核能安全委員會
Nuclear Safety Commission

2024

Statistics of Ionizing Radiation Applications and Management

August 2024

PreFace

As technology rapidly advances and develops, applications of ionizing radiation have been widely adopted in medicine, agriculture, industry, border controls, and academic research. As the use of radioactive materials and equipment capable of producing ionizing radiation increases, the demand for personnel qualified to operate radiation sources and manage radiation operations has also increased.

The Nuclear Safety Committee, formerly the Atomic Energy Council of the Executive Yuan, was restructured into a central third-level independent agency on September 27, 2023. This reorganization was part of the Executive Yuan’ s adjustments to its structure, aimed at more effectively fulfilling responsibilities related to nuclear safety management and oversight. In order to provide a complete overview of ionizing radiation applications in various fields, the Nuclear Safety Commission (NSC) has compiled the latest data, tables, and figures for review by radiation personnel and related stakeholders. The 2024 statistics were summarized below, please feel free to contact us if there is any mistake.

1. Radiation source licenses:

   Radiation source licenses are divided into "medical use" and "non-medical use" depending on the specific use. There were 22,701 medical use licenses and 16,642 non-medical use licenses, with a total of 39,343 licenses in Taiwan.

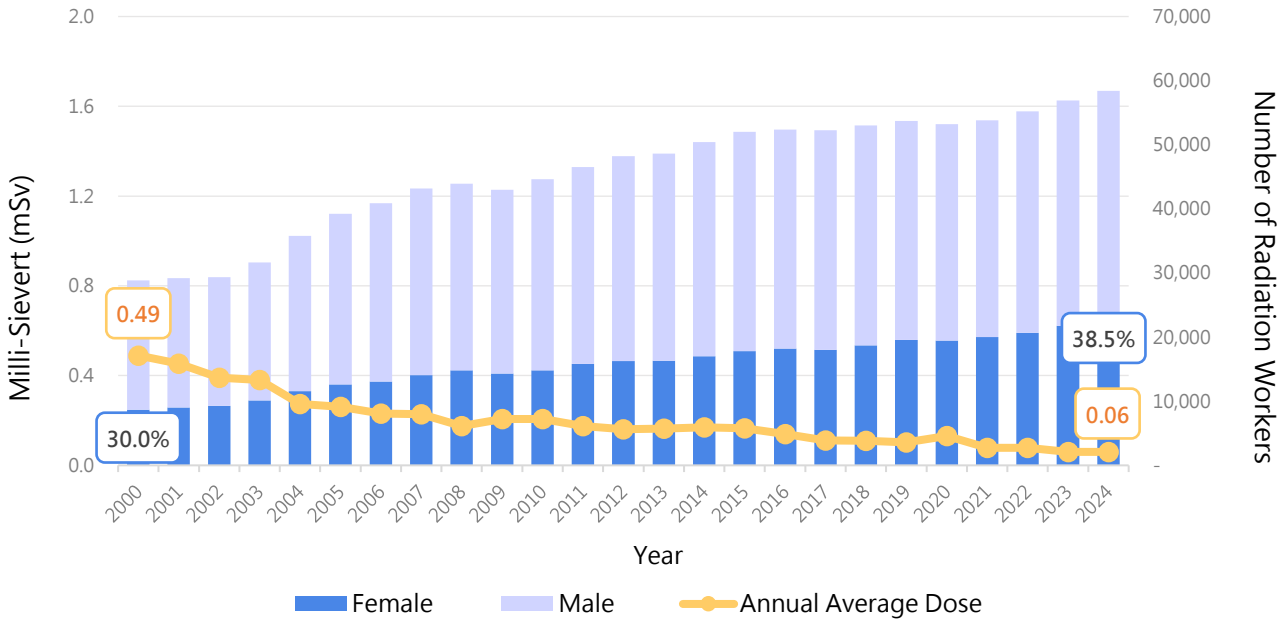
Radiation Sources / Type	Equipment	Materials	Total
Medical Use	22,167	534	22,701
Non-Medical Use	12,289	4,353	16,642
Total	34,456	4,887	39,343

Unit：Number of Licenses

2. Personnel dose:

In order to ensure the radiation safety of radiation workers, the NSC requires that the occupational exposure of radiation workers shall not exceed the dose limit in accordance with Article 15 of the "Ionizing Radiation Protection Act". Therefore, employers should implement personal radiation monitoring. Moreover, according to the "Safety Standards for Protection against Ionizing Radiation" revised and implemented in 2003, the dose limits of occupational exposure for radiation workers is "the effective dose shall not exceed 100 mSv over a cycle of five consecutive years, and not exceed 50 mSv in any single year".

There were 58,416 radiation workers in Taiwan. The male to female ratio was 61.5%：38.5%. Since 2011, the proportion of female employees has remained steady at more than 1/3 and has stably increased year by year. The annual average occupational dose was 0.06 mSv in 2024. For further details, please refer to the "Occupational Radiation Exposure Statistics Annual Report 2024". (https://www.nusc.gov.tw/u/v/58)



3. Personnel certificates:

Personnel certificates issued by the NSC are divided into two categories: (1) "Radiation Safety Certificate" for personnel who are only qualified to operate radiation sources; and (2) "Radiation Protection Personnel Certificate" for those qualified to operate radiation sources and are also responsible for radiation operation management. The personnel certificates are valid for a period of 6 years. Within six months prior to its expiration, the applicant may fill out an application form and apply to the competent authority for a certificate renewal.

(1) Radiation Safety Certificate:

Since 2003, the NSC has issued a total of 14,204 Radiation Safety Certificates, with the male to female ratio of 83.9% : 16.1%. In 2024, a total of 4,577 certificates had been issued, and the male to female ratio was 77.6%: 22.4%.

(2) Radiation Protection Personnel Certificate:

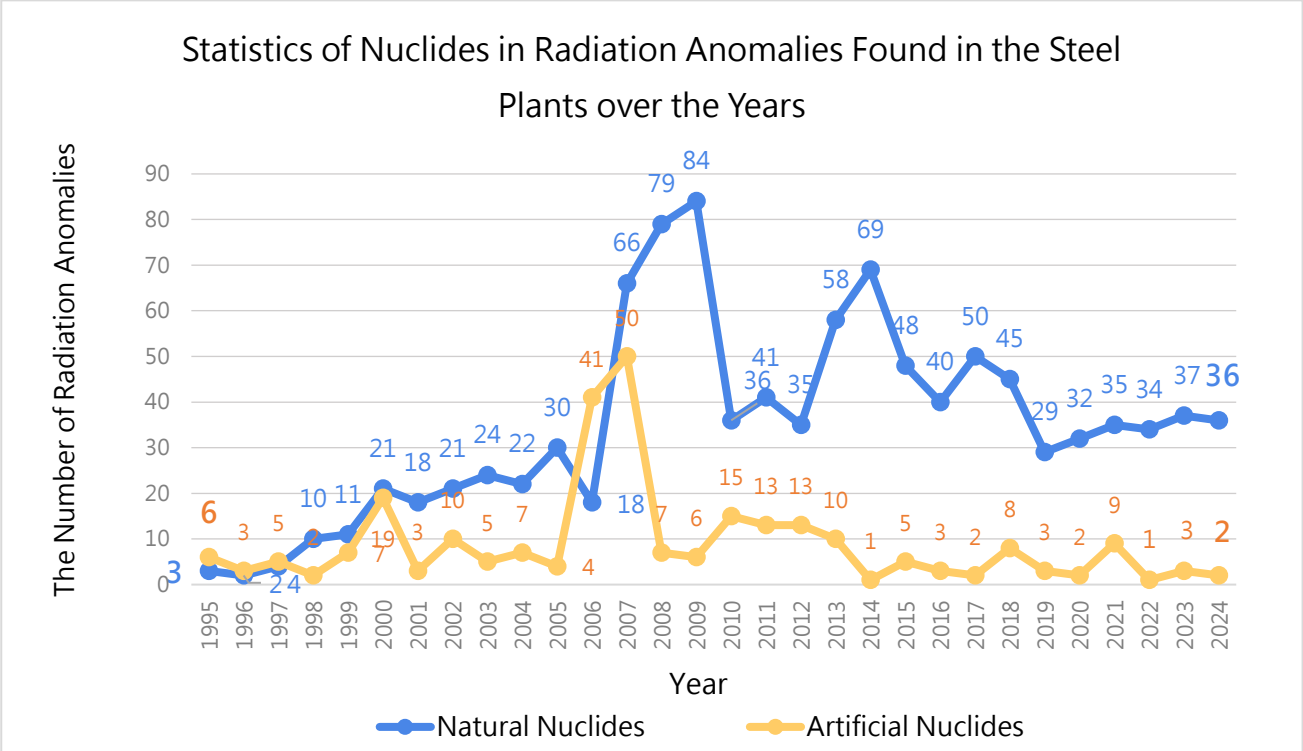
Since 2003, the NSC has issued a total of 4,190 Radiation Protection Personnel Certificates, with the male to female ratio of 65.0 % : 35.0%. In 2024, a total of 2,757 certificates had been issued, and the male to female ratio was 63.1% : 36.9%.

The table below shows the gender ratio is getting closer among people aged between 18 and 49 who possess Radiation Protection Personnel Certificates. This sign indicates an increasing trend of women holding important positions in the workplace. Through strengthening radiation protection knowledge and safety awareness of control measures, gender inequality in the workplace is declining.

