transportation	-1495	-17	-429	10	-552	-358	-2
Wholesale/retail,	-335	7	28	-309	-19	85	-6
Financial	-39	6	5	25	-2	2	0
Service	732	46	193	20	2	197	96

Notes: Change of cohort number; excluding the influence of deaths
ex) 45-49 years(1985) = 40-44 years(1980) - Outflow(1980-85)
+ Inflow(1980-85) - Estimated Deaths(1980-85)
then, Change of the cohort number
= 45-49 years(85)- 40-44 years(80) + Estimated Deaths (80-85)
Estimated deaths calculated by occupational mortality statistics

Source: Iwai, Fujioka, 'Statistical Study on the Employment Structure and the Stratum Structure of Labour Force in Modern Japan', (in Japanese)
The Institute of Economic and Political Studies, Kansai University, 1993, pp.138-141, p.184

The middle-aged male workers, moving from the above-mentioned sections, moved into others. Some of them were sent to other companies such as subsidiary companies, related companies, or were transferred to other branches in distant cities. Even if they had not been thrown out of work, the situation of these workers often got worse. They could not make the best use of former skills or experiences. Sometimes the wage level decreased. Furthermore, we have to consider the problem of their occupational situation which often became unstable. I guess that large parts of these workers were in the situation of "invisible underemployed" workers.

The workers remaining in the sectors which had a personnel reduction, had to work under the pressures caused by the dilemma of working longer in order to keep their occupational position or changing (or even losing) the post in order to avoid long extra work.

2-2-4 Household expenditure

Overwork is related to a working attitude. It is well known that consumption level in the United States is very high. Comparing the "diffusion level of consumer durable goods" between the United States and European countries, we stated that it was higher in the United States. (see table 10).

TABLE 10 Diffusion of consumer durables

Country	Japan	U.K.	France	Germany	U.S.A.
Year	1989	1988	1988	1988	1987
Microwave oven	65.6	39.0	-	12	60.8
Video	61.9	53.0	-	26.2	-
Color TV	97.1	91.0	81.7	87.4	92.7
Car	66.8	65.0	74.6	67.8	87.7
Stereo	54.9	-	-	42.4	-
Dishwasher	3.8	10.0	27.9	28.7	43.1
Telephone	78.6	85.0	-	93.2	90.4
Washing Machine	94.6	84.0	86.5	85.7	74.9
Refrigerator	96.2	95.0	97.5	77.8	67.3

Notes: United Kingdom, 'General Household Survey', U.S.A., 'Current Population Survey', Germany(former F.R. of Germany), 'Einkommensverbrauchs Statistics', France, 'Enquetes de Conjoncture Aupre des Menages', Japan, 'Consumer Expenditure Survey'
Source: S. Yamada, "Household expenditure", in 'International Comparison of Labour Statistics', op.cit., p.264

The average floor area of a house in the United States is almost twice the size of that in Europe. In Japan, the ratio of housing acquiring cost to annual income is 8.5 (table 11).

Prof. Schor pointed out that workers could not flee from "the insidious cycle of work-and-spend" in the United States. That is one of the important reasons why white collar workers tend to work for extra hours. We have to realize that "the insidious cycle work-and-spend" has spread to a whole society there.[24]

TABLE 11 Comparison of housing conditions

	Year	Number of houses per 1000 population	Floor area (1 square meter) per house	Ratio of housing acquiring cost to annual income (times)	(year)
U.S.A.	1987	419	61.8	3.4	1987
U.K.	1988	402	35.2	4.4	1986
Germany	1987	430	37.2	4.6	1986
Sweden	1985	463	-	-	-
France	1984	460	30.7	2.8	1984
Japan	1988	342	25	8.5	1990

Sources: M. Fujie, "Housing Conditions", 'Internatinal Comparison of Labour Statistics', op.cit., p.303

3 Occupational injuries

3-1 Availability of occupational injury statistics

3-1-1 Statistics on workers' health

We will make a statistical comparison on workers' health conditions. Prior to the comparison, it is necessary to examine the availability of these statistics.

When we observe workers' health, we normally use "occupational injury statistics". The statistics include occupational accidents and occupational diseases. Additionally, in some countries, they include a part of work-related diseases.

We can use other statistics related to workers' health: "occupational mortality statistics". These statistics include work-related diseases; besides, they include deaths unrelated to work.

Furthermore, we have general mortality statistics according to sex,

age and death causes. Nevertheless, we have to note that the statistics do not cover only workers, but also the non-economically active population.

Therefore, at first we have to examine the occupational injury statistics which can be compared. One issue is theoretical as far as definitions, concepts or coverage of these statistics. Another is the over/under-reporting as a result of the data collecting process.

3-1-2 Coverage of occupational injury statistics

Regarding the coverage of occupational injury statistics, we find big differences between Japan, the United States and European countries (table 12).

In Sweden, these statistics on occupational injury cover all employees of the private and public sector, and self employed persons. The statistics include occupational accidents, commuting accidents and diseases related to work.

However, in Japan, they only include occupational accidents and diseases of workers in establishments with 100 or more employees, except workers in the industries of "commerce", "finance and insurance", "agr iculture and fishing", and almost all "services". Occupational diseases cover 50 kinds of classical diseases in the list of occupational diseases. They exclude almost all other work-related diseases due to a very strict criteria on occupational diseases.

Occupational accidents and diseases are usually defined by the occupational injury compensation law. The laws and systems are different for each country. Occupational injury statistics only cover the cases acknowledged to be occupational injuries by each law or system. Although in some countries, occupational injury statistics include work-related diseases, in other countries the statistics exclude them or they are only partially included.

Therefore, making use of these statistics, we find it impossible to compare workers' health between Japan and Europe because of the big difference in coverage. We would be able to make a comparison regarding "classical occupational injuries" if we acquire data excluding work-related diseases.

