# Occupational Radiation Exposure in Hong Kong (2013)

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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 2013. The data were obtained from 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 2013, the RMS provided whole body type individual monitoring dosimeters to 9,715 named persons and 1,237 unnamed users at 831 sites. The named persons could be grouped into 59 different job types in one of the following four job categories: *dental* (10.94%), *industrial* (9.73%), *medical* (59.57%) and *others* (19.76%). 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 indicated there was steady and was the same as 0.11 mSv in 2012. All monitored persons had doses within the statutory limit of 20 mSv in a year. 84.1% 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. Three persons received a dose exceeding 6 mSv. The highest whole body dose recorded was 9.10 mSv.

For individual job categories, the average annual doses for dental, industrial, medical and others were respectively 0.04, 0.10, 0.13 and 0.10 mSv.

Among the monitored persons, about 48.1% worked in the public sector (including staff in hospitals of Hospital Authority), the rest of about 51.9% worked in the private sector. By gender, 4,881 (50.2%) were male and 4,834 (49.8%) were female (Figure 5). The dose distribution by gender is at Table 5.

## Extremity radiation monitoring

In 2013, the RMS also provided extremity (finger) dose monitoring service to 201 workers in Hong Kong. The average annual finger dose was about 4.16 mSv. Three workers received an annual finger dose exceeding 100 mSv and the highest dose recorded was 162 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 0.14, 1.13 and 10.66 mSv. By gender, 158 (78.6%) were male and 43 (21.4%) 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, 2013