Number of Issued Certificates in 2024						
	Radiation Safety Certificate			Radiation Protection Personnel Certificate		
Age Interval	Female	Male	Gender Ratio (Female: male, Unit: %)	Female	Male	Gender Ratio (Female: male, Unit: %)
	(Unit：people)			(Unit：people)		
80~	0	7	0：100	0	4	0：100
70~79	0	42	0：100	3	67	4.3：95.7
60~69	78	522	13.0：87.0	64	336	16.0：84.0
50~59	192	916	17.3：82.7	203	431	32.0：68.0
40~49	336	1,139	22.8：77.2	355	468	43.1：56.9
30~39	298	705	29.7：70.3	295	357	45.2：54.8
18~29	123	219	36.0：64.0	98	76	56.3：43.7
Total	1,027	3,550	22.4：77.6	1,018	1,739	36.9：63.1

4. The number of radiation anomalies found in the steel plants:

   A total of 38 cases were found in 2024. Anomalies caused by natural radionuclides account for 94.7% (36 out of 38) of radiation anomalies found in steel plants.

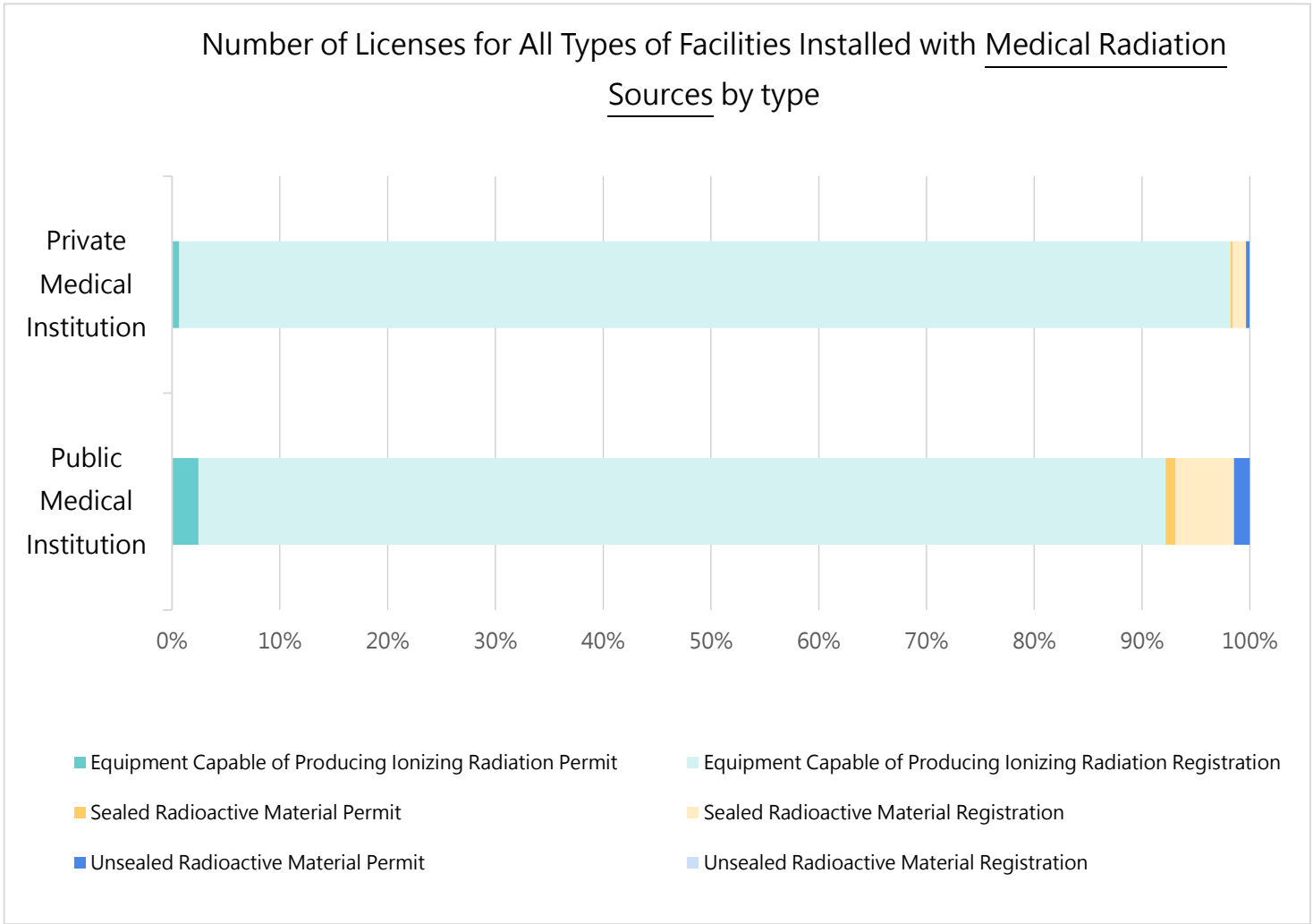


Content

1. Radiation Sources Licenses (Medical Use)

(1) Number of Licenses for All Types of Facilities Installed with Medical Radiation Sources by type

Type / Facility	Equipment Capable of Producing Ionizing Radiation		Sealed Radioactive Material		Unsealed Radioactive Material		Total
	Permit	Registration	Permit	Registration	Permit	Registration	
Public Medical Institution	53	1,950	20	118	32	0	2,173
Private Medical Institution	138	20,026	42	252	68	2	20,528
Total	191	21,976	62	370	100	2	22,701



(2) Number of Licenses for All Types of Medical Institution Installed with Medical Radiation Sources by county/city

Institution / County/City	Permit						Registration					
	Public Medical Institutions			Private Medical Institutions			Public Medical Institutions			Private Medical Institutions		
	Equip-ment	Seal-ed	Un-sealed	Equip-ment	Seal-ed	Un-sealed	Equip-ment	Seal-ed	Un-sealed	Equip-ment	Seal-ed	Un-sealed
Keelung City	0	0	0	2	0	2	39	0	0	251	2	0
Taipei City	27	8	11	16	6	9	540	82	0	3,463	43	2
New Taipei City	1	0	2	22	7	9	109	1	0	3,088	40	0
Taoyuan City	1	1	2	14	3	7	110	1	0	1,871	32	0
Hsinchu (County and City)	2	1	2	3	1	2	106	4	0	834	13	0
Miaoli County	0	0	0	2	0	1	26	0	0	359	2	0
Taichung City	3	3	4	22	7	10	118	3	0	2,858	33	0
Changhua County	1	0	0	6	3	3	24	0	0	846	10	0
Nantou County	1	0	1	1	0	0	50	0	0	271	0	0
Yunlin County	2	1	2	2	0	1	71	6	0	322	0	0
Chiayi (County and City)	1	1	1	7	3	4	73	0	0	563	19	0
Tainan City	4	2	1	11	2	4	144	8	0	1,548	11	0
Kaohsiung City	7	2	4	20	6	7	196	6	0	2,458	27	0
Pingtung County	2	1	1	2	1	2	51	3	0	492	1	0
Yilan County	1	0	1	3	0	2	78	4	0	319	5	0
Hualien County	0	0	0	3	3	3	89	0	0	261	11	0
Taitung County	0	0	0	2	0	2	47	0	0	125	3	0
Penghu County	0	0	0	0	0	0	42	0	0	47	0	0
Kinmen County	0	0	0	0	0	0	20	0	0	50	0	0
Lienchiang County	0	0	0	0	0	0	17	0	0	0	0	0
Total	53	20	32	138	42	68	1,950	118	0	20,026	252	2

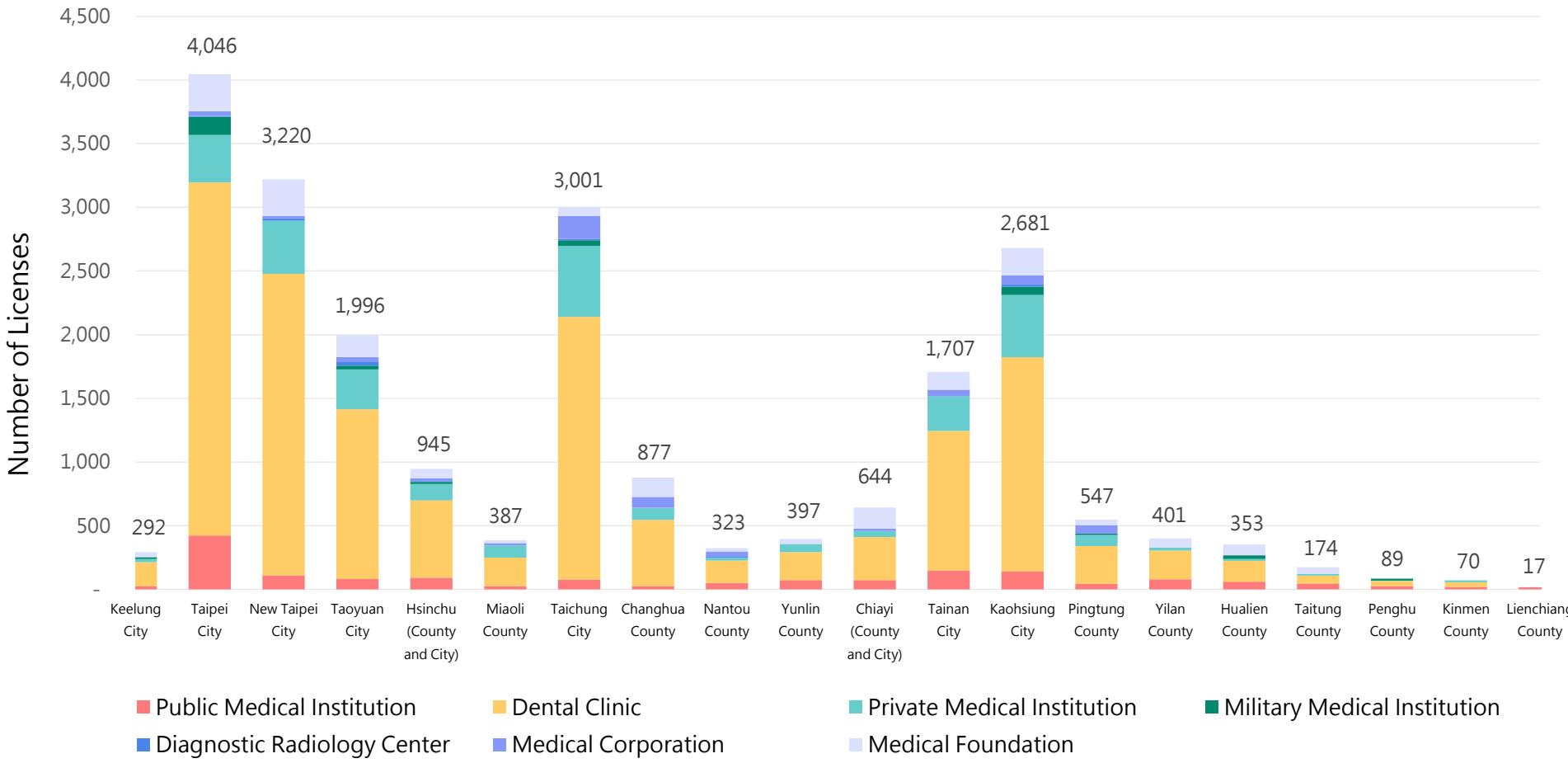
Remarks:

1. Equipment: Equipment capable of producing ionizing radiation.
2. Sealed: Sealed radioactive material.
3. Unsealed: Unsealed radioactive material.