TABLE 12 Coverage on statistics of occupational injuries and diseases

Country	coverage of persons	coverage of the absence periods	coverage of employment injuries	coverage of occupational diseasess
Britain	all employees incl. self-employed excl. personal enterprise	over 3 days	occupational injuries occupational diseases	limited enumeration; 67 kinds of diseases
Germany	all employees incl. self-employed incl. students excl. public employees	over 3 days	occupational injuries commuting accidents occupational diseases,	limited enumeration; 59 kinds of diseases, ordinance designated diseases, some diseases by harmful effect
France	78% of all employees excl. agriculture miners, railway workers, ship and gas workers, public employees	over 1 day	occupational injuries commuting accidents occupational diseases	91 kinds of diseases(general industry), 47 kinds of diseases (agriculture),incl. working enviro nment and posture rela ted diseases
Sweden	private and public sectors; all employees, self-employed	over 1 day	occupational injuries commuting accidents occupational diseases	no list of diseases, diseases approved relation to work
U.S.A	various according to state: employees of manufacturing and commerce; all public employees, excl. agriculture and and family workers	over 1 day	occupational injuries occupational diseases	various according to state, less than half of all states have an approved list of occupational disease
Japan	private enterprise employees, incl. self-employed and family workers, who are members of occupational injury insurance, excl. ship workers and public employees, Data of occupational injuries from sample survey; establishments with 100 or more employees, excl. commerce,finance, insurance,agriculture,fishing and almost all serviceing	over 4 days	occupational injuries occupational diseases	limited enumeration; 50 kinds of diseases, other diseases excluded from the list are limited strictly by notice of Labour Ministry; excl. almost all workrelated diseases

Sources: ILO, 'Year Book of Labour Statistics',
European Foundation for the Improvement of Living and Working

Conditions, 'Occupational Accidents and Diseases; A Review of Data Sources',1986,
ILO(1991), "Revision of the ILO List of Occupational Diseases,Appended to Convention No.121 -- Working Document --", and others.

3-1-3 Under-reporting on the data collecting processes

Chart 5 shows the data collecting processes of occupational injuries in Japan. In central European countries, there seems to be no problems regarding "under-reporting" or "over-reporting" on occupational fatal injuries.[25] However, in Japan, under-reporting on occupational injuries is already known by the people concerned but they are reticent in acting upon the information.[26]

Regarding occupational diseases, firstly, sufferers or bereaved families face many difficulties when they try to claim compensation. The employers often refuse to help them for reasons of the system of occupational injury compensation insurance itself. If the Labour Standard Inspection Office recognizes the diseases of their employees to be occupational injuries, they have to pay a much higher insurance premium.

Furthermore, it is very difficult to acquire occupational compensation even if a claim is accepted. Regarding circulatory system diseases, the official criterion for compensation awarding is very strict. Additionally, the criterion for real application is exceedingly strict. According to the official criterion, death from overwork is acknowledged to be the result of occupational disease only in the case of workloads being "especially excessive" during 1 week (or 24 hours) before one's death.[27] The criterion is actually applied only in cases where the sufferer worked for twice or more of the regular working hours during the above-mentioned period.[28]

Therefore, almost all cases of Karoshi are not acknowledged to be occupational diseases because the usual working hours in Japan are exceedingly long. This criterion for real application leads to under-reporting on the processes of examination and decision by "The Labour Standards

CHART 5 Formalities of compensation claim on occupational injuries (in the case of circulatory system diseases)

1 Death or Occurrence of disease

⇒ **2 Sufferer (or the bereaved family) : Compensation claim**

[Claim affixed to the occupational and medical certificates that provide the relationship between work and disease/death]

•The system for claiming: The sufferer or the bereaved family have to arrange the certificates themselves.
•Difficulties in procuring the certificates
Reasons:
(1) Employers often refuse to show the detailed records on the working situations of the sufferers.
-- An occurence of occupational injury leads to an increase in the premium of workers' compensation insurance.
(2) It is difficult to get a medical certificate on causal relationship between the work and the disease/death.
-- The oocupational authority of the company doctors is not strong because they are employed by the company, too.
-- Middle/small sized companies don't have company doctors at their disposition.
-- The doctors of the hospitals can't understand the real working situation of the sufferers.

● Underreporting of the number of compensation claims

⇒ **3 the Labour Standards Inspection Office: Acceptance and examination of compensation claims**

[The chief of the office proceeds as follows:
(1) A fact-finding inquiry into the job duties of the sufferer
(2) Discussion with the doctor regarding the relationship between work and disease
(3) Judgement on whether the disease is acknowledged to be an occupational injury or not]
[Decision -- Acknowledgement or not]
(It takes 1 - 2 years from date of compensation claim.)
•The decisions of 'acknowledgement' are very rare.
Reason: Very strict criterion for compensation awarding (the notification of the Ministry of Labour)
-- Circulatory system diseases are not mentioned on the list of occupational diseases.
-- Regarding aforementioned diseases, "acknowledgment" is actually applied only to the following special cases. (unofficial criterion *1)
i.e., "The sufferer worked for twice or more of usual working hours during 1 week (or 24 hours) before one's death."

● Underreporting of 'work-related diseases (or deaths)'
⇒ 4 **"Judges" of occupational injury compensation: Re-examination for claims**
[The sufferer or the bereaved family can make an appeal if they are not in agreement with the decision of the Labour Standard Inspection Office.] [Decision -- Acknowledgement or Dismissal] (It takes 1 - 2 years from date of appeal.) •The rates of relieves are very low. Reason: Their judgements are based on the above-mentioned criterion.
⇒ 5 **the "Judging Committee" of Occupational Compensation : Re-judging**
[The sufferer or the bereaved family can claim for "re-judging" if they disagree with the decision of the "Judge".] [Open Examination] [Decision -- Acknowledgement or Dismissal] •The rates of relieves are very low. Reason: The decisions are affected by the above-mentioned criterion (the notification of the Ministry of Labour). -- The Committee mainly consists of persons concerned in or retired from the Ministry of Labour. *2)
⇒ 6 **The District Court: Lawsuit and judicial decision**
[The sufferer or the bereaved family can start a lawsuit if they disagree with the decision of the Judging Committee.] •Difficulties in starting a lawsuit: (1) Difficulty to verify the relationship between work and disease/death (2) Judicial decision takes many years without any financial compensation or help. •The sufferer who received acknowledgement by Judicial decision is rare. Reason: The judges have to consider the official criterion for workers' compensation of the Ministry of Labour. -- official criterion for "acknowledgement" on circulatory system diseases "only in cases where workloads were 'excessive' during 1 week (or 24 hours) before one's death"
⇒ 7 **The High Court: ,** ⇒ 8 **The Supreme Court: An appeal against a decision**

