Occupational Radiation Exposure in Hong Kong (2019)

Radiation Monitoring Service
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This is a report on the occupational external radiation dose data of persons who were employed in work involving radioactive substances or irradiating apparatus in Hong Kong in the year 2019. The data were obtained from individual occupational monitoring using thermoluminescent dosimeters (TLD) provided by the Radiation Monitoring Service (RMS) of the Radiation Health Division, Department of Health, the Government of the Hong Kong Special Administrative Region.

Whole body radiation monitoring

In 2019, the RMS provided whole body type individual monitoring dosimeters to 11,848 named persons and 1,218 unnamed users at 879 sites. The named persons could be grouped into 57 different job types in one of the following four job categories: *dental* (9.85%), *industrial* (8.49%), *medical* (63.97%) and *others* (17.69%). A summary of the annual dose distribution tabulated separately by job category and by job type is at Table 1 and 3 respectively.

The average annual dose of all the monitored persons was 0.11 mSv, which slightly increased from 0.09 mSv in 2018. All monitored persons had doses within the statutory limit of 20 mSv in a year. 84.2% had annual doses 0.17 mSv or below, which was the level equivalent to one-tenth the pro rata monthly fraction derived from the annual statutory dose limit. One person received annual dose exceeding 6 mSv. The highest whole body dose recorded was 8.06 mSv.

For individual job categories, the average annual doses for dental, industrial, medical and others were respectively 0.04, 0.11, 0.12 and 0.12 mSv.

Among the monitored persons, about 50.7% worked in the public sector (including staff in hospitals of Hospital Authority), the rest of about 49.3% worked in the private sector. By gender, 5,761 (48.6%) were male and 6,087 (51.4%) were female (Figure 5). The dose distribution by gender is at Table 5.

Extremity radiation monitoring

In 2019, the RMS also provided extremity (finger) dose monitoring service to 341 workers at 57 sites in Hong Kong. The average annual finger dose was about 6.91 mSv. Eight workers received annual finger doses exceeding 100 mSv and the highest dose recorded was 293.10 mSv against the annual limit of 500 mSv prescribed by the Radiation Ordinance. A summary of the dose distribution tabulated separately by job category and by job type is at Table 2 and 4 respectively.

For individual job categories, the average annual extremity doses for industrial, medical and others were respectively 1.64, 4.26 and 13.53 mSv. By gender, 275 (80.6%) were male and 66 (19.4%) were female (Figure 6). The dose distribution by gender is at Table 6.