(3) Number of Licenses for All Types of Medical Institution Installed with Equipment Capable of Producing Ionizing Radiation by county/city

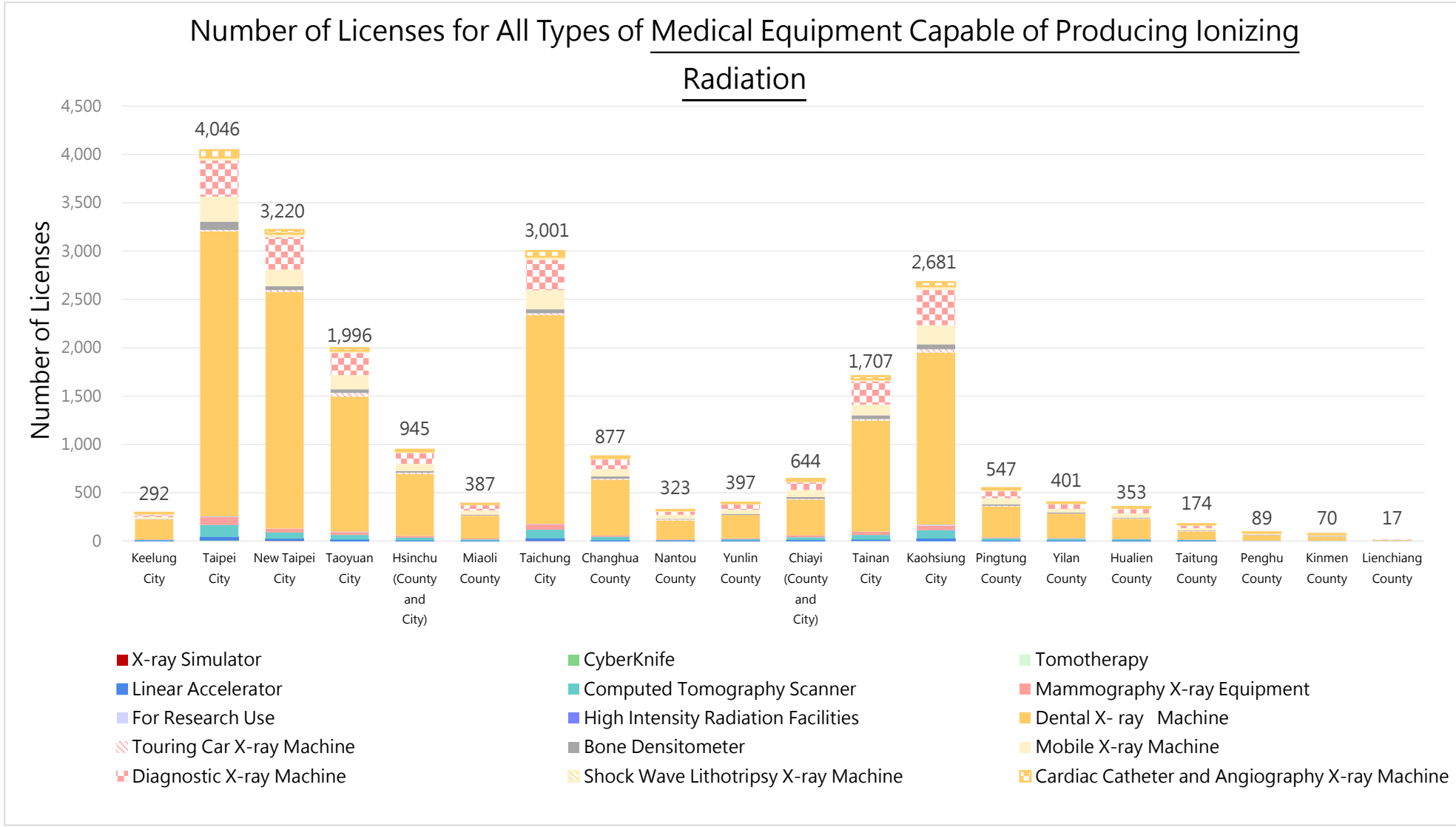
Institution / County/City	Public Medical Institution	Dental Clinic	Private Medical Institution	Military Medical Institution	Diagnostic Radiology Center	Medical Corporation	Medical Foundation	Total
Keelung City	24	189	25	15	0	0	39	292
Taipei City	424	2,772	372	143	6	37	292	4,046
New Taipei City	110	2,368	417	0	18	19	288	3,220
Taoyuan City	82	1,333	313	29	32	36	171	1,996
Hsinchu(County and City)	91	609	127	17	7	23	71	945
Miaoli County	26	223	96	0	0	18	24	387
Taichung City	78	2,061	559	43	10	181	69	3,001
Changhua County	25	521	95	0	0	85	151	877
Nantou County	51	176	23	0	5	40	28	323
Yunlin County	73	219	64	0	0	0	41	397
Chiayi (County and City)	74	336	49	0	0	18	167	644
Tainan City	148	1,096	272	0	2	49	140	1,707
Kaohsiung City	140	1,682	491	63	16	76	213	2,681
Pingtung County	44	297	87	9	0	67	43	547
Yilan County	79	227	22	0	0	0	73	401
Hualien County	60	165	13	29	0	0	86	353
Taitung County	47	61	12	0	0	0	54	174
Penghu County	25	41	3	17	0	0	3	89
Kinmen County	20	36	14	0	0	0	0	70
Lienchiang County	17	0	0	0	0	0	0	17
Total	1,638	14,412	3,054	365	96	649	1,953	22,167

Number of Licenses for All Types of Medical Institution Installed with Equipment Capable of Producing Ionizing Radiation by county/city



(4) Number of Licenses for All Types of Medical Equipment Capable of Producing Ionizing Radiation by county/city