Notes: (1) 'Asahi Shinbun', 19 May, 1990, P.31
(2) 'Weekly Journal of Occupational Injury' (Syukan Rosai), Institute of Occupational Injuries, 23 May, 5 Sep., 1990

Sources: Okamura, 'Karoshi and Occupational Injury Compensation',Rodo-junposya, Tokyo,1990, p.91, Fujioka, "Karoshi and Occupational Injury Statistics", 'Journal of Economics', No.17, Shimane University, 1991

Inspection Office", re-examination by "the Judges of Occupational Injury Compensation" and re-judging by " the Judging Committee of Occupational Compensation". The cases, having been acknowledged by Judicial decision in the Courts, were rare (cf. table 1).

We will now refer to the data concerning under-reporting in Japan. Although the number of male deaths caused by cardiovascular disease among workers, including deaths unrelated to work, was 53,464 in 1985, claims filed for occupational diseases was 441 (male and female) including survivals, and only 39 cases were acknowledged (see table 13).

TABLE 13 Numbers of deaths, claims filed and cases of compensation awarded for cardiovascular diseases (Japan)

		1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Crebro-vascular Disease	Deaths(all industry) aged 40-59				25637＊1 6822＊1						
	Claimsfild			296	289	349	351	480	538	436	404
	Cases awarded	21	16	36	26	42	42	61	96	77	78
Heart Diseases	Deaths(all industry) aged 40-59				27827＊1 7578＊1						
	Claims filed			142	152	157	148	196	239	161	151
	Cases awarded	14	3	18	13	21	7	20	14	15	15
Total	Deaths(all industry) aged 40-59				53464＊1 14400＊1						
	Claims filed			438	441	506	499	676	777	597	555
	Cases awarded ＊2	35	19	54	39	63	49	81	110	92	93
	Cases of death from overwork awarded ＊3						21	29	30	33	

Notes: 1. only male deaths
2. incl. both cases which "arise from physical injury" and those that don't.
3. excl. "those from physical injury", represent caes of Karoshi

Sources: National Defense Counsel for Victims of Karoshi, 'Karoshi',Madosha, 1990, Tokyo, p xv, Fujioka, "Karoshi and Occupational Injury Statistics", op.cit.

3-2 Statistical Comparison on Occupational Injuries

When we make a comparison on occupational injury statistics, the coverage of workers' absence periods due to occupational injuries is so varied that we have to use fatal injuries for comparison. The

comparison on fatal injuries in European countries is interesting, having similar coverage and data qualities. Nevertheless, due to overall large differences it is impossible to compare the European countries with Japan or the United States.

The Health and Safety Executive in Great Britain published 'Workp lace Health and Safety in Europe'.[29] It seems to be the latest research regarding comparison of occupational injuries. The authors made an adjusted table for comparing occupational fatal injuries between the former F. R. of Germany, France and Great Britain (see table 14). The industrial percentage distribution was based on the British one.

TABLE 14 Fatal injuries for all industries except the public sector - standard rates
: rates adjusted to GB industrial mix

Great	Britain		France		F.R. Germany	
Year	Rate	Year	Standard	Adjusted	Standard	Adjusted
1983	2.5	1983	6.3	5.3	5.9	4.7
1986/87	2.0	1986	4.5	4.1	-	-
1987/88	1.9	1987	4.7	4.2	3.7	2.8
1988/89	2.8	1988	5.1	-	3.7	3.1
1989/90	1.9	1989	-	-	-	-
% change 1983-87/88	-24%	% change 1983-87	-25%	-21%	-37%	-34%

Notes:
(1) Rates are per 100,000 employees in Great Britain, and France; employees and self-employed in the former FRG
(2) Public administration and education excluded for FR, GB and the former FRG.
Some public transport excluded for the former FRG.
(3) Rates are based on injuries that exclude commuting and work related traffic accidents for GB, FR and the former FRG.
Source: Health and Safety Excutive, 'Workplace Health & Safety in Europe', 1991, London, p.14

Richard E. Wokutch and Josetta S. McLaughlin, adjusted and compared occupational injuries between the United States and Japan (see table 15). The table that they compiled covered fatal injuries in manufacturing establishments with 100 or more employees. Although this table is useful in order to compare occupational injuries, we can't ignore the fact that the fatal injury rate in small establishments is higher than

that of big ones in Japan. Furthermore, the fatal injury statistics in Japan are not available for the comparison of fatal injuries including work-related diseases because the statistics exclude almost all deaths from overwork.

TABLE 15 Fatal Injuries in the United States and Japan (manufacturing sector,1983-87,88,89)
Fatality Rates (per 2 million working hours) *1

	the United States	Japan	
Year	manufacturing establishments with 100 or more employees *2	manufacturing establishments with 100 or more employees *3	manufacturing establishments with 30-99 employees *4
1983	0.035	0.020	0.060
1984	0.031	0.020	0.080
1985	0.034	0.020	0.060
1986	0.029	0.020	0.020
1987	0.035	0.020	0.000
1988	-	0.020	0.040
1989	-	0.020	0.100

Notes:1 For both the United States and Japan, fatalities per 2 million hours worked.
2 U.S. data (unpublished) from Bureau of Labor Statistics, excludes establishments below 100 employees to compare with Japanese data.
3 Japanese data; 'Safety and Health Data book in Japan' (Tokyo, Japan, Industrial Safety and Health Association), 'Annual Report', (Tokyo, idem), 'Year book of Labour Statistics' (Geneva,ILO). data by sample survey
4 Japanese data of establishments with 30-99 employees;special survey ('Otsu Survey of Occupational Injury')

Sources: Richard E. Wokutch and Josetta S. McLaughlin, 'The U.S. and Japanese work injury and illness experience', 'Monthly Labour Review', April 1992, New York, p8.
'Safety and Health Data book in Japan', op.cit.