Figure 1

The Distribution of Whole Body Dosimeter Users by Job Categories, 2019

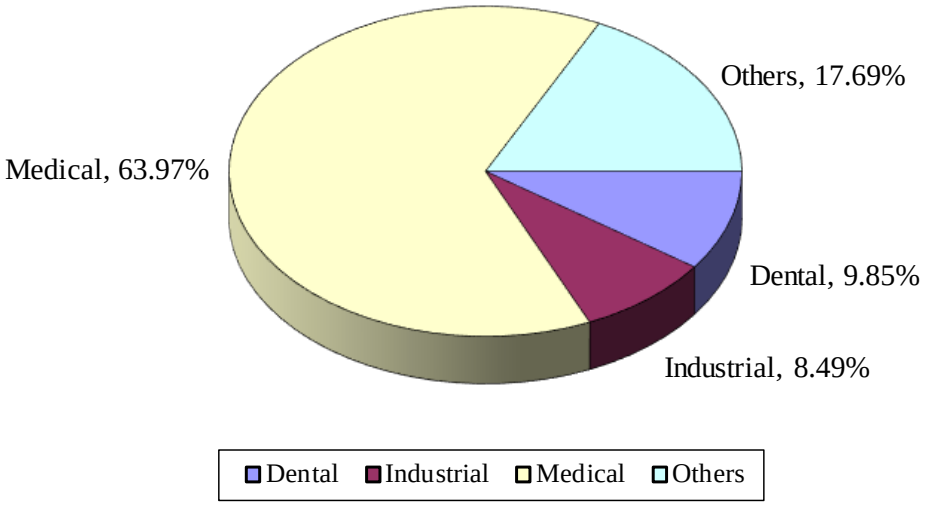

Figure 2

The Distribution of Finger Dosimeter Users by Job Categories, 2019

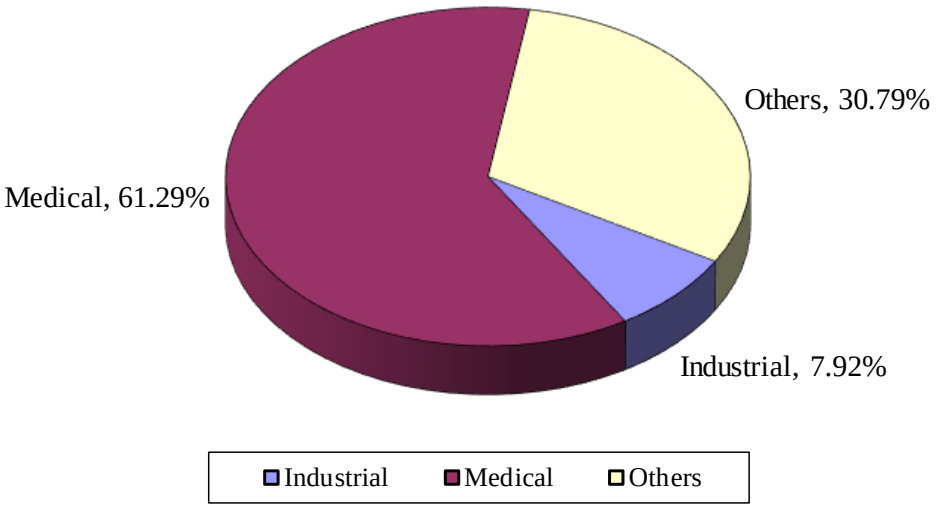

Figure 3

The Average Annual Occupational Whole Body Dose by Job Categories, 2019

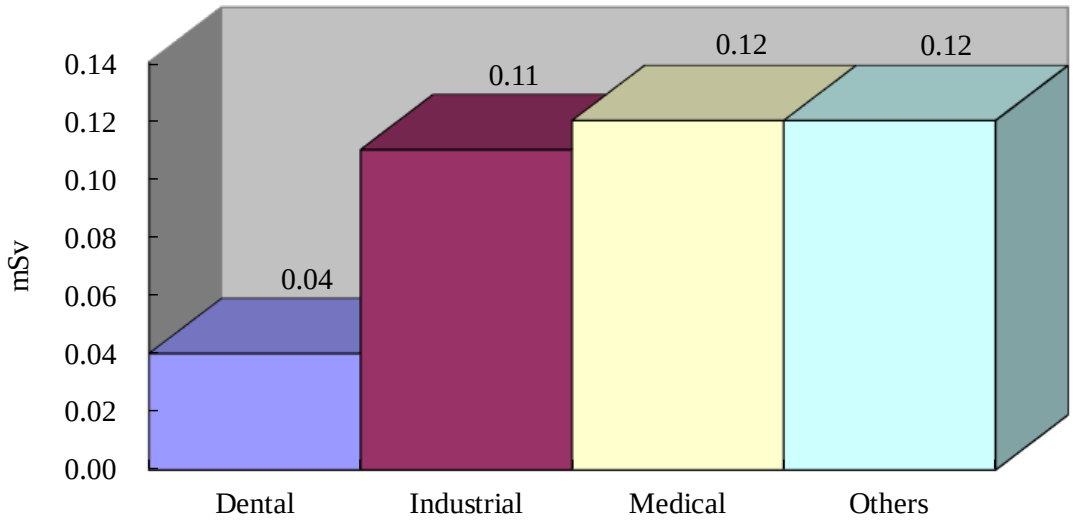

Figure 4

The Average Annual Occupational Finger Dose by Job Categories, 2019

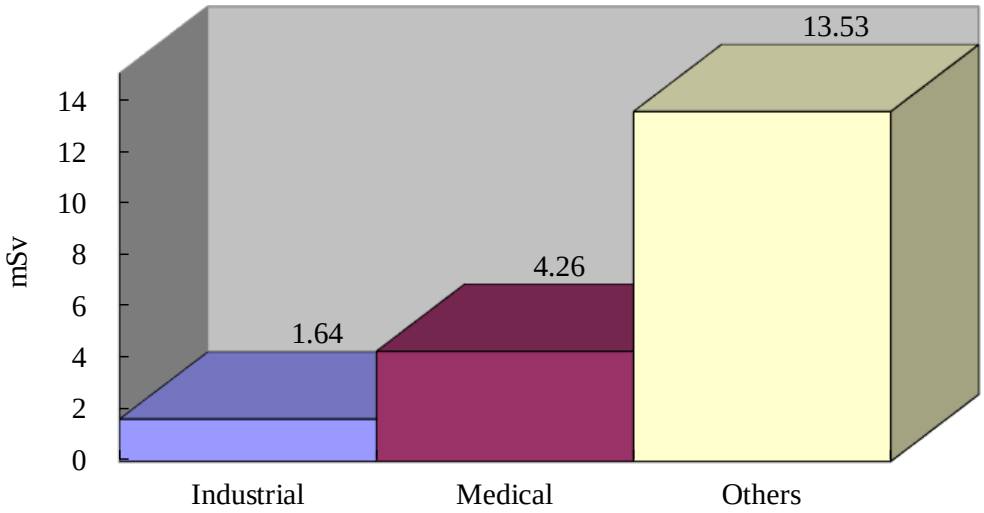

Figure 5