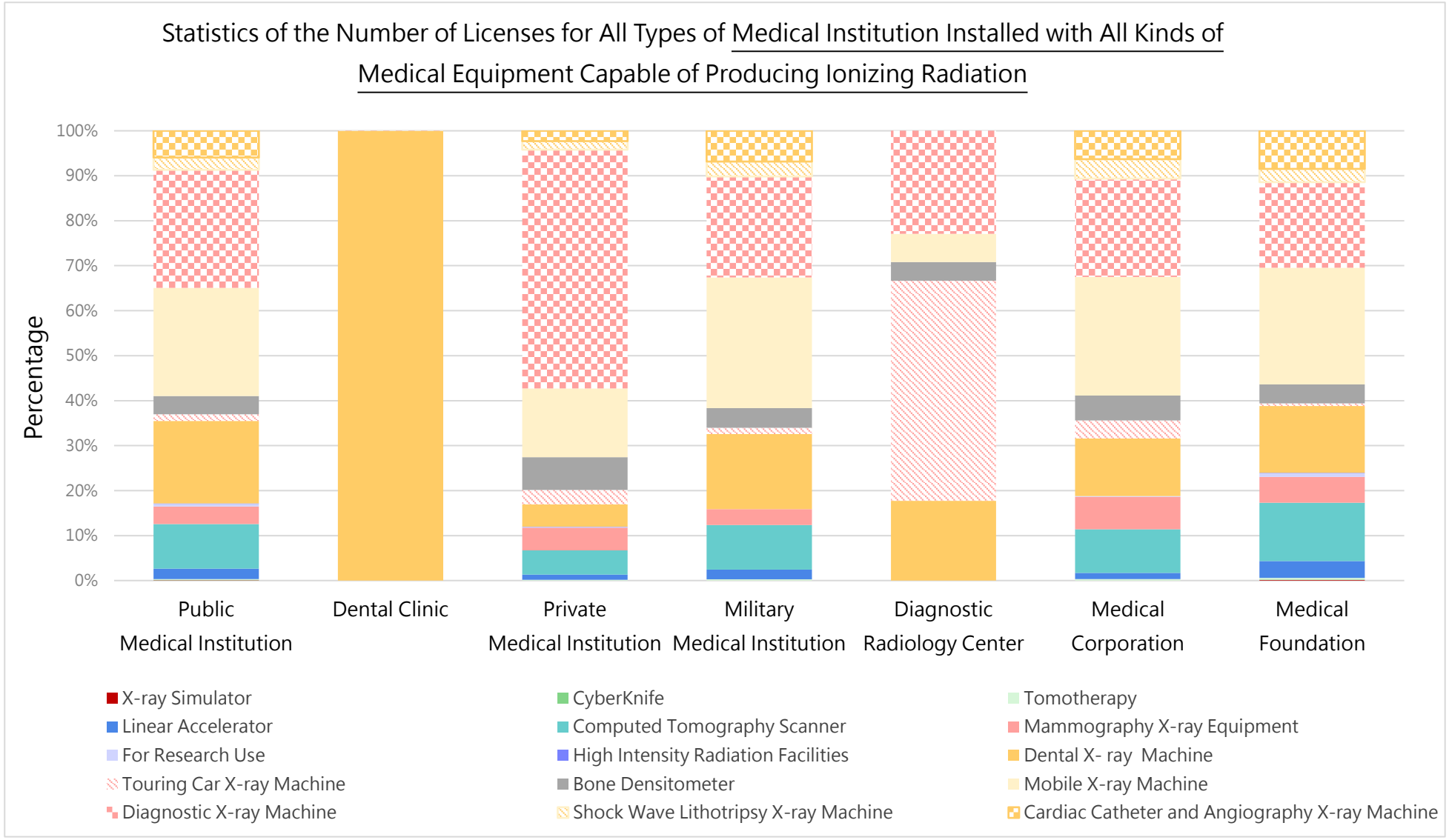
Equipment / County/City	X-ray Simulator	Cyberknife	Tomotherapy	Linear Accelerator	Computed Tomography Scanner	Mammo-graphy X-ray Equipment	For Research Use	High Intensity Radiation Facilities	Dental X- ray Machine	Touring Car X-ray Machine	Bone Densito-meter	Mobile X-ray Machine	Diagnostic X-ray Machine	Shock Wave Lithotripsy X-ray Machine	Cardiac Catheter And Angiography X-ray Machine	Total
Keelung City	0	0	0	2	10	6	1	0	203	0	3	23	33	6	5	292
Taipei City	0	1	7	32	125	81	6	3	2,949	16	86	258	382	23	77	4,046
New Taipei City	1	1	4	18	63	40	1	0	2,447	22	39	175	342	27	40	3,220
Taoyuan City	0	0	0	14	49	30	4	1	1,396	40	35	148	237	15	27	1,996
Hsinchu (County and City)	0	0	1	4	29	16	2	0	640	15	18	73	119	11	17	945
Miaoli County	0	0	0	2	15	8	0	0	236	4	6	45	62	5	4	387
Taichung City	1	0	3	21	91	54	4	1	2,162	20	41	200	320	25	58	3,001
Changhua County	0	0	0	7	36	16	0	0	575	9	24	76	109	8	17	877
Nantou County	0	0	0	2	8	6	0	0	196	9	8	42	41	6	5	323
Yunlin County	1	0	0	4	14	9	1	0	240	0	10	43	65	4	6	397
Chiayi (County and City)	0	0	0	8	31	18	1	0	371	7	18	75	84	8	23	644
Tainan City	0	2	2	11	48	32	2	0	1,150	14	40	112	248	11	35	1,707
Kaohsiung City	0	0	2	24	87	45	8	1	1,783	34	52	198	373	28	46	2,681
Pingtung County	0	0	0	4	24	10	0	0	319	8	13	64	82	10	13	547
Yilan County	0	0	0	4	20	6	1	0	252	1	12	35	58	4	8	401
Hualien County	0	0	0	3	15	5	0	0	206	5	8	44	53	5	9	353
Taitung County	0	0	0	2	10	4	0	0	84	4	5	26	33	3	3	174
Penghu County	0	0	0	0	2	2	0	0	55	0	3	8	14	1	4	89
Kinmen County	0	0	0	0	2	1	0	0	40	3	6	5	11	1	1	70
Lienchiang County	0	0	0	0	1	1	0	0	8	0	0	2	5	0	0	17
Total	3	4	19	162	680	390	31	6	15,312	211	427	1,652	2,671	201	398	22,167


Number of Licenses for All Types of Medical Equipment Capable of Producing Ionizing Radiation
Number of Licenses
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
292
4,046
3,220
1,996
945
387
3,001
877
323
397
644
1,707
2,681
547
401
353
174
89
70
17
Keelung City
Taipei City
New Taipei City
Taoyuan City
Hsinchu (County and City)
Miaoli County
Taichung City
Changhua County
Nantou County
Yunlin County
Chiayi (County and City)
Tainan City
Kaohsiung City
Pingtung County
Yilan County
Hualien County
Taitung County
Penghu County
Kinmen County
Lienchiang County
X-ray Simulator
CyberKnife
Tomotherapy
Linear Accelerator
Computed Tomography Scanner
Mammography X-ray Equipment
For Research Use
High Intensity Radiation Facilities
Dental X- ray Machine
Touring Car X-ray Machine
Bone Densitometer
Mobile X-ray Machine
Diagnostic X-ray Machine
Shock Wave Lithotripsy X-ray Machine
Cardiac Catheter and Angiography X-ray Machine

(5) Statistics of the Number of Licenses for All Types of Medical Institution Installed with All Kinds of Medical Equipment Capable of Producing Ionizing Radiation

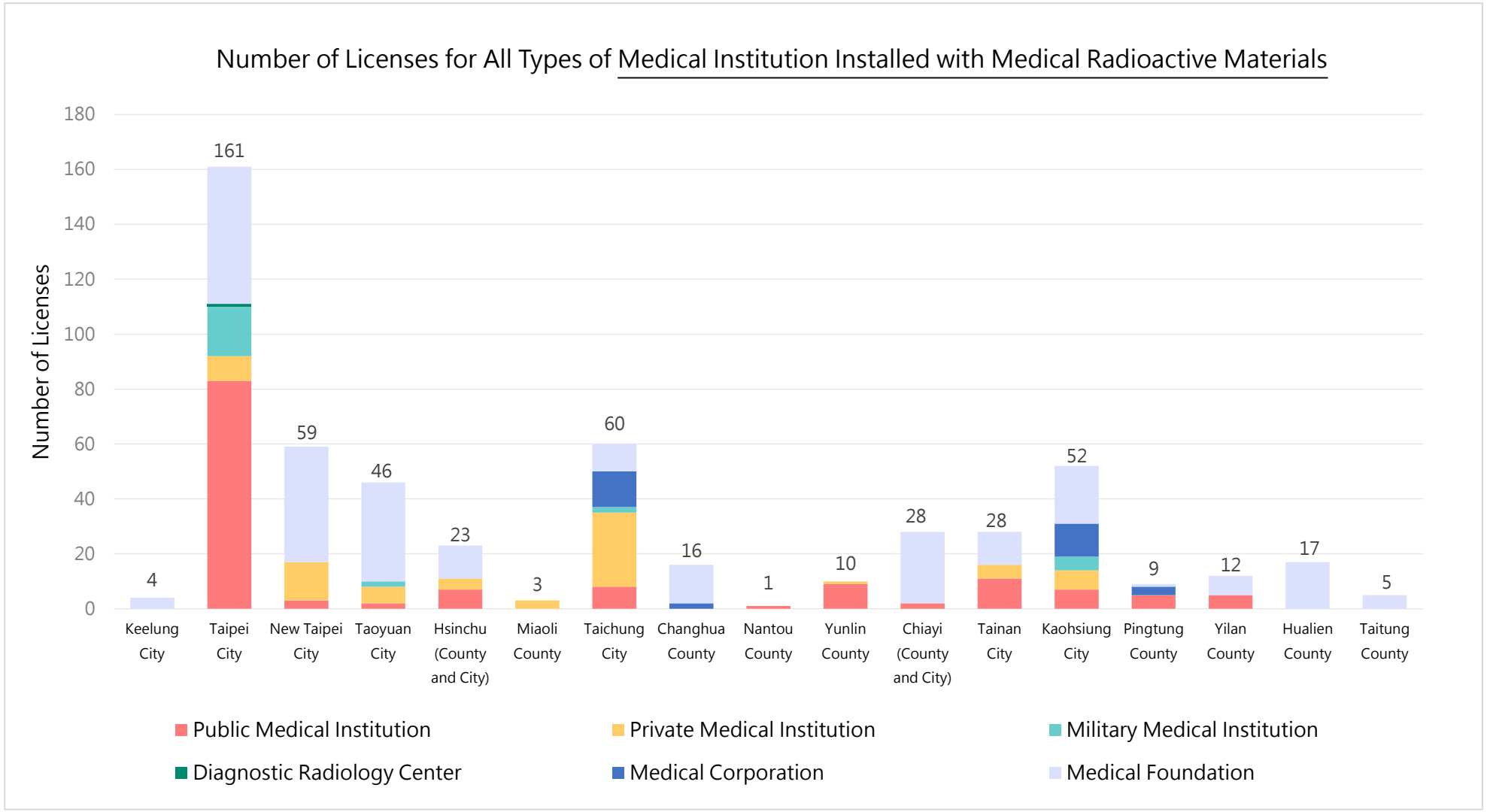
Equipment / Institution	X-ray Simulator	Cyberknife	Tomotherapy	Linear Accelerator	Computed Tomography Scanner	Mammography X-ray Equipment	For Research Use	High Intensity Radiation Facilities	Dental X- ray Machine	Touring Car X-ray Machine	Bone Densitometer	Mobile X-ray Machine	Diagnostic X-ray Machine	Shock Wave Lithotripsy X-ray Machine	Cardiac Catheter and Angiography X-ray Machine	Total
Public Medical Institution	1	2	2	38	163	64	9	2	300	25	66	394	430	45	97	1,638
Dental Clinic	0	0	0	0	0	0	0	0	14,409	0	0	2	1	0	0	14,412
Private Medical Institution	0	0	6	34	165	154	5	2	152	97	222	467	1,622	58	70	3,054
Military Medical Institution	0	0	1	8	36	13	0	0	61	5	16	106	82	12	25	365
Diagnostic Radiology Center	0	0	0	0	0	0	0	0	17	47	4	6	22	0	0	96
Medical Corporation	0	0	2	9	63	47	1	0	83	26	36	171	142	28	41	649
Medical Foundation	2	2	8	73	253	112	16	2	290	11	83	506	372	58	165	1,953
Total	3	4	19	162	680	390	31	6	15,312	211	427	1,652	2,671	201	398	22,167

Remarks: Equipment capable of producing ionizing radiation includes fixed-type and touring-type vehicles, excluding biopsy.