4 Occupational mortality and mortality of the working age population

4-1 Occupational mortality statistics

We should then check the available occupational mortality statistics because of the difficulties in comparing occupational injury statistics.

We can find these kinds of statistics in a few countries such as the United Kingdom, France, Japan and the Scandinavian countries. However, data collecting methods, coverage, indices and categories of

occupation in these statistics vary.

In the two tables on occupational mortality statistics (Nos. 16 and 17), only a little information regarding the difference in the mortality ratio between white and blue collar workers is evident. For example, the difference in ratio between the two groups in Japan was insignificant, whereas in Finland it was quite large. The characteristics in Japan may be associated with the increase of cardiovascular diseases among white collar workers. However, the information is not sufficient for a comparison.

TABLE 16 Standardized mortality ratio of male 35-64 by occupation (Japan)

(Employed=100)

Category Year	All causes	Dis. of Circulatory system		
		Total	Heart disease	Cerebro-vascular
1975				
Overall population	134	-	126	133
Employed	100	100	100	100
Management & Admin.	59	56	82	51
Clerical	101	96	117	88
Professional & Tech.	77	76	94	68
Transport equip. operat.	91	82	83	82
Production	89	90	82	92
Agriculture,forest,fish.	131	133	107	143
Sales	123	127	138	123
Service	104	111	108	110
Unemployed	717	-	489	568
1985				
Overall population	139	-	130	136
Employed	100	100	100	100
Management & Admin.	73	67	86	66
Clerical	95	90	101	86
Professional & Tech.	89	89	103	80
Transport equip. operat.	94	95	104	100
Production	74	76	66	78
Agriculture,forest,fish.	145	144	109	148
Sales	114	117	131	117
Service	151	165	160	165
Unemployed	654	-	431	536

Notes: standardized death rates; standard population = employed population (1985,Japan),
standardized mortality ratio was given by the standardized death rates; Employed=100

Sources:Ministry of Welfare and Public Health, 'Population Dynamics Statistics by Occupation and Industry', (1975,1985), Association of Welfare Statistics, Tokyo, Japan

TABLE 17 Standardized mortality ratio of male 35-64 by occupation (Finland)

Year	All causes	Dis. of Circulatory system		
		Total	Heart disease *1	Cerebro-vascular
1971-75				
All	100	100	100	100
Upper white collar	65	67	67	79
Lower white collar	88	98	101	93
Skilled workers	106	104	104	102
Unskilled workers	137	124	122	129
Farmers	88	91	91	90
1981-85				
All	100	100	100	100
Upper white collar	62	62	60	70
Lower white collar	88	94	97	87
Skilled workers	105	104	104	106
Unskilled workers	153	140	135	150
Farmers *2	91	96	96	87

Notes: (1) Ischaemic heart disease
(2) stratum category;
Upper white collar; managers, higher administrative or clerical employees
Lower white collar; lower administrative or clerical enployees
Skilled; skilled or specialized workers not including farm and forestry workers
Unskilled; unskilled workers as well as farm and forestry workers
Farmers; farmer employers, own-account farmers.
All categories include former workers

Sources: Tapani Valkonen, Tuija Martelin, Arja Rimpela, 'Socio-Economic Mortality Differences in Finland 1971-1985', Central Statistical Office of Finland, 1990.

Although the mortality ratio was adjusted for comparison, these tables are not comparable due to the differences in the stratum of classifications, data collecting methods and year. Furthermore, occupational mortality statistics do not include merely old types of fatal occupational injuries but also deaths caused by work-related diseases and other diseases of workers. Therefore, in order to make a comparison of workers' health, it is indispensable to examine the available occupational mortality statistics and to adjust them prior to comparison.

4-2 Comparison on Mortality in the Middle Aged Population

We will attempt to use general mortality statistics for comparison. The "World Health Statistics" (WHO) are useful in this regard as they show the death number and rates according to sex, age and cause. Before comparison, we need to note the limitation of these statistics as the data does not concern workers but the working age population.

Through case studies, we understand that death from overwork caused by cardiovascular diseases mainly strikes the middle-aged (see chart 1). Table 18 is a comparison on mortality of the middle-aged population caused by cardiovascular diseases. We can't directly compare death rates because death causes are very different between Far East Asian and Western countries due mainly to different food and dietary habits. Therefore, we observed both the "death rate" of the 15-54 age group and the "ratio of middle-aged mortality".

Although death rates are normally used for comparison, the "ratio of middle-aged mortality" is unknown. We can calculate the "ratio of middle-aged mortality" (ratio of 15 years and up to 55 years and up mortality) by using the following formula:

$$\frac{SD_{(15\text{-}54)} + SD_{(55\text{-})}}{SD_{(55\text{-})}} = \frac{SD_{(15\text{-})}}{SD_{(55\text{-})}}$$

