Occupational Radiation Exposure in Hong Kong (2016)

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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 2016. The data were obtained from individual occupational monitoring using thermoluminescent dosimeters (TLD) provided by the Radiation Monitoring Service (RMS) of the Radiation Health Unit, Department of Health, the Government of the Hong Kong Special Administrative Region.

Whole body radiation monitoring

In 2016, the RMS provided whole body type individual monitoring dosimeters to 10,529 named persons and 1,336 unnamed users at 855 sites. The named persons could be grouped into 57 different job types in one of the following four job categories: *dental* (10.46%), *industrial* (9.57%), *medical* (62.24%) and *others* (17.73%). 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 0.10 mSv, which was slightly decreased from the 0.13 mSv in 2015. All monitored persons had doses within the statutory limit of 20 mSv in a year. 85.7% 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. No person received a dose exceeding 6 mSv. The highest whole body dose recorded was 5.79 mSv.

For individual job categories, the average annual doses for dental, industrial, medical and others were respectively 0.04, 0.10, 0.11 and 0.11 mSv.

Among the monitored persons, about 50.5% worked in the public sector (including staff in hospitals of Hospital Authority), the rest of about 49.5% worked in the private sector. By gender, 5,098 (48.4%) were male and 5,431 (51.6%) were female (Figure 5). The dose distribution by gender is at Table 5.

Extremity radiation monitoring

In 2016, the RMS also provided extremity (finger) dose monitoring service to 277 workers at 50 sites in Hong Kong. The average annual finger dose was about 4.17 mSv. Four workers received annual finger doses exceeding 100 mSv and the highest dose recorded was 238.71 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 0.20, 1.08 and 12.38 mSv. By gender, 222 (80.1%) were male and 55 (19.9%) 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, 2016