Statistics of the Number of Licenses for All Types of Medical Institution Installed with All Kinds of Medical Equipment Capable of Producing Ionizing Radiation
Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Public Medical Institution
Dental Clinic
Private Medical Institution
Military Medical Institution
Diagnostic Radiology Center
Medical Corporation
Medical Foundation
X-ray Simulator
CyberKnife
Tomotherapy
Linear Accelerator
Computed Tomography Scanner
Mammography X-ray Equipment
For Research Use
High Intensity Radiation Facilities
Dental X- ray Machine
Touring Car X-ray Machine
Bone Densitometer
Mobile X-ray Machine
Diagnostic X-ray Machine
Shock Wave Lithotripsy X-ray Machine
Cardiac Catheter and Angiography X-ray Machine

(6) Number of Licenses for All Types of Medical Institution Installed with Medical Radioactive Materials by county/city

Institution / County/City	Public Medical Institution	Private Medical Institution	Military Medical Institution	Diagnostic Radiology Center	Medical Corporation	Medical Foundation	Total
Keelung City	0	0	0	0	0	4	4
Taipei City	83	9	18	1	0	50	161
New Taipei City	3	14	0	0	0	42	59
Taoyuan City	2	6	2	0	0	36	46
Hsinchu (County and City)	7	4	0	0	0	12	23
Miaoli County	0	3	0	0	0	0	3
Taichung City	8	27	2	0	13	10	60
Changhua County	0	0	0	0	2	14	16
Nantou County	1	0	0	0	0	0	1
Yunlin County	9	1	0	0	0	0	10
Chiayi (County and City)	2	0	0	0	0	26	28
Tainan City	11	5	0	0	0	12	28
Kaohsiung City	7	7	5	0	12	21	52
Pingtung County	5	0	0	0	3	1	9
Yilan County	5	0	0	0	0	7	12
Hualien County	0	0	0	0	0	17	17
Taitung County	0	0	0	0	0	5	5
Total	143	76	27	1	30	257	534

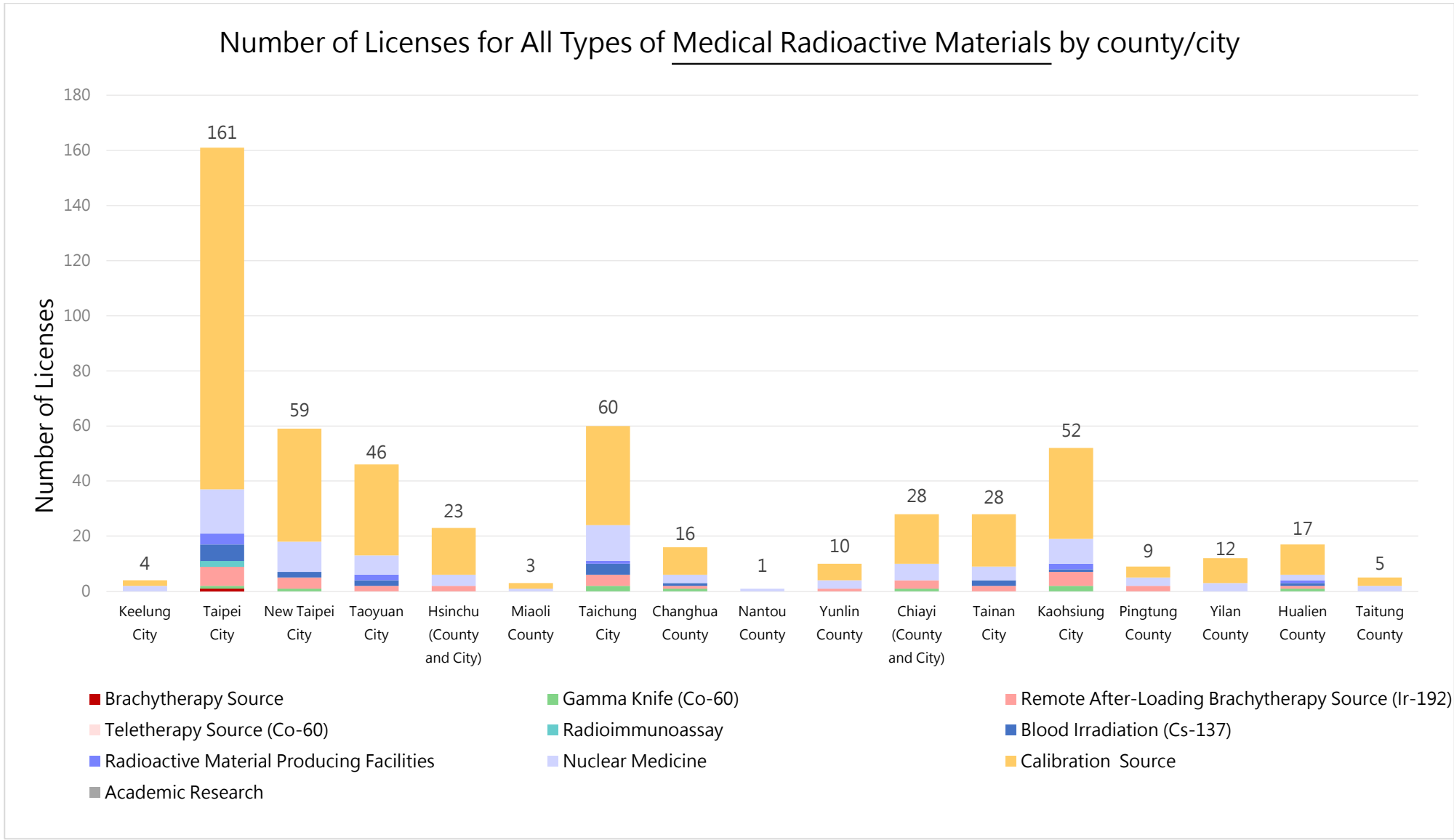

Number of Licenses for All Types of Medical Institution Installed with Medical Radioactive Materials
Number of Licenses
180
160
140
120
100
80
60
40
20
0
4
161
59
46
23
3
60
16
1
10
28
28
52
9
12
17
5
Keelung City
Taipei City
New Taipei City
Taoyuan City
Hsinchu (County and City)
Miaoli County
Taichung City
Changhua County
Nantou County
Yunlin County
Chiayi (County and City)
Tainan City
Kaohsiung City
Pingtung County
Yilan County
Hualien County
Taitung County
Public Medical Institution
Private Medical Institution
Military Medical Institution
Diagnostic Radiology Center
Medical Corporation
Medical Foundation

(7) Number of Licenses for All Types of Medical Radioactive Materials by county/city

Radioactive Material / County/City	Brachytherapy Source	Gamma Knife (Co-60)	Remote After-Loading Brachytherapy Source (Ir-192)	Teletherapy Source (Co-60)	Radioimmuno-assay(RIA)[1]	Blood Irradiation (Cs-137)	Radioactive Material Producing Facilities[2]	Nuclear Medicine[3]	Calibration Source[4]	Total
Keelung City	0	0	0	0	0	0	0	2	2	4
Taipei City	1	1	7	0	2	6	4	16	124	161
New Taipei City	0	1	4	0	0	2	0	11	41	59
Taoyuan City	0	0	2	0	0	2	2	7	33	46
Hsinchu (County and City)	0	0	2	0	0	0	0	4	17	23
Miaoli County	0	0	0	0	0	0	0	1	2	3
Taichung City	0	2	4	0	0	4	1	13	36	60
Changhua County	0	1	1	0	0	1	0	3	10	16
Nantou County	0	0	0	0	0	0	0	1	0	1
Yunlin County	0	0	1	0	0	0	0	3	6	10
Chiayi (County and City)	0	1	3	0	0	0	0	6	18	28
Tainan City	0	0	2	0	0	2	0	5	19	28
Kaohsiung City	0	2	5	0	0	1	2	9	33	52
Pingtung County	0	0	2	0	0	0	0	3	4	9
Yilan County	0	0	0	0	0	0	0	3	9	12
Hualien County	0	1	1	0	0	1	1	2	11	17
Taitung County	0	0	0	0	0	0	0	2	3	5
Total	1	9	34	0	2	19	10	91	368	534

Remarks:

1. Only the radioactive materials used for RIA by diagnostic radiology center and foundation are included; those used by medical institutions are classified under the nuclear medicine category.
2. Radioactive material producing facilities mainly produce F-18, C-11, N-13, O-15, etc.
3. Unsealed radioactive materials used in nuclear medicine include Tc-99m, Tl-201, Ga-67, etc.
4. Sealed radioactive materials for calibration include Co-57, Ge-68, Cs-137, etc.