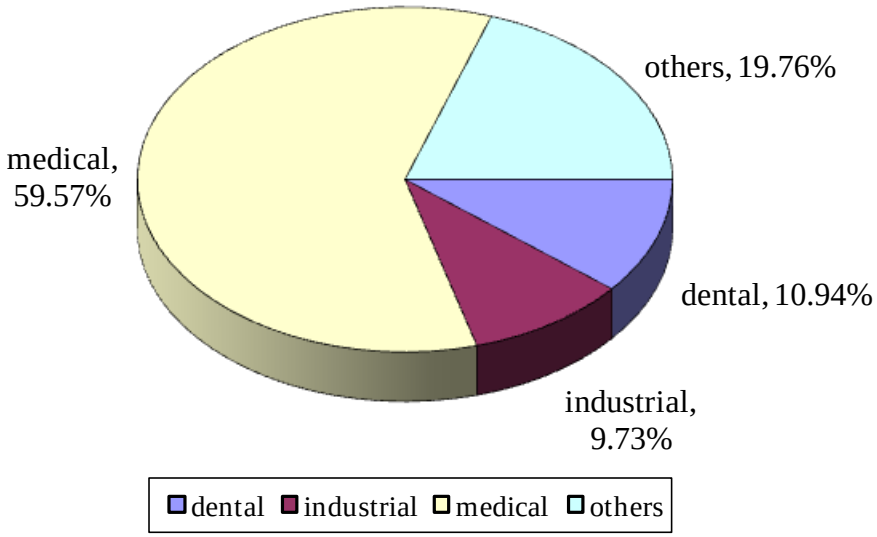



**Figure 2**

## The Distribution of Finger Dosimeter Users by Job Categories, 2013

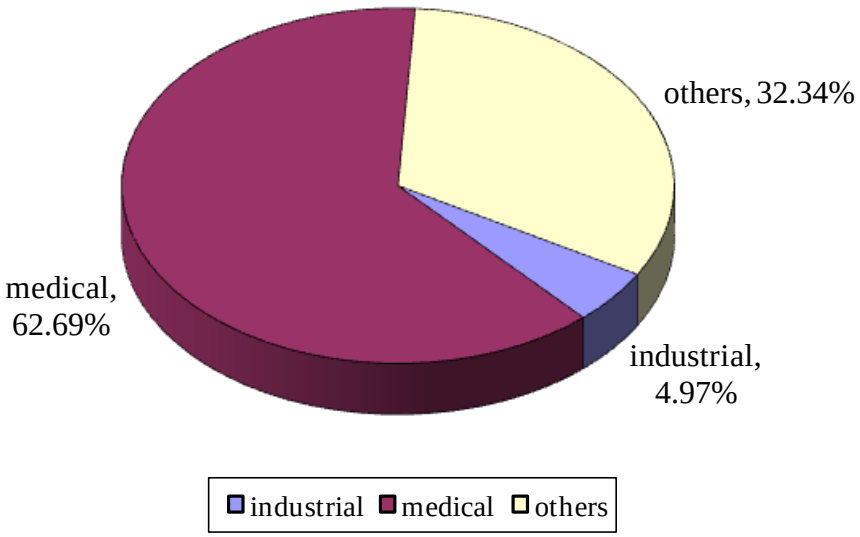


**Figure 3**

## The Average Annual Occupational Whole Body Dose by Job Categories, 2013

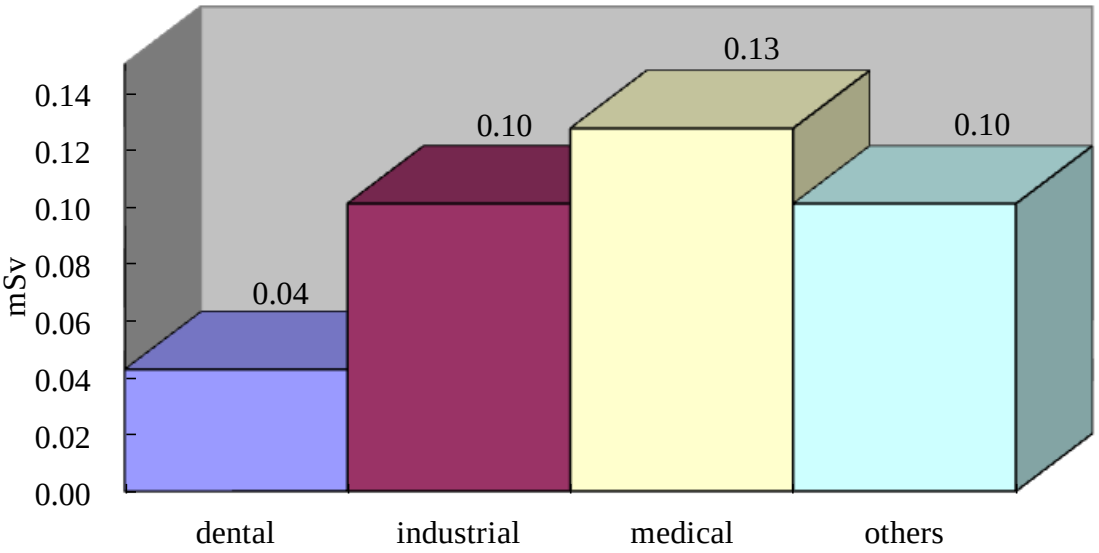



**Figure 4**

## The Average Annual Occupational Finger Dose by Job Categories, 2013

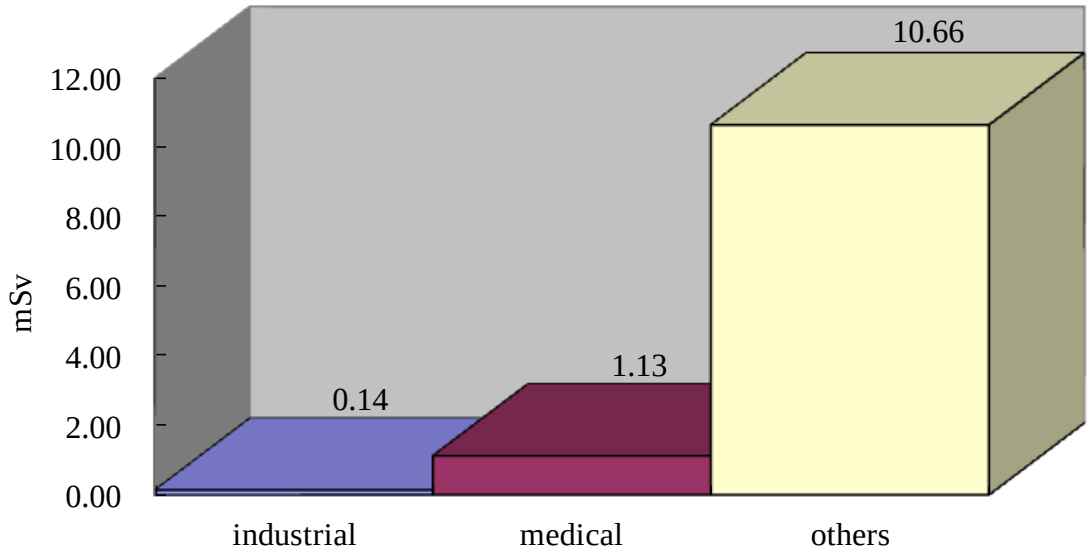


**Figure 5**

## The Distribution of Whole Body Dosimeter Users by Gender, 2013

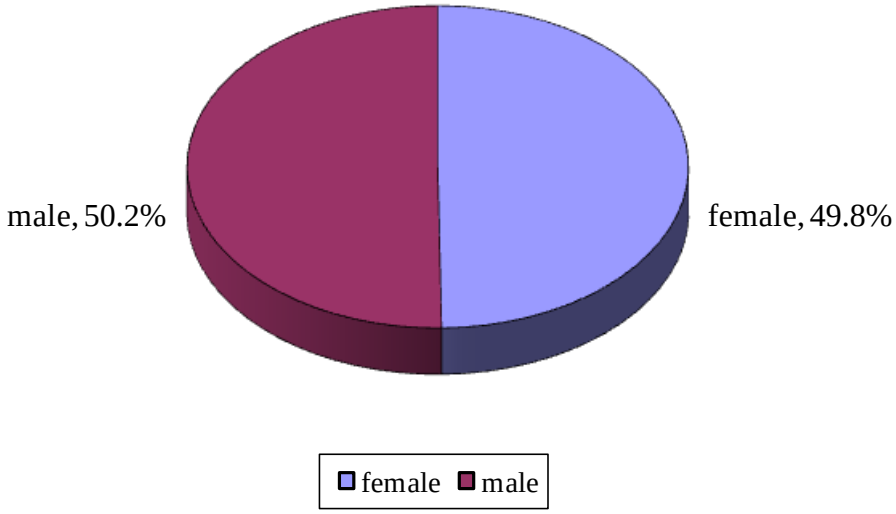
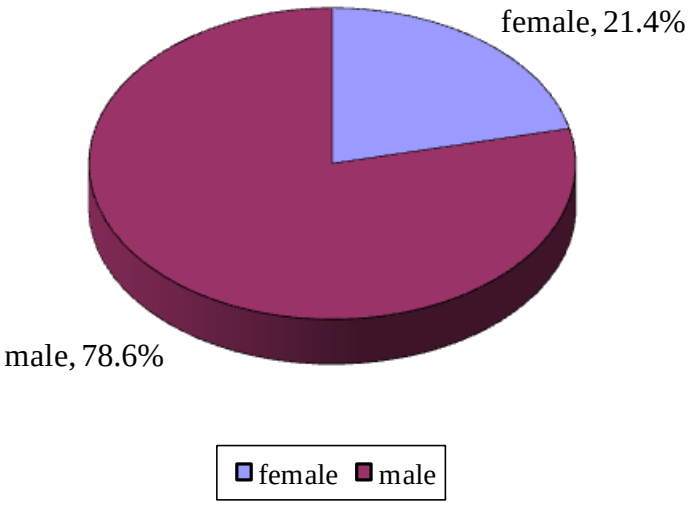



**Figure 6**

## The Distribution of Finger Dosimeter Users by Gender, 2013



## Table 1

## The Distribution of Whole Body Dose by Job Categories, 2013

| | $x \leq 0.17$ | $0.17 < x \leq 0.75$ | $0.75 < x \leq 1.5$ | $1.5 < x \leq 3.0$ | $3.0 < x \leq 6.0$ | $6.0 < x \leq 10$ | $10 < x$ |
|---|---|---|---|---|---|---|---|
| Dental | 992 | 65 | 5 | 1 | 0 | 0 | 0 |
| Industrial | 786 | 139 | 16 | 3 | 1 | 0 | 0 |
| Medical | 4753 | 848 | 122 | 47 | 14 | 3 | 0 |
| Others | 1636 | 243 | 25 | 10 | 6 | 0 | 0 |
| Total | 8167 | 1295 | 168 | 61 | 21 | 3 | 0 |

Remark: x represents the dose values in mSv

## Table 2

## The Distribution of Finger Dose by Job Categories, 2013

| | $x \leq 1$ | $1 < x \leq 10$ | $10 < x \leq 100$ | $100 < x \leq 200$ | $200 < x \leq 500$ | $500 < x$ |
|---|---|---|---|---|---|---|
| Industrial | 10 | 0 | 0 | 0 | 0 | 0 |
| Medical | 98 | 26 | 2 | 0 | 0 | 0 |
| Others | 44 | 9 | 9 | 3 | 0 | 0 |
| Total | 152 | 35 | 11 | 3 | 0 | 0 |