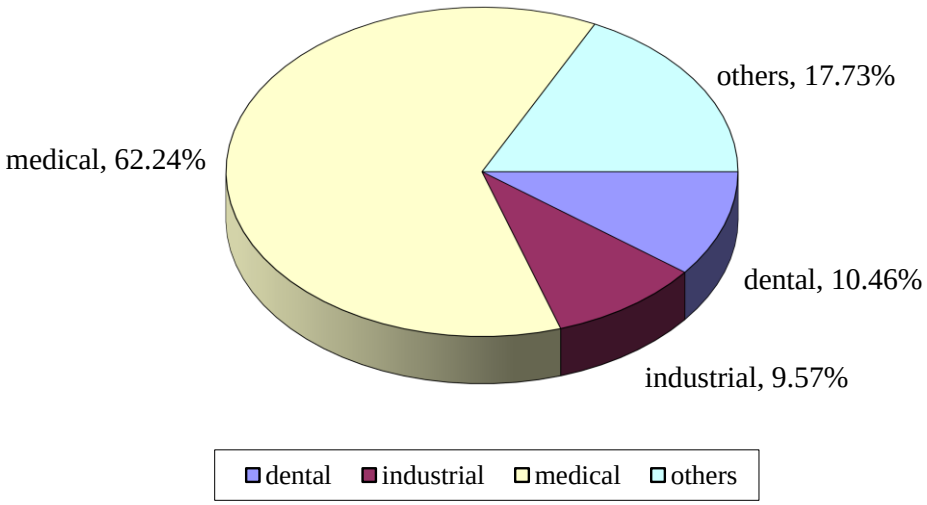

Figure 2

The Distribution of Finger Dosimeter Users by Job Categories, 2016

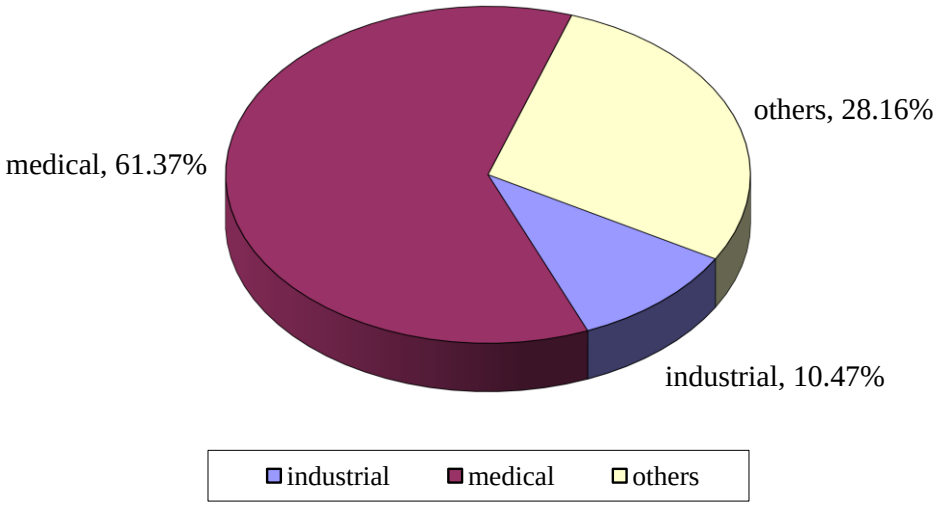

Figure 3

The Average Annual Occupational Whole Body Dose by Job Categories, 2016

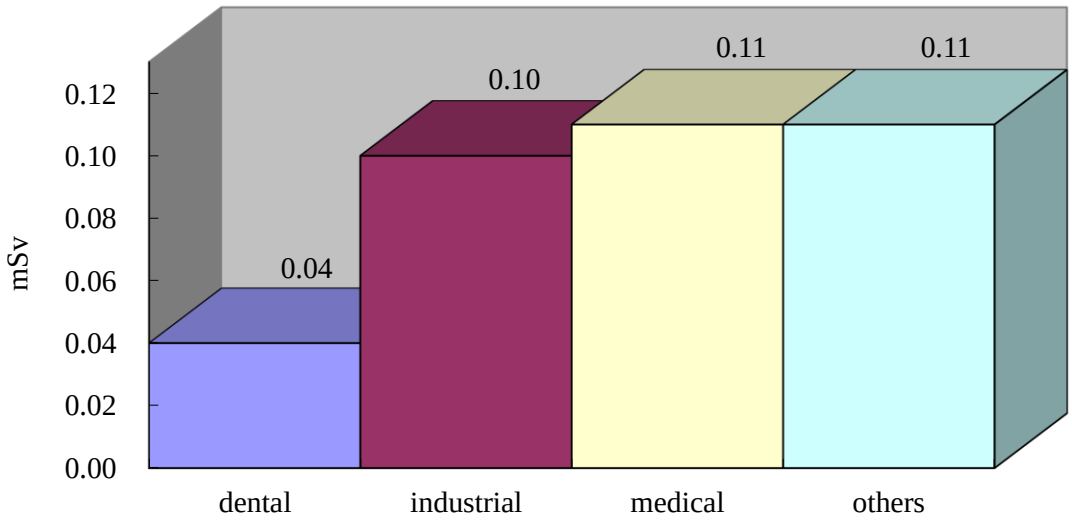

Figure 4

The Average Annual Occupational Finger Dose by Job Categories, 2016

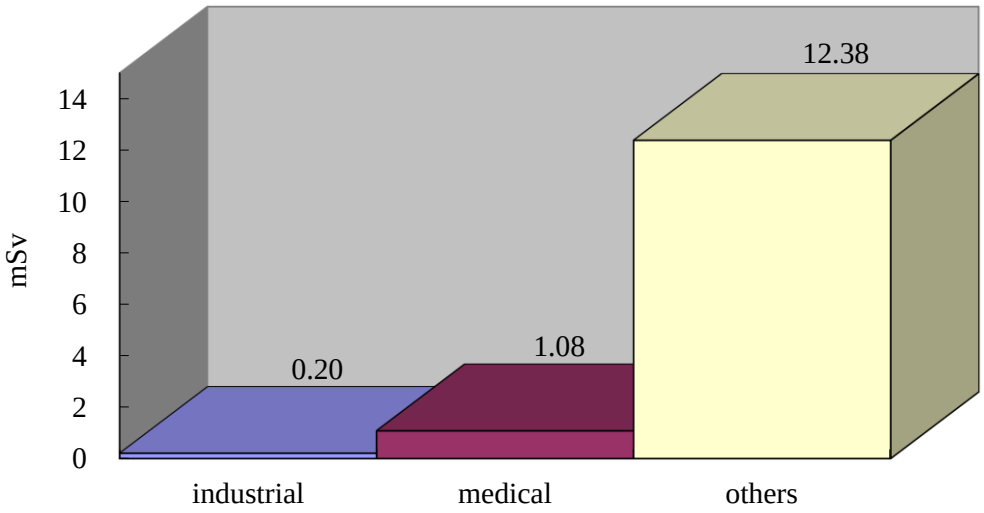

Figure 5

The Distribution of Whole Body Dosimeter Users by Gender, 2016

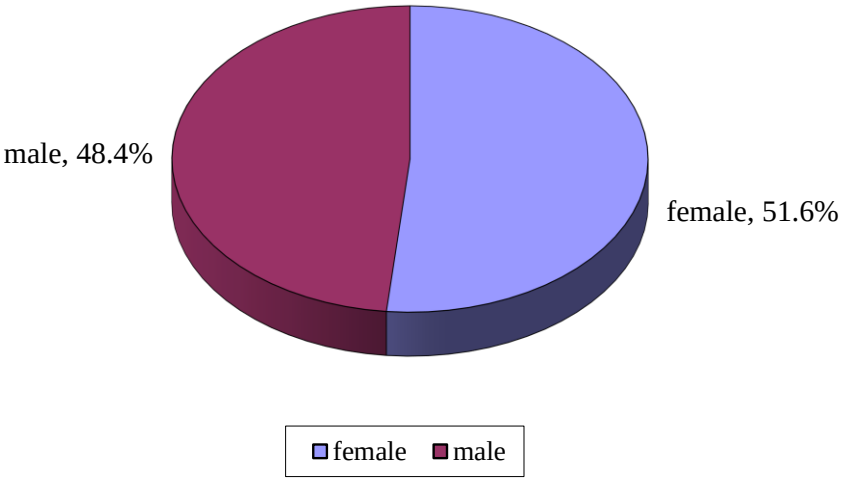

Figure 6

The Distribution of Finger Dosimeter Users by Gender, 2016

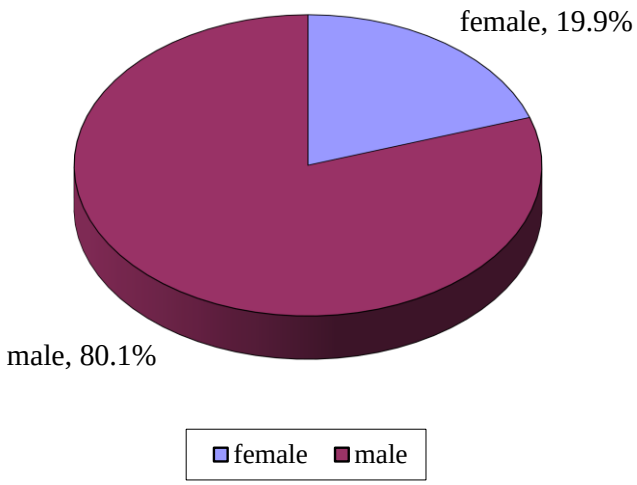

Table 1

The Distribution of Whole Body Dose by Job Categories, 2016

	$x \leq 0.17$	$0.17 < x \leq 0.75$	$0.75 < x \leq 1.5$	$1.5 < x \leq 3.0$	$3.0 < x \leq 6.0$	$6.0 < x \leq 10$	$x > 10$
Dental	1026	72	3	0	0	0	0
Industrial	857	126	22	2	1	0	0
Medical	5549	786	154	55	9	0	0
Others	1592	228	30	7	10	0	0
Total	9024	1212	209	64	20	0	0