The Distribution of Whole Body Dosimeter Users by Gender, 2019

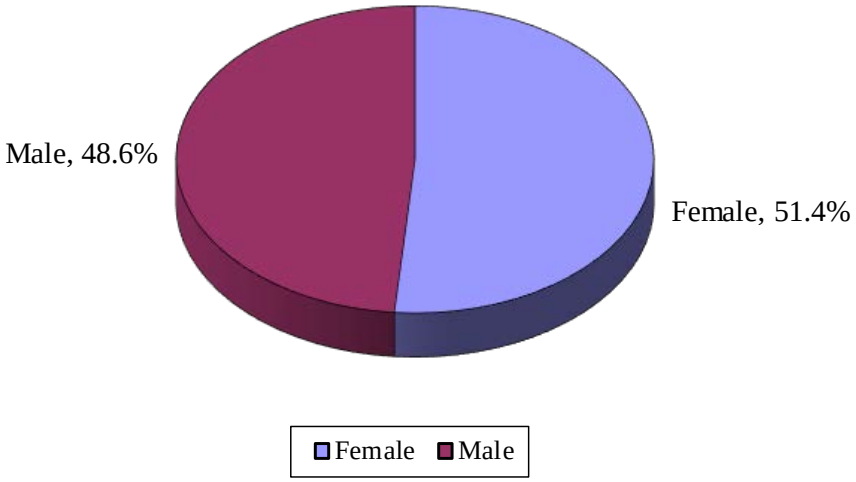

Figure 6

The Distribution of Finger Dosimeter Users by Gender, 2019

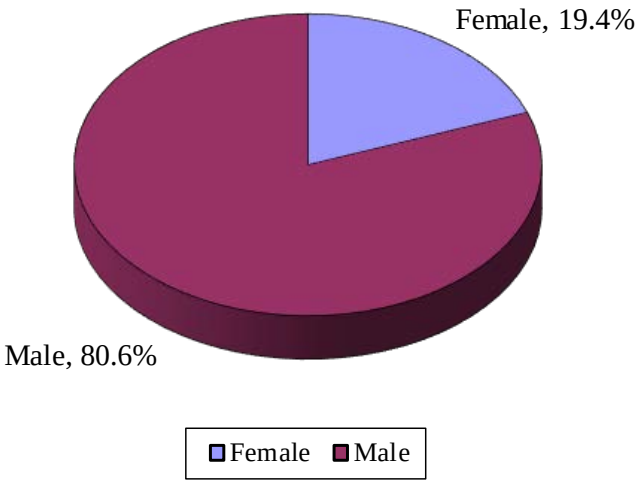

Table 1

The Distribution of Whole Body Dose by Job Categories, 2019

	$x \leq 0.17$	$0.17 < x \leq 0.75$	$0.75 < x \leq 1.5$	$1.5 < x \leq 3.0$	$3.0 < x \leq 6.0$	$6.0 < x \leq 10$	$x > 10$
Dental	1082	84	1	0	0	0	0
Industrial	831	152	14	8	1	0	0
Medical	6268	1103	118	72	18	0	0
Others	1794	236	38	13	14	1	0
Total	9975	1575	171	93	33	1	0