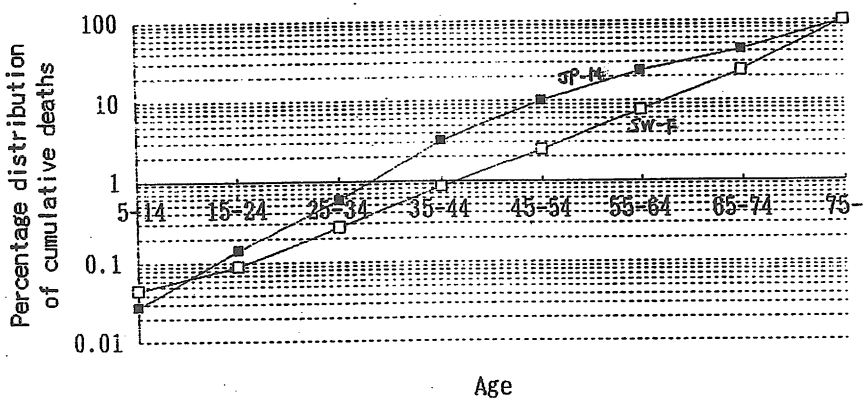
$SD_{(i)}$: standardized death number by age group (as in table 18 note 4, p41)

We have to explain the significance of this ratio. When we compare the cumulative curve of mortality, we find distinct characteristics in middle-age by cerebrovascular diseases in Japan where the cumulative male mortality curve shows a notable upper bulge (increase), compared with the Swedish female mortality curve (see charts 6 and 7).

This bulge in the curve in Japan indicates that some factors which can decrease mortality (i.e., advance in medical technology, medical services, change of dietary habits, improvement in living conditions, etc.) are not

CHART 6 Cumulative mortality curve (Japan and Sweden)

CHART 7 Cumulative mortality curve (Semi-logarithmic scale)



Notes: JP-M; mortality caused by Cerebrovascular disease for male population in Japan,1990
SW-F; mortality caused by Circulatory system disease for female population in sweden,1989
Source: WHO, 'World Health Statistics'

always effective for the middle-aged population. In other words, a high "ratio of middle-aged mortality" could be caused by some factors which prevent a decrease in mortality in this age group. We could consider working conditions as part of these factors.

When the death rate of the middle-aged population decreases, the

"ratio of middle-aged mortality" will come close to 1. However, if the decreasing pace of the middle-aged death rate is slower than the old-aged death rate, the ratio will indicate a relatively high level. For example, the ratio of Swedish female caused by heart disease indicated 1.030 in 1989, but the ratio of Japanese male caused by diseases of the circulatory system indicated 1.088 in 1990 (table 18).

In the United States, an incredibly high death rate level caused by heart disease is evident in the 15-54 male population in table 18. Additionally, we have to pay attention to a higher "ratio of middle-aged mortality" caused by heart and cerebrovascular diseases in that country. The mortality pattern in table 19 indicates 5151 for Heart diseases (very high death rate, fast decreasing pace of the rate, very high ratio of middle-aged mortality and a decline of the ratio) , and 3233 for Cerebrovascular disease (medium death rate level, slow decreasing pace of the rate, relatively high ratio of middle-aged mortality and increase of the raio).[30]

In Japan, although the death rate caused by heart disease is at a low level, the death rate in the 15-54 male population caused by cerebrovascular disease is at an exceedingly high level. The death rate caused by heart and cerebrovascular diseases decreased more slowly there than in other countries. Additionally, the "ratio of middle-aged mortality" caused by both diseases is at a high level. The mortality pattern indicated 1243 for Heart disease (low death rate but high ratio of middle-aged mortality) and 5242 for Cerebrovascular disease (very high death rate and high ratio of middle-aged mortality).

In the Republic of Korea, we find similar characteristics as those in Japan. Furthermore, the death rate caused by hypertension is exceedingly high there.

In these countries, we see similarities with long working hours, high death rate for the middle-aged male population caused by heart or cerebrovascular disease and a high "ratio of middle-aged mortality", which give us the first indication that long working hours are related to mortality in the middle-aged male population.

In spite of the limitations of this comparison, we have some interesting indications on working conditions and workers' health between these countries.

TABLE 18-1 Mortality of middle-aged population (cardiovascular diseases)

(death rate: per 100,000 persons)

Male								
All causes		Standardized death rates *2			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-74	mortality *3
U.S.A	1975	1617.5	392.1	4598.8	114	151	109	1.207
Japan	1975	1381.7	250.3	4134.2	98	96	98	1.147
Korea	1985	1818.8	479.6	5076.9	128	184	120	1.230
Eng. & Wal.	1975	1714.2	273.4	5219.6	121	105	123	1.127
France	1975	1600.8	364.9	4607.4	113	140	109	1.193
Germany	1975	1807.7	337.4	5385.0	128	130	127	1.152
Sweden	1975	1416.0	260.5	4227.3	100	100	100	1.150
Dis. of Circulatory system		Standardized death rates			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-	mortality
U.S.A	1975	865.6	124.1	2669.4	115	192	110	1.113
Japan	1975	624.4	63.0	1990.3	83	97	82	1.077
Korea	1985	609.5	124.6	1789.4	81	192	74	1.169
Eng. & Wal.	1975	879.9	116.8	2736.4	117	180	113	1.104
France	1975	581.7	64.2	1840.9	77	99	76	1.085
Germany	1975	820.7	80.2	2622.2	109	124	108	1.074
Sweden	1975	752.0	64.7	2424.0	100	100	100	1.065
Heart Disease *1		Standardized death rates			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-	mortality
U.S.A	1975	649.5	103.8	1977.3	114	205	108	1.128
Japan	1975	202.8	24.9	635.4	36	49	35	1.096
Korea	1985	147.1	43.6	398.8	26	86	22	1.266
Eng. & Wal.	1975	602.1	95.7	1834.0	106	189	100	1.127
France	1975	311.7	40.4	971.8	55	80	53	1.101
Germany	1975	518.8	61.9	1630.6	91	122	89	1.092
Sweden	1975	568.6	50.6	1828.9	100	100	100	1.067
Cerebrovascular Dis.		Standardized death rates			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-	mortality
U.S.A	1975	143.2	12.5	461.2	110	118	109	1.066
Japan	1975	368.4	34.6	1180.7	283	328	280	1.071
Korea	1985	271.9	39.8	836.4	209	378	199	1.116
Eng. & Wal.	1975	184.5	13.2	601.2	142	125	143	1.053
France	1975	192.2	15.2	622.7	148	145	148	1.059
Germany	1975	220.6	11.3	729.8	169	108	173	1.038
Sweden	1975	130.2	10.5	421.3	100	100	100	1.061