Remark: x represents the dose values in mSv

Table 2

The Distribution of Finger Dose by Job Categories, 2016

	$x \leq 1$	$1 < x \leq 10$	$10 < x \leq 100$	$100 < x \leq 200$	$200 < x \leq 500$	$x > 500$
Industrial	28	1	0	0	0	0
Medical	145	20	5	0	0	0
Others	60	7	7	3	1	0
Total	233	28	12	3	1	0

Remark: x represents the dose values in mSv

Table 3

The Distribution of Whole Body Dose by Job Types, 2016

	$x \leq 0.17$	$0.17 < x \leq 0.75$	$0.75 < x \leq 1.5$	$1.5 < x \leq 3.0$	$3.0 < x \leq 6.0$	$6.0 < x \leq 10$	$x > 10$
Administrator	11	4	0	0	0	0	0
Artisan	59	7	0	0	0	0	0
Chemist	23	6	1	1	4	0	0
Clerk	56	5	2	0	0	0	0
Consultant (Medical)	27	6	2	1	0	0	0
Delivery	2	0	1	0	0	0	0
Dental Assistant	396	16	1	0	0	0	0
Dental Hygienist	18	4	0	0	0	0	0
Dental Therapist	213	19	0	0	0	0	0
Dentist	399	33	2	0	0	0	0
Department Manager	1	1	0	0	0	0	0
Driver	18	4	2	0	0	0	0
Engineer	181	28	4	1	0	0	0
Experimental Officer	2	0	0	0	0	0	0
Fire Safety Worker	7	1	0	0	0	0	0
Laboratory Attendant	37	4	2	1	0	0	0
Lecturer	26	0	0	0	0	0	0