Remark: x represents the dose values in mSv

## Table 3

## The Distribution of Whole Body Dose by Job Types, 2013

| | $x \leq 0.17$ | $0.17 < x \leq 0.75$ | $0.75 < x \leq 1.5$ | $1.5 < x \leq 3.0$ | $3.0 < x \leq 6.0$ | $6.0 < x \leq 10$ | $10 < x$ |
|---|---|---|---|---|---|---|---|
| Artisan | 78 | 14 | 0 | 0 | 0 | 0 | 0 |
| Administrator | 18 | 4 | 0 | 0 | 0 | 0 | 0 |
| Chemist | 22 | 10 | 1 | 2 | 1 | 0 | 0 |
| Clerk | 57 | 6 | 0 | 0 | 0 | 0 | 0 |
| Consultant (Medical) | 29 | 7 | 1 | 1 | 0 | 0 | 0 |
| Delivery | 3 | 1 | 0 | 1 | 0 | 0 | 0 |
| Dentist | 391 | 29 | 2 | 0 | 0 | 0 | 0 |
| Dental Assistant | 363 | 14 | 2 | 1 | 0 | 0 | 0 |
| Dental Hygienist | 14 | 1 | 0 | 0 | 0 | 0 | 0 |
| Dental Therapist | 224 | 21 | 1 | 0 | 0 | 0 | 0 |
| Department Manager | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| Driver | 22 | 3 | 0 | 0 | 0 | 0 | 0 |
| Engineer | 177 | 22 | 3 | 1 | 1 | 0 | 0 |
| Experimental Officer | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fire Safety Worker | 5 | 5 | 0 | 0 | 0 | 0 | 0 |
| Laboratory Attendant | 47 | 6 | 3 | 1 | 0 | 0 | 0 |
| Lecturer | 32 | 0 | 0 | 0 | 0 | 0 | 0 |

## The Distribution of Whole Body Dose by Job Types, 2013 (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 | 10 < x |
|---|---|---|---|---|---|---|---|
| Lightning Conductor Worker | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Luminous Watch Assembly Worker | 8 | 1 | 0 | 0 | 0 | 0 | 0 |
| Mechanic | 36 | 4 | 3 | 0 | 0 | 0 | 0 |
| Medical Officer | 1000 | 226 | 30 | 8 | 0 | 1 | 0 |
| Medical Officer (Therapeutic) | 55 | 9 | 5 | 1 | 0 | 0 | 0 |
| Medical Technologist | 30 | 8 | 0 | 0 | 0 | 0 | 0 |
| Nurse | 1461 | 226 | 18 | 2 | 1 | 0 | 0 |
| Nurse (Veterinary) | 30 | 7 | 1 | 1 | 0 | 2 | 0 |
| Operator | 191 | 10 | 0 | 0 | 0 | 0 | 0 |
| Pharmacist | 6 | 5 | 0 | 0 | 0 | 0 | 0 |
| Physicist (Health) | 10 | 3 | 1 | 0 | 0 | 0 | 0 |
| Physicist (Medical) | 52 | 15 | 6 | 1 | 0 | 0 | 0 |
| Physiotherapist | 4 | 1 | 0 | 0 | 0 | 0 | 0 |
| Police | 6 | 3 | 0 | 0 | 0 | 0 | 0 |
| Quality Assurance | 55 | 14 | 1 | 1 | 0 | 0 | 0 |
| Radiobiologist | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| Radiographer (Diagnostic) | 1180 | 182 | 40 | 29 | 12 | 0 | 0 |

## The Distribution of Whole Body Dose by Job Types, 2013 (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 | 10 < x |
|---|---|---|---|---|---|---|---|
| Radiographer (Industrial) | 22 | 30 | 0 | 0 | 0 | 0 | 0 |
| Radiographer (Therapeutic) | 102 | 29 | 7 | 1 | 0 | 0 | 0 |
| Radiologist | 102 | 16 | 0 | 0 | 0 | 0 | 0 |
| Research Assistant | 214 | 16 | 0 | 0 | 0 | 0 | 0 |
| Safety Officer | 8 | 1 | 0 | 0 | 0 | 0 | 0 |
| Scientific Assistant | 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scientific Officer | 15 | 4 | 0 | 1 | 0 | 0 | 0 |
| Security Officer | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Speech Therapist | 56 | 8 | 0 | 0 | 0 | 0 | 0 |
| Store Keeper | 3 | 1 | 0 | 0 | 0 | 0 | 0 |
| Student | 221 | 14 | 0 | 0 | 0 | 0 | 0 |
| Teaching Assistant | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| Technician (Electrical) | 81 | 22 | 5 | 0 | 0 | 0 | 0 |
| Technician (Laboratory) | 290 | 61 | 2 | 1 | 2 | 0 | 0 |
| Technician (X-rays) | 66 | 9 | 3 | 0 | 0 | 0 | 0 |
| Technical Officer | 85 | 11 | 1 | 0 | 0 | 0 | 0 |
| Trainee | 17 | 3 | 0 | 0 | 0 | 0 | 0 |