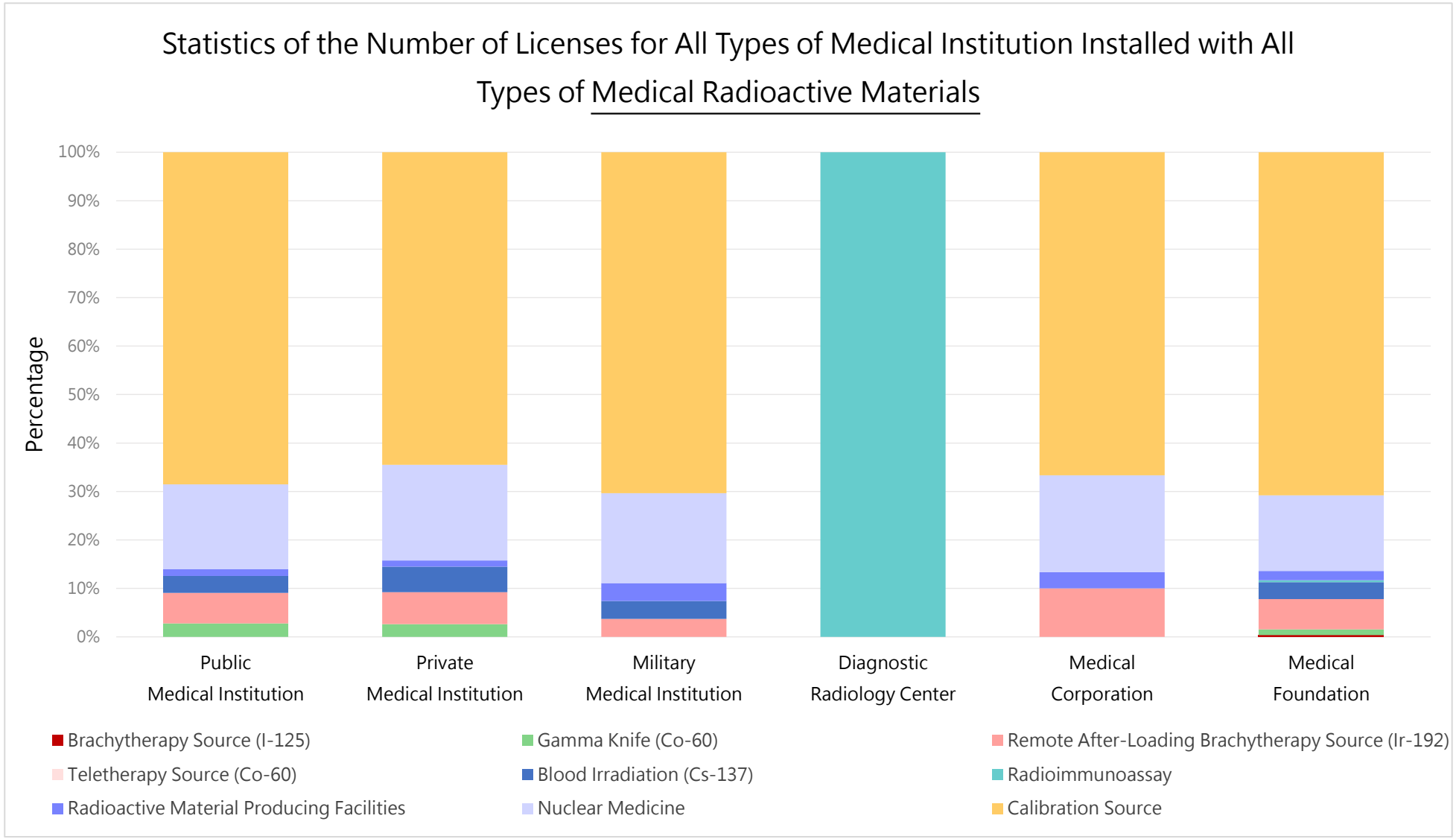

Number of Licenses for All Types of Medical Radioactive Materials by county/city
Number of Licenses
180
160
140
120
100
80
60
40
20
0
4
161
59
46
23
3
60
16
1
10
28
28
52
9
12
17
5
Keelung City
Taipei City
New Taipei City
Taoyuan City
Hsinchu (County and City)
Miaoli County
Taichung City
Changhua County
Nantou County
Yunlin County
Chiayi (County and City)
Tainan City
Kaohsiung City
Pingtung County
Yilan County
Hualien County
Taitung County
Brachytherapy Source
Gamma Knife (Co-60)
Remote After-Loading Brachytherapy Source (Ir-192)
Teletherapy Source (Co-60)
Radioimmunoassay
Blood Irradiation (Cs-137)
Radioactive Material Producing Facilities
Nuclear Medicine
Calibration Source
Academic Research

(8) Statistics of the Number of Licenses for All Types of Medical Institution Installed with All Types of Medical Radioactive Materials

Radioactive Material / Facility	Brachytherapy Source (I-125)	Gamma Knife (Co-60)	Remote After-Loading Brachytherapy Source (Ir-192)	Teletherapy Source (Co-60)	Blood Irradiation (Cs-137)	Radioimmuno-assay(RIA)[1]	Radioactive Material Producing Facilities[2]	Nuclear Medicine[3]	Calibration Source[4]	Total
Public Medical Institution	0	4	9	0	5	0	2	25	98	143
Private Medical Institution	0	2	5	0	4	0	1	15	49	76
Military Medical Institution	0	0	1	0	1	0	1	5	19	27
Diagnostic Radiology Center	0	0	0	0	0	1	0	0	0	1
Medical Corporation	0	0	3	0	0	0	1	6	20	30
Medical Foundation	1	3	16	0	9	1	5	40	182	257
Total	1	9	34	0	19	2	10	91	368	534

Remarks:

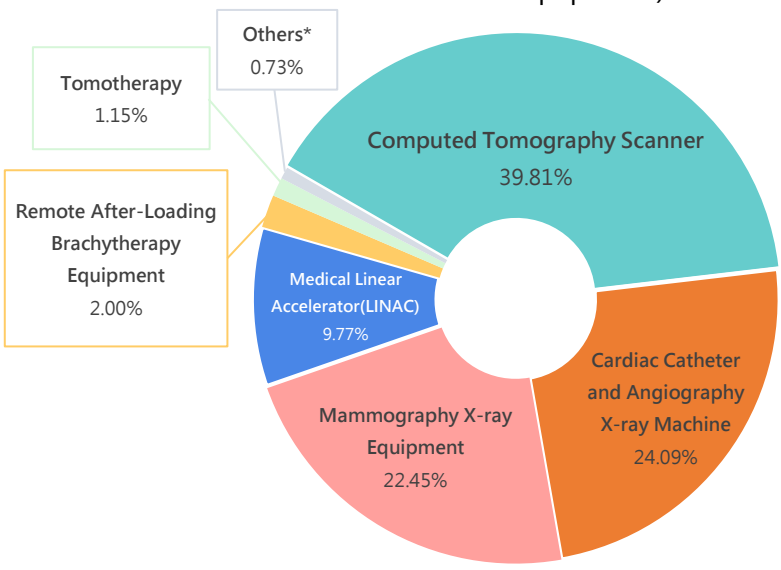
1. Only the radioactive materials used for RIA by diagnostic radiology center and foundation are included; those used by medical institutions are classified under the nuclear medicine category.
2. Radioactive material producing facilities mainly produce F-18, C-11, N-13, O-15, etc.
3. Unsealed radioactive materials used in nuclear medicine include Tc-99m, Tl-201, Ga-67, etc.
4. Sealed radioactive materials for calibration include Co-57, Ge-68, and Cs-137, etc.


Statistics of the Number of Licenses for All Types of Medical Institution Installed with All Types of Medical Radioactive Materials
Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Public Medical Institution
Private Medical Institution
Military Medical Institution
Diagnostic Radiology Center
Medical Corporation
Medical Foundation
Brachytherapy Source (I-125)
Gamma Knife (Co-60)
Remote After-Loading Brachytherapy Source (Ir-192)
Teletherapy Source (Co-60)
Blood Irradiation (Cs-137)
Radioimmunoassay
Radioactive Material Producing Facilities
Nuclear Medicine
Calibration Source

(9) Number of Licenses for All Types of Equipment that should Implement Radiation Medical Exposure Quality Assurance (not include disabled equipment)

Medical Equipment	Number of Licenses
Computed Tomography Scanner	656
Cardiac Catheter and Angiography X-ray Machine	397
Mammography X-ray Equipment	370
Medical Linear Accelerator(LINAC)	161
Remote After-Loading Brachytherapy Equipment	33
Tomotherapy	19
Gamma Knife	7
CyberKnife	4
X-ray Simulator	1
Co-60 Teletherapy Machine	0
Total	1,648

Number of Licenses for All Types of Equipment that should Implement Radiation Medical Exposure Quality Assurance(not include disabled equipment)