Remark: x represents the dose values in mSv

Table 2

The Distribution of Finger Dose by Job Categories, 2019

	$x \leq 1$	$1 < x \leq 10$	$10 < x \leq 100$	$100 < x \leq 200$	$200 < x \leq 500$	$x > 500$
Industrial	21	4	2	0	0	0
Medical	167	30	9	3	0	0
Others	79	9	12	3	2	0
Total	267	43	23	6	2	0

Remark: x represents the dose values in mSv

Table 3

The Distribution of Whole Body Dose by Job Types, 2019

	$x \leq 0.17$	$0.17 < x \leq 0.75$	$0.75 < x \leq 1.5$	$1.5 < x \leq 3.0$	$3.0 < x \leq 6.0$	$6.0 < x \leq 10$	$x > 10$
Administrator	12	2	0	0	0	0	0
Artisan	48	10	0	0	0	0	0
Chemist	20	12	3	2	6	1	0
Clerk	40	0	1	0	0	0	0
Consultant (Medical)	21	5	0	0	0	0	0
Delivery	1	0	1	0	0	0	0
Dental Assistant	418	24	1	0	0	0	0
Dental Hygienist	21	3	0	0	0	0	0
Dental Therapist	210	24	0	0	0	0	0
Dentist	433	33	0	0	0	0	0
Department Manager	0	2	0	0	0	0	0
Driver	14	6	2	0	0	0	0
Engineer	199	39	5	4	1	0	0
Experimental Officer	2	0	0	0	0	0	0
Fire Safety Worker	4	1	0	0	0	0	0
Laboratory Attendant	33	2	1	1	0	0	0
Lecturer	17	1	0	0	0	0	0

The Distribution of Whole Body Dose by Job Types, 2019 (Continued)

	$x \leq 0.17$	$0.17 < x \leq 0.75$	$0.75 < x \leq 1.5$	$1.5 < x \leq 3.0$	$3.0 < x \leq 6.0$	$6.0 < x \leq 10$	$x > 10$
Luminous Watch Assembly Worker	6	1	0	0	0	0	0
Mechanic	30	2	1	1	0	0	0
Medical Officer	1339	267	28	5	3	0	0
Medical Officer (Therapeutic)	36	13	0	0	0	0	0
Medical Technologist	28	5	0	0	1	0	0
Nurse	1912	331	15	7	1	0	0
Nurse (Veterinary)	55	8	1	0	0	0	0
Operator	207	29	0	1	0	0	0
Pharmacist	10	9	2	2	0	0	0
Physicist (Health)	11	7	1	0	0	0	0
Physicist (Medical)	75	17	6	0	0	0	0
Physiotherapist	4	0	0	0	0	0	0
Police	2	5	0	0	0	0	0
Quality Assurance	26	6	1	0	0	0	0
Radiobiologist	1	0	0	0	0	0	0
Radiographer (Diagnostic)	1517	202	41	51	12	0	0
Radiographer (Industrial)	40	21	1	0	0	0	0

The Distribution of Whole Body Dose by Job Types, 2019 (Continued)