The Distribution of Whole Body Dose by Job Types, 2016 (Continued)

	x ≤ 0.17	0.17 < x ≤ 0.75	0.75 < x ≤ 1.5	1.5 < x ≤ 3.0	3.0 < x ≤ 6.0	6.0 < x ≤ 10	x > 10
Luminous Watch Assembly Worker	5	3	0	0	0	0	0
Mechanic	30	2	2	0	0	0	0
Medical Officer	1172	184	52	4	3	0	0
Medical Officer (Therapeutic)	54	3	4	0	0	0	0
Medical Technologist	30	4	0	0	0	0	0
Nurse	1769	225	19	3	2	0	0
Nurse (Veterinary)	43	6	0	1	0	0	0
Operator	274	10	1	0	1	0	0
Pharmacist	5	3	4	1	0	0	0
Physicist (Health)	7	7	1	0	0	0	0
Physicist (Medical)	66	13	4	1	0	0	0
Physiotherapist	3	1	0	0	0	0	0
Police	4	5	0	0	0	0	0
Quality Assurance	37	9	2	0	0	0	0
Radiobiologist	2	0	0	0	0	0	0
Radiographer (Diagnostic)	1348	180	38	40	3	0	0
Radiographer (Industrial)	34	30	2	0	0	0	0

The Distribution of Whole Body Dose by Job Types, 2016 (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)	110	11	9	1	0	0	0
Radiologist	131	22	2	1	0	0	0
Research Assistant	193	21	1	0	0	0	0
Safety Officer	8	1	0	0	0	0	0
Scientific Assistant	4	0	0	0	0	0	0
Scientific Officer	15	2	0	0	0	0	0
Security Officer	1	0	0	0	0	0	0
Speech Therapist	66	8	0	0	0	0	0
Store Keeper	2	0	0	0	0	0	0
Student	178	11	0	0	0	0	0
Teaching Assistant	1	0	0	0	0	0	0
Technical Officer	110	11	4	0	0	0	0
Technician (Electrical)	83	21	5	0	0	0	0
Technician (Laboratory)	246	54	4	1	2	0	0
Technician (X-rays)	47	5	3	0	0	0	0
Trainee	16	5	0	0	0	0	0
Vet	135	17	2	0	1	0	0

The Distribution of Whole Body Dose by Job Types, 2016 (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	79	17	0	0	0	0	0
Ward Attendant	434	79	14	2	0	0	0
Workman	58	12	1	0	0	0	0
X-ray Assistant	27	1	1	0	0	0	0
X-ray Crystallographer	3	0	0	0	0	0	0
No Job Code	718	91	17	5	4	0	0
Total	9024	1212	209	64	20	0	0

Remark: x represents the dose values in mSv

Table 4

The Distribution of Finger Dose by Job Types, 2016

	$x \leq 1$	$1 < x \leq 10$	$10 < x \leq 100$	$100 < x \leq 200$	$200 < x \leq 500$	$x > 500$
Chemist	7	1	2	3	1	0
Consultant (Medical)	1	0	0	0	0	0
Engineer	24	1	0	0	0	0
Laboratory Attendant	2	0	0	0	0	0
Lecturer	1	0	0	0	0	0
Medical Officer	61	1	0	0	0	0
Medical Officer (Therapeutic)	15	0	0	0	0	0
Medical Technologist	1	0	0	0	0	0
Operator	1	0	0	0	0	0
Pharmacist	1	2	1	0	0	0
Physicist (Medical)	9	0	0	0	0	0
Radiographer (Diagnostic)	46	17	4	0	0	0
Radiographer (Therapeutic)	1	0	0	0	0	0
Radiologist	5	0	0	0	0	0
Research Assistant	2	1	0	0	0	0
Scientific Officer	0	0	1	0	0	0
Speech Therapist	1	0	0	0	0	0

The Distribution of Finger Dose by Job Types, 2016 (Continued)

	x ≤ 1	1 < x ≤ 10	10 < x ≤ 100	100 < x ≤ 200	200 < x ≤ 500	x > 500
Store Keeper	1	0	0	0	0	0
Student	1	0	0	0	0	0
Technical Officer	1	0	0	0	0	0
Technician (Laboratory)	8	1	2	0	0	0
Vet	1	0	0	0	0	0
Ward Attendant	3	0	0	0	0	0
Workman	1	0	0	0	0	0
No Job Code	39	4	2	0	0	0
Total	233	28	12	3	1	0

Remark: x represents the dose values in mSv

Table 5

The Distribution of Whole Body Dose by Gender, 2016

	$x \leq 0.17$	$0.17 < x \leq 0.75$	$0.75 < x \leq 1.5$	$1.5 < x \leq 3.0$	$3.0 < x \leq 6.0$	$6.0 < x \leq 10$	$x > 10$
Male	4272	647	127	39	13	0	0
Female	4752	565	82	25	7	0	0
Total	9024	1212	209	64	20	0	0

Remark: x represents the dose values in mSv

Table 6

The Distribution of Finger Dose by Gender, 2016

	$x \leq 1$	$1 < x \leq 10$	$10 < x \leq 100$	$100 < x \leq 200$	$200 < x \leq 500$	$x > 500$
Male	187	21	10	3	1	0
Female	46	7	2	0	0	0
Total	233	28	12	3	1	0

Remark: x represents the dose values in mSv