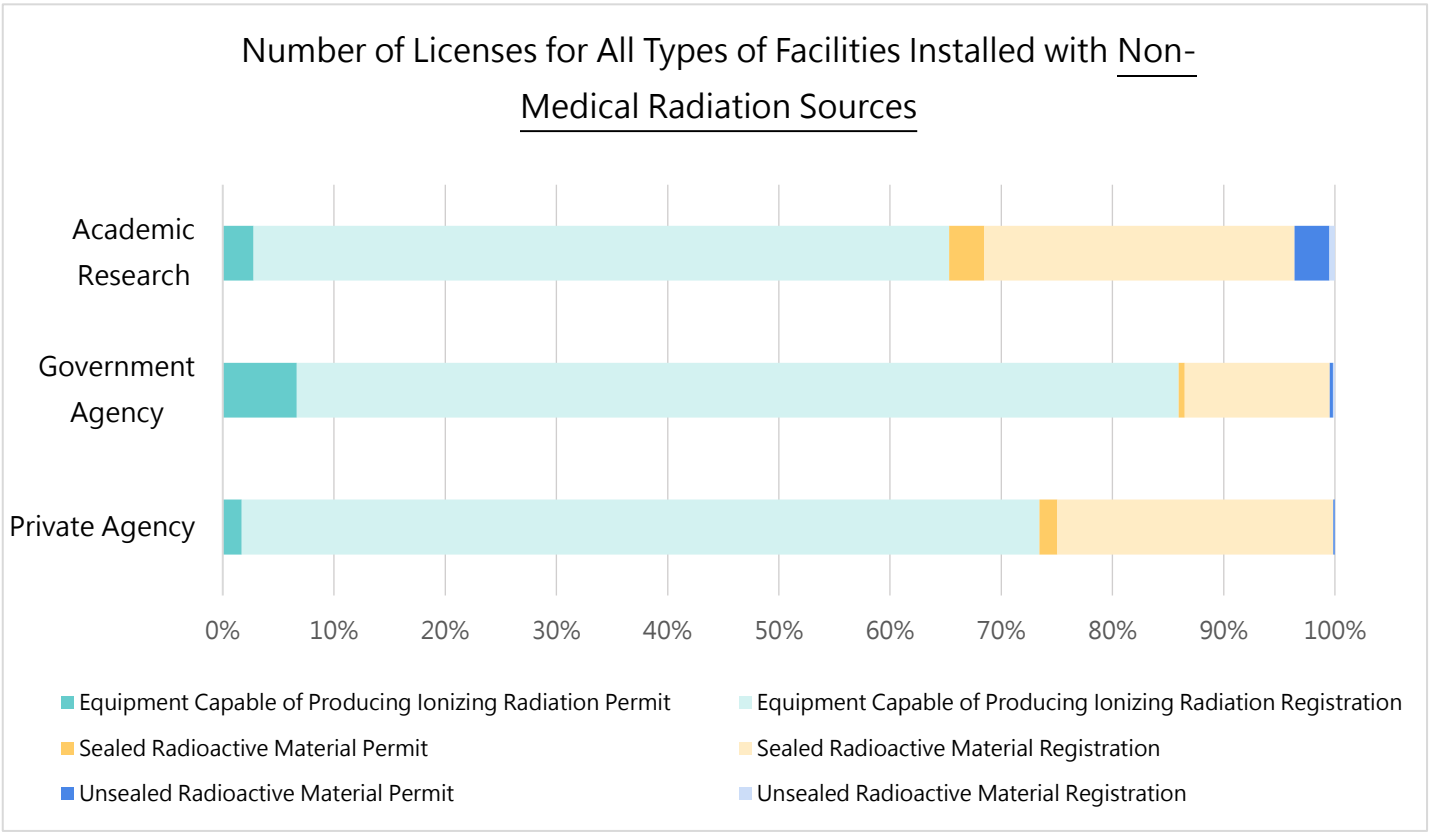


* Others category includes Gamma Knife (0.42%), CyberKnife (0.24%), and X-ray Simulator (0.06%).

2. Radiation Sources Licenses (Non-Medical Use)

(1) Number of Licenses for All Types of Facilities Installed with Non-Medical Radiation Sources by type

Type / Facility	Equipment Capable of Producing Ionizing Radiation		Sealed Radioactive Material		Unsealed Radioactive Material		Total
	Permit	Registration	Permit	Registration	Permit	Registration	
Private Agency	250	10,602	237	3,667	22	1	14,779
Government Agency	71	846	6	139	3	2	1,067
Academic Research	22	498	25	222	25	4	796
Total	343	11,946	268	4,028	50	7	16,642



(2) Number of Licenses for All Types of Facilities Installed with Non-Medical Radiation Sources by county/city

Facility / County/City	Permit									Registration								
	Private Agency			Government Agency			Academic Research			Private Agency			Government Agency			Academic Research		
	Equip-ment	Sealed	Unseal-ed	Equip-ment	Sealed	Unseal-ed	Equip-ment	Sealed	Unseal-ed	Equip-ment	Sealed	Unseal-ed	Equip-ment	Sealed	Unseal-ed	Equip-ment	Sealed	Unseal-ed
Keelung City	4	4	0	3	0	0	0	0	0	55	1	0	30	1	0	5	2	1
Taipei City	22	4	1	8	0	1	3	5	5	755	67	0	156	35	1	93	57	1
New Taipei City	12	7	9	6	3	1	0	0	0	1,507	220	0	57	37	0	11	0	0
Taoyuan City	43	14	2	21	0	0	9	14	8	2,250	475	1	286	23	0	55	51	0
Hsinchu(County and City)	10	7	1	1	0	0	7	5	3	1,150	480	0	11	1	0	114	34	0
Miaoli County	9	6	1	0	0	0	0	0	0	259	112	0	5	0	0	4	0	0
Taichung City	23	12	4	7	0	0	1	0	4	1,035	411	0	54	11	0	70	23	0
Changhua County	6	6	0	0	0	0	0	0	0	319	76	0	4	0	0	5	0	0
Nantou County	3	2	0	2	0	0	0	0	0	103	15	0	5	2	0	4	0	0
Yunlin County	6	33	0	0	0	0	2	0	0	206	208	0	4	0	0	10	2	0
Chiayi (County and City)	4	0	0	2	0	0	0	0	1	147	33	0	9	1	0	4	3	1
Tainan City	15	1	0	6	0	0	0	0	2	969	1,025	0	38	3	0	57	18	1
Kaohsiung City	84	139	3	6	1	1	0	1	1	1,554	388	0	105	16	0	38	18	0
Pingtung County	6	0	1	5	2	0	0	0	0	136	68	0	10	4	1	8	6	0
Yilan County	2	2	0	0	0	0	0	0	0	97	56	0	5	1	0	3	0	0
Hualien County	1	0	0	2	0	0	0	0	1	37	24	0	16	1	0	17	8	0
Taitung County	0	0	0	1	0	0	0	0	0	17	7	0	19	3	0	0	0	0
Penghu County	0	0	0	1	0	0	0	0	0	3	1	0	17	0	0	0	0	0

Facility / County/City	Permit									Registration								
	Private Agency			Government Agency			Academic Research			Private Agency			Government Agency			Academic Research		
	Equip-ment	Sealed	Unseal-ed	Equip-ment	Sealed	Unseal-ed	Equip-ment	Sealed	Unseal-ed	Equip-ment	Sealed	Unseal-ed	Equip-ment	Sealed	Unseal-ed	Equip-ment	Sealed	Unseal-ed
Lienchiang County	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0
Kinmen County	0	0	0	0	0	0	0	0	0	3	0	0	8	0	0	0	0	0
Total	250	237	22	71	6	3	22	25	25	10,602	3,667	1	846	139	2	498	222	4

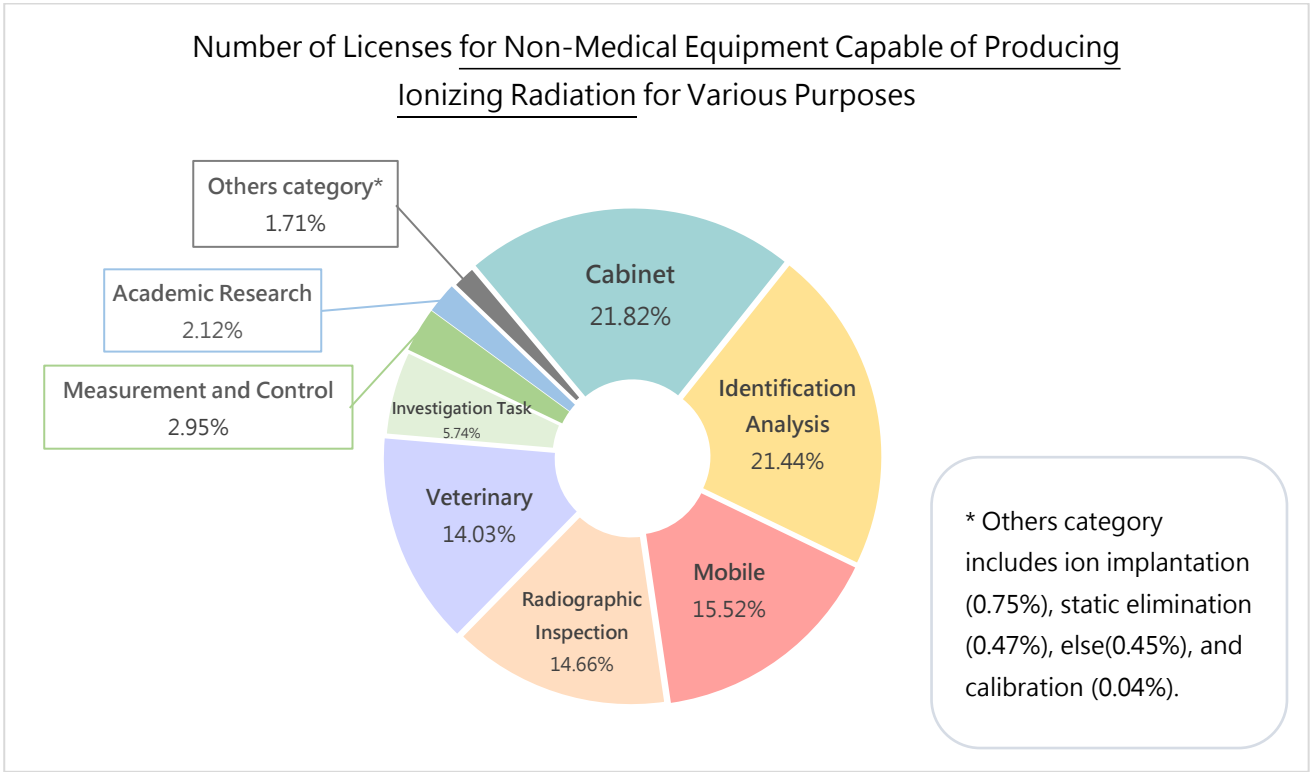
Remarks:

1. Equipment: Equipment capable of producing ionizing radiation.
2. Sealed: Sealed radioactive material.
3. Unsealed: Unsealed radioactive material.