## The Distribution of Whole Body Dose by Job Types, 2013 (Continued)

| | $x \leq 0.17$ | $0.17 < x \leq 0.75$ | $0.75 < x \leq 1.5$ | $1.5 < x \leq 3.0$ | $3.0 < x \leq 6.0$ | $6.0 < x \leq 10$ | $10 < x$ |
|---|---|---|---|---|---|---|---|
| Veterinarian | 147 | 15 | 2 | 0 | 1 | 0 | 0 |
| Vet Assistant | 94 | 14 | 1 | 1 | 0 | 0 | 0 |
| Ward Attendant | 303 | 65 | 8 | 2 | 0 | 0 | 0 |
| Ward Manager | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Workman | 81 | 20 | 4 | 1 | 0 | 0 | 0 |
| X-ray Assistant | 30 | 4 | 0 | 0 | 0 | 0 | 0 |
| X-ray Crystallographer | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| No Job Code | 599 | 92 | 17 | 4 | 3 | 0 | 0 |
| Total | 8167 | 1295 | 168 | 61 | 21 | 3 | 0 |

Remark: x represents the dose values in mSv

## Table 4

## The Distribution of Finger Dose by Job Types, 2013

| | x<=1 | 1<x<=10 | 10<x<=100 | 100<x<=200 | 200<x<=500 | 500<x |
|---|---|---|---|---|---|---|
| Chemist | 3 | 0 | 4 | 3 | 0 | 0 |
| Consultant (Medical) | 1 | 0 | 0 | 0 | 0 | 0 |
| Engineer | 8 | 0 | 0 | 0 | 0 | 0 |
| Laboratory Attendant | 2 | 0 | 0 | 0 | 0 | 0 |
| Lecturer | 1 | 0 | 0 | 0 | 0 | 0 |
| Medical Officer | 33 | 1 | 0 | 0 | 0 | 0 |
| Medical Officer (Therapeutic) | 19 | 0 | 0 | 0 | 0 | 0 |
| Medical Technologist | 1 | 0 | 0 | 0 | 0 | 0 |
| Pharmacist | 1 | 2 | 0 | 0 | 0 | 0 |
| Physicist (Medical) | 5 | 1 | 0 | 0 | 0 | 0 |
| Radiographer (Diagnostic) | 32 | 22 | 2 | 0 | 0 | 0 |
| Radiographer (Therapeutic) | 1 | 0 | 0 | 0 | 0 | 0 |
| Radiologist | 2 | 0 | 0 | 0 | 0 | 0 |
| Scientific Officer | 1 | 1 | 0 | 0 | 0 | 0 |
| Technician (Laboratory) | 9 | 0 | 2 | 0 | 0 | 0 |
| Ward Attendant | 3 | 0 | 0 | 0 | 0 | 0 |
| No Job Code | 30 | 8 | 3 | 0 | 0 | 0 |
| Total | 152 | 35 | 11 | 3 | 0 | 0 |

Remark: x represents the dose values in mSv

## Table 5

## The Distribution of Whole Body Dose by Gender, 2013

| | $x \leq 0.17$ | $0.17 < x \leq 0.75$ | $0.75 < x \leq 1.5$ | $1.5 < x \leq 3.0$ | $3.0 < x \leq 6.0$ | $6.0 < x \leq 10$ | $10 < x$ |
|---|---|---|---|---|---|---|---|
| Male | 4006 | 720 | 98 | 42 | 14 | 1 | 0 |
| Female | 4161 | 575 | 70 | 19 | 7 | 2 | 0 |
| Total | 8167 | 1295 | 168 | 61 | 21 | 3 | 0 |

Remark: x represents the dose values in mSv

## Table 6

## The Distribution of Finger Dose by Gender, 2013

| | $x \leq 1$ | $1 < x \leq 10$ | $10 < x \leq 100$ | $100 < x \leq 200$ | $200 < x \leq 500$ | $500 < x$ |
|---|---|---|---|---|---|---|
| Male | 118 | 26 | 11 | 3 | 0 | 0 |
| Female | 34 | 9 | 0 | 0 | 0 | 0 |
| Total | 152 | 35 | 11 | 3 | 0 | 0 |

Remark: x represents the dose values in mSv