TABLE 18-2 Mortality of middle-aged population (cardiovascular diseases)

(death rate: per 100,000 persons)

Male								
All causes		Standardized death rates			Index Sweden =100			Ratio of middle-aged mortality
Country	Year	15-	15-54	55-	15-	15-54	55-	
U.S.A	1975	952.1	196.6	2790.1	105	141	100	1.171
Japan	1975	948.1	141.6	2910.3	104	102	105	1.118
Korea	1985	930.1	199.6	2707.3	102	144	97	1.179
Eng. & Wal.	1975	1072.1	167.0	3274.1	118	120	118	1.124
France	1975	930.2	159.6	2805.2	102	115	101	1.138
Germany	1975	1122.2	175.6	3425.2	124	126	123	1.125
Sweden	1975	907.7	139.0	2777.8	100	100	100	1.122
Dis. of Circulatory system		Standardized death rates			Index Sweden =100			Ratio of middle-aged mortality
Country	Year	15-	15-54	55-	15-	15-54	55-	
U.S.A	1975	533.0	47.3	1714.9	111	195	108	1.067
Japan	1975	463.1	32.1	1511.7	96	132	95	1.052
Korea	1985	133.0	25.8	393.6	28	106	25	1.160
Eng. & Wal.	1975	559.8	39.9	1824.7	116	165	115	1.053
France	1975	375.2	22.4	1233.7	78	92	78	1.044
Germany	1975	544.3	29.5	1797.0	113	121	113	1.040
Sweden	1975	480.6	24.3	1590.8	100	100	100	1.037
Heart Disease		Standardized death rates			Index Sweden =100			Ratio of middle-aged mortality
Country	Year	15-	15-54	55-	15-	15-54	55-	
U.S.A	1975	355.7	29.8	1148.5	112	236	109	1.063
Japan	1975	152.3	13.1	490.9	48	104	46	1.065
Korea	1985	85.5	21.3	241.5	27	169	23	1.215
Eng. & Wal.	1975	316.3	22.3	1031.6	100	176	98	1.053
France	1975	180.7	9.8	596.5	57	78	56	1.040
Germany	1975	294.4	16.7	970.0	93	132	92	1.042
Sweden	1975	316.6	12.6	1056.0	100	100	100	1.029
Cerebrovascular Dis.		Standardized death rates			Index Sweden =100			Ratio of middle-aged mortality
Country	Year	15-	15-54	55-	15-	15-54	55-	
U.S.A	1975	125.1	11.7	400.8	104	124	102	1.071
Japan	1975	264.3	16.9	866.3	219	178	221	1.047
Korea	1985	158.1	23.3	486.1	131	246	124	1.117
Eng. & Wal.	1975	172.2	12.3	561.1	143	130	143	1.053
France	1975	145.2	8.6	477.7	120	90	122	1.044
Germany	1975	181.2	7.6	603.5	150	80	154	1.031
Sweden	1975	120.8	9.5	391.7	100	100	100	1.059

TABLE 18-3 Mortality of middle-aged population (cardiovascular diseases)

(death rate: per 100,000 persons)

Male								
All causes		Standardized death rates			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-	mortality
U.S.A	1989	1330.0	315.9	3797.2	113	162	106	1.202
Japan	1990	1045.4	175.6	3161.6	89	90	88	1.135
Korea	1987	1672.4	436.5	4679.2	142	224	131	1.227
Eng. & Wal.	1990	1333.9	201.5	4088.9	113	103	114	1.120
France	1990	1233.0	294.1	3517.4	105	151	98	1.203
Germany	1990	1379.0	244.3	4139.8	117	125	116	1.144
Sweden	1989	1178.9	194.9	3573.0	100	100	100	1.133
Dis. of Circulatory system		Standardized death rates			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-	mortality
U.S.A	1989	568.7	72.9	1774.8	96	168	92	1.100
Japan	1990	359.1	42.2	1129.8	61	97	59	1.091
Korea	1987	525.4	102.7	1553.7	89	236	81	1.161
Eng. & Wal.	1990	612.5	63.3	1948.6	104	145	101	1.079
France	1990	360.3	39.1	1141.8	61	90	59	1.083
Germany	1990	621.1	53.2	2002.8	105	122	104	1.065
Sweden	1989	590.3	43.5	1920.6	100	100	100	1.055
Heart Disease＊4		Standar dized death rates			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-	mortality
U.S.A	1989	447.6	59.1	1392.6	102	168	98	1.103
Japan	1990	197.7	24.5	619.1	45	70	44	1.096
Korea	1987	129.8	37.3	354.7	30	106	25	1.256
Eng. & Wal.	1990	437.1	52.4	1372.9	100	149	97	1.093
France	1990	233.3	26.6	701.9	51	76	49	1.092
Germany	1990	431.5	42.1	1378.9	98	119	97	1.074
Sweden	1989	438.9	35.3	1420.9	100	100	100	1.060
Cerebro-vascular Dis.		Standar dized death rates			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-	mortality
U.S.A	1989	72.0	7.4	229.3	75	131	72	1.078
Japan	1990	140.9	16.1	444.4	146	287	140	1.088
Korea	1987	234.5	35.0	719.8	243	622	227	1.118
Eng. & Wal.	1990	120.9	7.5	396.7	125	133	125	1.046
France	1990	88.8	8.1	285.0	92	145	90	1.069
Germany	1990	129.7	7.1	427.8	134	126	135	1.040
Sweden	1989	96.5	5.6	317.7	100	100	100	1.043

TABLE 18-4 Mortality of middle-aged population (cardiovascular diseases)

(death rate: per 100,000 persons)