	$x \leq 0.17$	$0.17 < x \leq 0.75$	$0.75 < x \leq 1.5$	$1.5 < x \leq 3.0$	$3.0 < x \leq 6.0$	$6.0 < x \leq 10$	$x > 10$
Radiographer (Therapeutic)	136	31	1	1	0	0	0
Radiologist	149	32	4	0	0	0	0
Research Assistant	184	11	1	1	0	0	0
Safety Officer	8	3	1	0	0	0	0
Scientific Assistant	8	0	0	0	0	0	0
Scientific Officer	14	1	0	0	0	0	0
Security Officer	1	0	0	0	0	0	0
Speech Therapist	63	6	0	0	0	0	0
Store Keeper	2	0	0	0	1	0	0
Student	137	8	0	0	0	0	0
Teaching Assistant	1	0	0	0	0	0	0
Technical Officer	110	16	1	1	0	0	0
Technician (Electrical)	128	25	4	0	0	0	0
Technician (Laboratory)	246	40	1	0	1	0	0
Technician (X-rays)	43	5	1	0	0	0	0
Trainee	17	2	0	0	0	0	0
Vet	169	17	1	1	0	0	0

The Distribution of Whole Body Dose by Job Types, 2019 (Continued)

	$x \leq 0.17$	$0.17 < x \leq 0.75$	$0.75 < x \leq 1.5$	$1.5 < x \leq 3.0$	$3.0 < x \leq 6.0$	$6.0 < x \leq 10$	$x > 10$
Vet Assistant	147	14	2	0	0	0	0
Ward Attendant	532	134	16	5	1	0	0
Workman	45	15	1	0	0	0	0
X-ray Assistant	31	5	0	0	0	0	0
X-ray Crystallographer	1	0	0	0	0	0	0
No Job Code	1011	123	26	10	6	0	0
Total	9975	1575	171	93	33	1	0

Remark: x represents the dose values in mSv

Table 4

The Distribution of Finger Dose by Job Types, 2019

	$x \leq 1$	$1 < x \leq 10$	$10 < x \leq 100$	$100 < x \leq 200$	$200 < x \leq 500$	$x > 500$
Chemist	8	3	7	2	1	0
Engineer	16	3	0	0	0	0
Laboratory Attendant	3	0	0	0	0	0
Lecturer	1	0	0	0	0	0
Medical Officer	71	0	0	0	0	0
Medical Officer (Therapeutic)	14	0	0	0	0	0
Medical Technologist	1	0	0	0	0	0
Operator	0	1	0	0	0	0
Pharmacist	3	3	3	1	0	0
Physicist (Health)	1	0	0	0	0	0
Physicist (Medical)	9	0	0	0	0	0
Physiotherapist	1	0	0	0	0	0
Quality Assurance	0	0	1	0	0	0
Radiographer (Diagnostic)	57	27	6	2	0	0
Radiographer (Therapeutic)	1	0	0	0	0	0
Radiologist	6	0	0	0	0	0
Research Assistant	5	0	1	0	0	0

The Distribution of Finger Dose by Job Types, 2019 (Continued)

	$x \leq 1$	$1 < x \leq 10$	$10 < x \leq 100$	$100 < x \leq 200$	$200 < x \leq 500$	$x > 500$
Scientific Officer	0	0	1	0	0	0
Speech Therapist	3	0	0	0	0	0
Store Keeper	1	0	0	0	0	0
Student	1	0	0	0	0	0
Technical Officer	0	0	1	0	0	0
Technician (Electrical)	2	0	0	0	0	0
Technician (Laboratory)	7	1	1	0	0	0
Ward Attendant	1	0	0	0	0	0
Workman	1	0	0	0	0	0
No Job Code	54	5	2	1	1	0
Total	267	43	23	6	2	0

Remark: x represents the dose values in mSv

Table 5

The Distribution of Whole Body Dose by Gender, 2019

	$x \leq 0.17$	$0.17 < x \leq 0.75$	$0.75 < x \leq 1.5$	$1.5 < x \leq 3.0$	$3.0 < x \leq 6.0$	$6.0 < x \leq 10$	$x > 10$
Male	4778	799	103	53	27	1	0
Female	5197	776	68	40	6	0	0
Total	9975	1575	171	93	33	1	0

Remark: x represents the dose values in mSv

Table 6

The Distribution of Finger Dose by Gender, 2019

	$x \leq 1$	$1 < x \leq 10$	$10 < x \leq 100$	$100 < x \leq 200$	$200 < x \leq 500$	$x > 500$
Male	212	35	20	6	2	0
Female	55	8	3	0	0	0
Total	267	43	23	6	2	0

Remark: x represents the dose values in mSv