Female								
All causes		Standardized death rates			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-	mortality
U.S.A	1989	850.9	149.7	2557.0	113	139	110	1.142
Japan	1990	623.4	89.6	1922.1	83	83	83	1.113
Korea	1987	874.5	180.3	2563.5	116	167	110	1.171
Eng. & Wal.	1990	887.0	117.7	2758.7	118	109	118	1.104
France	1990	697.4	116.4	2111.1	92	108	91	1.134
Germany	1990	850.9	121.0	2626.7	113	112	113	1.112
Sweden	1989	754.9	108.1	2328.5	100	100	100	1.113
Dis. of Circulatory system		Standardized death rates			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-	mortality
U.S.A	1989	384.2	28.8	1248.9	106	193	104	1.056
Japan	1990	257.7	17.7	841.4	71	119	70	1.051
Korea	1987	307.6	55.2	921.6	85	370	77	1.146
Eng. & Wal.	1990	391.1	20.1	1293.7	108	135	108	1.038
France	1990	241.5	11.7	800.7	67	78	67	1.035
Germany	1990	413.3	18.5	1373.9	114	124	114	1.033
Sweden	1989	361.1	14.9	1203.3	100	100	100	1.030
Heart Disease		Standardized death rates			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-	mortality
U.S.A	1989	276.8	18.6	904.7	103	146	102	1.050
Japan	1990	110.4	4.0	369.1	41	31	42	1.027
Korea	1987	120.3	7.0	395.8	45	55	45	1.043
Eng. & Wal.	1990	285.3	12.9	948.1	106	101	107	1.033
France	1990	117.1	5.0	390.1	44	39	44	1.031
Germany	1990	178.7	7.5	595.2	67	59	67	1.031
Sweden	1989	268.0	12.8	889.0	100	100	100	1.035
Cerebrovascular Dis.		Standardized death rates			Index Sweden =100			Ratio of middle-aged
Country	Year	15-	15-54	55-	15-	15-54	55-	mortality
U.S.A	1989	69.6	6.3	223.7	78	130	76	1.068
Japan	1990	105.8	8.4	342.8	119	173	116	1.059
Korea	1987	142.7	20.3	440.5	160	420	150	1.112
Eng. & Wal.	1990	118.2	6.4	390.4	133	131	133	1.040
France	1990	73.0	4.1	240.6	82	85	82	1.042
Germany	1990	108.9	5.1	361.4	122	105	123	1.034
Sweden	1989	89.2	4.8	294.4	100	100	100	1.040

Notes:
1, Heart disease (1975) includes "Chronic rheumatic heart disease" (code No. A81), "Ischaemic heart disease" (A83), as well as "Other forms of heart disease" (A84), except in the figures for the Republic of Korea.
2, Standardized death rates; Standard population=1990 Japanese population
3, "Ratio of middle-aged mortality":(Ratio of 15- deaths to 55- deaths)

$$\frac{SD_{(15\text{-}54)}+SD_{(55\text{-})}}{SD_{(55\text{-})}}$$

$$=\frac{SD_{(15\text{-})}}{SD_{(55\text{-})}}$$

$$=\frac{\sum_{i=15.19} SP_{(i)}\cdot DR_{(i)}}{\sum_{i=55.59} SP_{(i)}\cdot DR_{(i)}}$$

$SD_{(i)}$: standardized death number by age group
$SP_{(i)}$: standard population by age group
; 1990 Japanese population
$DR_{(i)}$: death rate by age group

In the case of decreasing 15-54 deaths, this ratio comes close to 1.
4, Heart disease (1989 or 1990) includes "Acute myocardial infraction" (code No. 270), "Other ischaemic heart diseases" (279) as well as "Disease of pulmonary circ. and other forms of heart disease" (28).
Source: orginal data by WHO, 'World Health Statistics'

TABLE 19 Pattern of middle-aged mortality (cardiovascular diseases)

	All causes		Circulatory system		Heart disease		Cerebrovascular disease		Hypertensive disease	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
U.S.A.	5151	3151	5141	5121	5151	4121	3233	3132	5252	5142
Japan	1151	1151	1242	2122	1243	1111	5242	5222	5112	3112
Korea	5152	5151	5151	5151	2151	1121	5252	5152	5151	5151
EG.&WL.	2152	2151	4131	3111	4141	2111	3121	3111	5141	5131
France	4252	2152	1142	1111	1141	1111	4232	1122	5131	5111
Germany	3151	2151	3131	3111	2131	1111	3222	2212	5131	5111
Sweden	2151	2151	2121	2111	2131	2212	2121	2121	2111	2111

Notes: meaning of patterns (a number of four digit figures)
1000 ; Index number of standardized death rate from 15-54 ,1990(89) Sweden=100
− 99 = 1, 100 − 119 = 2, 120 − 139 = 3, 140 − 159 = 4, 160 − = 5
100 The difference in falling pace of standardized death rate between 15-54 and 55 years and up (1975 - 1990, Index; 1975 =100)
Index of 15-54 < Index of 55- years = 1 , 15-54 > 55- years = 2
10 Ratio of middle-aged mortality (Ratio of 15- to 55- deaths)

− 1.039 = 1, 1.040 − 1.059 = 2, 1.060 − 1.079 = 3,
1.080 − 1.099 = 4, 1.100 − = 5

1 Change of ratio of middle-aged mortality (1975-1990 or 89)
− -0.006 = 1, -0.005 − +0.005 = 2, +0.005 − = 3,

Ex.) 5242: mortality caused by Cerebrovascular disease of male population in Japan

5000 Index number of standardized death rate at 15-54 1990(89) Sweden=100; 160 or over

200 The difference in falling pace of standardized death rate between 15-54 and 55- years old (1975 - 1990, Index;1975=100);
the index of 15-54 > the index of 55 years

40 Ratio of middle-aged mortality (Ratio of 15- to 55- deaths);
1.080 − 1.099

2 Change of Ratio of middle-aged mortality (1975-1990,89);
-0.005 − +0.005 or over

Source: Regarding the methodology of "pattern analysis", see Fujioka, Iwai, "The method of pattern analysis", 'Statistical Study on the Employment Structure and Stratum Structure of Labour Force in Modern Japan', the Institute of Economic and Political Studies, Kansai University, 1993

Conclusions

We have learned the mechanism of death from overwork and the relationship between working conditions and workers' health, depending on research from epidemiologists, economists and others in Japan and the United States.

From the end of the 1970s, enterprises in Japan rationalized and reduced labour drastically. Gorernment did not take effective measures to reduce working hours. Labour Unions selected wage increases or job security opportunities, instead of a reduction in working hours. Consequently, working hours were not reduced in spite of modernization in production facilities.

Continuous overwork among workers, such as overtime and shift work often make their life style unhealthy ones. Accumulation of fatigue and stress and lack of holidays make it difficult for workers to recover their normal healthy condition. As a result, cardiovascular diseases tend to appear, and finally, Karoshi, death from overwork, may suddenly take place.

A direct factor leading to overwork is long working hours. Overwork is closely related to the wage level per hour, the pressure of unemployment/underemployment and the high cost of living. Blue collar workers have to overwork themselves in order to earn a higher salary by

reason of a relatively low wage level per hour. White collar workers tend to overwork themselves as well to keep their occupational situation or high living standard.

We have made statistical comparisons on the above-mentioned working conditions In Japan, working hours are extremely long, and in the United States much longer than in European countries. Annual paid leave in both countries is exceedingly short. Earnings per hour in Japan are relatively low. Then the official unemployment rate in Japan is lowest, and in the United States the rate is a little lower than in the former F. R. of Germany, while the "unemployment-and-underemployment" rate in both countries are higher than the former F. R. of Germany. The living standard in the United States is at a high level. In Japan the housing cost is much higher than in European countries.

We examined the occupational injury statistics which can be compared for Japan, the U.S. and Europe. However, the statistics turned out to be useless for comparison concerning work-related diseases. One of the reasons is the diversity of coverage of the statistics. Moreover, a difference in data qualities resulting from under-reporting is another reason.

Then, we investigated the possibility of using two kinds of occupational mortality statistics. Nevertheless, we found that the comparison was too difficult as we had no prior examination of availability and adjustment.

The comparison of statistical data on general mortality revealed the highest death rate caused by heart disease for the middle-aged male population was in the United States. Regarding Japan on the other hand, we observed that cerebrovascular disease had been highly prevalent as a death cause. Moreover, the "ratio of middle-aged mortality" was at a high level in both countries. This meant that some factors which could decrease mortality were not always effective for the middle-aged population due to the particular conditions of this age group such as arduous working conditions etc.

This data showed some important indications on the approach of work-related diseases. Nevertheless, we can't be sure of the relationship between working conditions and workers' health by these statistics as the data is not related to workers but to the working age population.

Future analysis

We have to use three kinds of statistical data, which altogether enables us to observe the new types of work-related diseases. The first is data concerning occupational injury statistics: number of claims and compensation-awarded cases on work-related diseases. The second is occupational mortality statistics adjusted for comparison. The third is general mortality statistics according to sex, age and death causes.

At first, regarding occupational injury statistics, three tasks will be expected. The first is to collect the data on compensation for work-related diseases. If we collect data based on claim cases for occupational injury compensation and compensation-awarded cases resulting from cardiovascular diseases, we would be able to observe workers' health in relation to work-related diseases in a limited way. It is also necessary to collect data according to sex, age, occupation, industry and death causes such as heart disease, cerebrovascular and hypertensive diseases after the 1970s.

The second task regarding occupational injury statistics is to collect the descriptive records of claim and compensation-awarded cases on cardiovascular diseases. It will help us to understand the relationship between working conditions and work-related cardiovascular diseases. Moreover, we will also get information concerning working women that we have not mentioned.[31]

The third is to compare the coverage and criteria regarding work-related diseases for occupational injuries.

Regarding occupational mortality statistics, we consider it indispensable to collect various kinds of occupational mortality statistics for examination before making an adjusted table for comparison.[32]

Furthermore on general mortality statistics, we have to compare middle-aged mortality caused by cardiovascular diseases in various developed and newly industrialized countries. In connection with this, we have to compare working conditions in these countries. We expect to find a correlation between mortality caused by cardiovascular diseases and working conditions, trends and other regularities in the data.

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"94. Mr. TOTSUKA (International Educational Development) pointed out that the struggle for implementation of economic, social and cultural rights concerned all countries, not only developing countries. He gave as an example the case of Japan, one of the most developed countries in the world, where a peculiarly Japanese phenomenon, karoshi, or death from overwork, had reached epidemic proportions since the late 1980s. It had in fact been estimated that some 10,000 middle-management 'corporate warriors' died from overwork every year.",

"Women workers were also becoming more frequent victims of karoshi."

"97. The Japanese Government should admit that the karoshi phenomenon existed, and should provide compensation for victims and their families; it should take effective measures to prohibit unpaid overtime, and should ratify the ILO conventions which limited the number of hours of authorized overtime worked."

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(Acknowledgment)

This paper was based on a draft "Working Conditions and Health of Workers in Japan, the United States and Europe --International Comparison of Labour Statistics--" which was prepared for 'STAT Seminar' at the Bureau of Statistics, the International Labour Office in Geneva on 28 January 1994.

The author is grateful to Mr. Farhad Mehran (Bureau of Statistics) and Mr. Padmanabh Gopinath (International Institute for Labour Studies) who accepted me as a visiting scholar in the ILO. The author is also thankful to Mr. Kazutaka Kogi (now retired), Mr. Michel. Lesage, Ms. Karen. Taswell and Ms. Sandra. Vergnaud of the ILO for their kind help and advice on this research as well as to Ms. Nobue. Park, Ms.Magali Imbert-Luccioni and Ms. Kerrye d'Arcy for the help on the correction of this paper. Nevertheless, all the responsibility rests with the author.