(3) Number of Licenses for Non-Medical Equipment Capable of Producing Ionizing Radiation for Various Purposes

Equipment Usage	Number of Licenses
Identification Analysis	2,635
Radiographic Inspection	1,801
Veterinary	1,724
Academic Research	261
Investigation Task	706
Measurement and Control	363
Ion Implantation	92
Static Elimination	58
Calibration	5
Cabinet	2,682
Mobile	1,907
Others*	55
Total	12,289

* "Others" refers to the equipment held by the sales and manufacturing industry and is not classified.

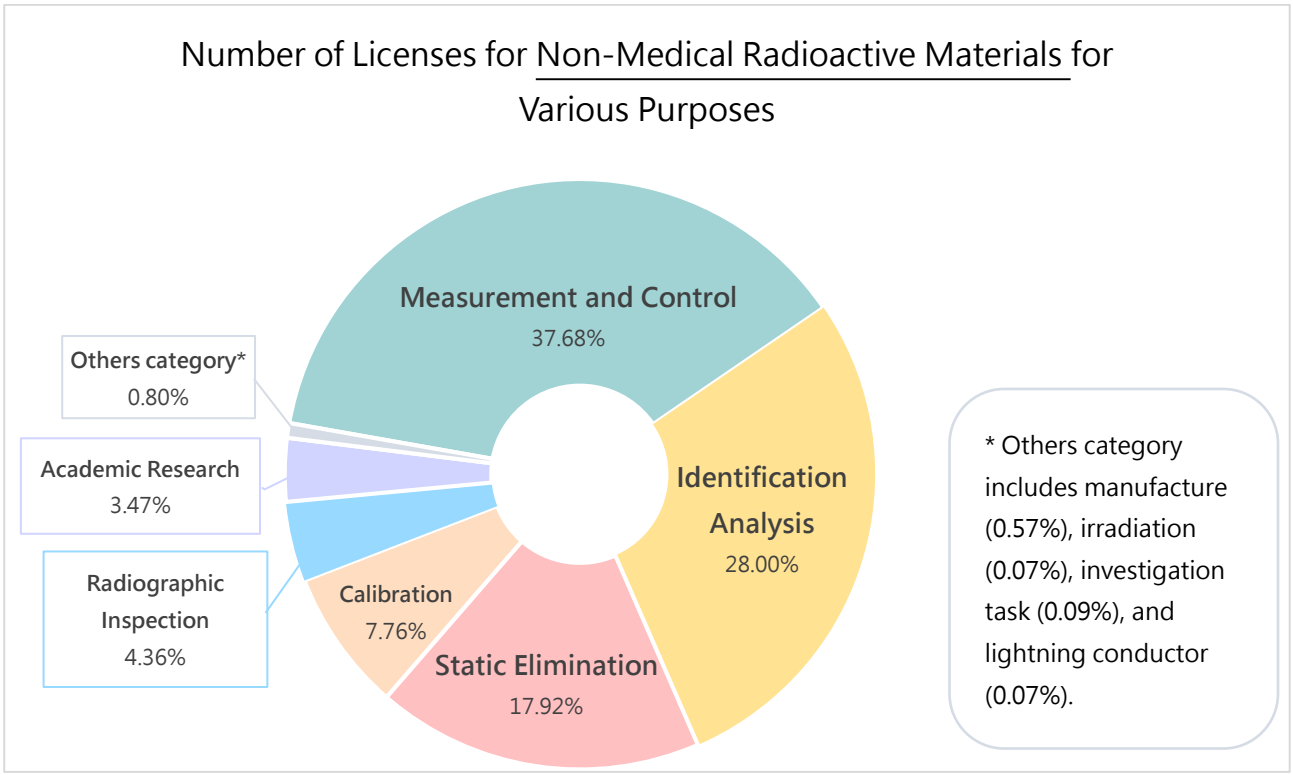


(4) Number of Licenses for Non-Medical Radioactive Materials for Various Purposes

Radioactive Material Usage	Number of Licenses
Measurement and Control	1,640
Identification Analysis	1,219
Academic Research	151
Calibration	338
Radiographic Inspection	190
Investigation Task	4
Static Elimination	780
Manufacture[1]	25
Lightning Conductor[2]	3
Irradiation[3]	3
Total	4,353

Remarks:

1. Manufacture usage includes packaging and manufacturing.
2. Lightning conductors use Am-241 sources.
3. Irradiation refers to the irradiation of agricultural products, medical products, etc.



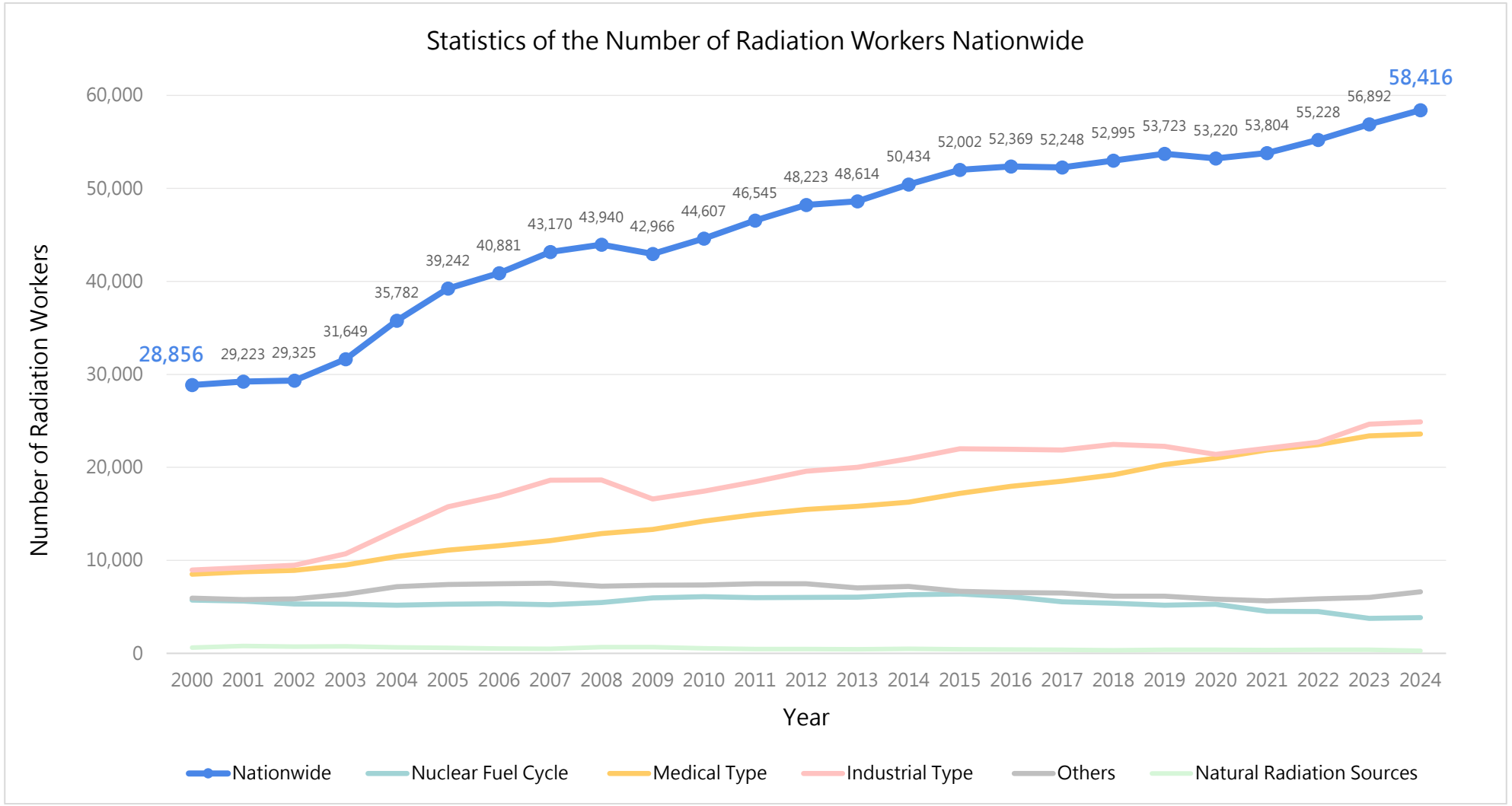
3. Personnel Dose

(1) Statistics of the Number of Radiation Workers Nationwide

Year	Nuclear Fuel Cycle	Medical Type	Industrial Type	Natural Radiation Sources[1]	Others[2]	Nationwide[3]
2000	5,731	8,510	8,960	51	5,925	28,856
2001	5,622	8,775	9,221	66	5,786	29,223
2002	5,296	8,914	9,468	60	5,857	29,325
2003	5,281	9,504	10,702	63	6,361	31,649
2004	5,189	10,425	13,272	54	7,167	35,782
2005	5,287	11,101	15,754	49	7,410	39,242
2006	5,325	11,561	16,966	43	7,472	40,881
2007	5,232	12,110	18,615	40	7,541	43,170
2008	5,473	12,873	18,639	56	7,221	43,940
2009	5,971	13,321	16,588	56	7,329	42,966
2010	6,093	14,207	17,435	46	7,360	44,607
2011	6,001	14,920	18,465	39	7,482	46,545
2012	6,026	15,482	19,576	38	7,473	48,225
2013	6,040	15,804	20,002	36	7,031	48,617
2014	6,313	16,272	20,919	40	7,199	50,437
2015	6,384	17,199	21,995	37	6,659	52,012
2016	6,084	17,958	21,951	34	6,540	52,369
2017	5,557	18,522	21,877	31	6,479	52,248
2018	5,383	19,199	22,479	27	6,137	52,995
2019	5,189	20,291	22,269	31	6,142	53,723
2020	5,286	20,970	21,406	31	5,832	53,220
2021	4,513	21,866	22,046	30	5,645	53,804
2022	4,497	22,439	22,695	32	5,870	55,228
2023	3,761	23,398	24,639	31	6,027	56,892
2024	3,840	23,587	24,890	23	6,609	58,416

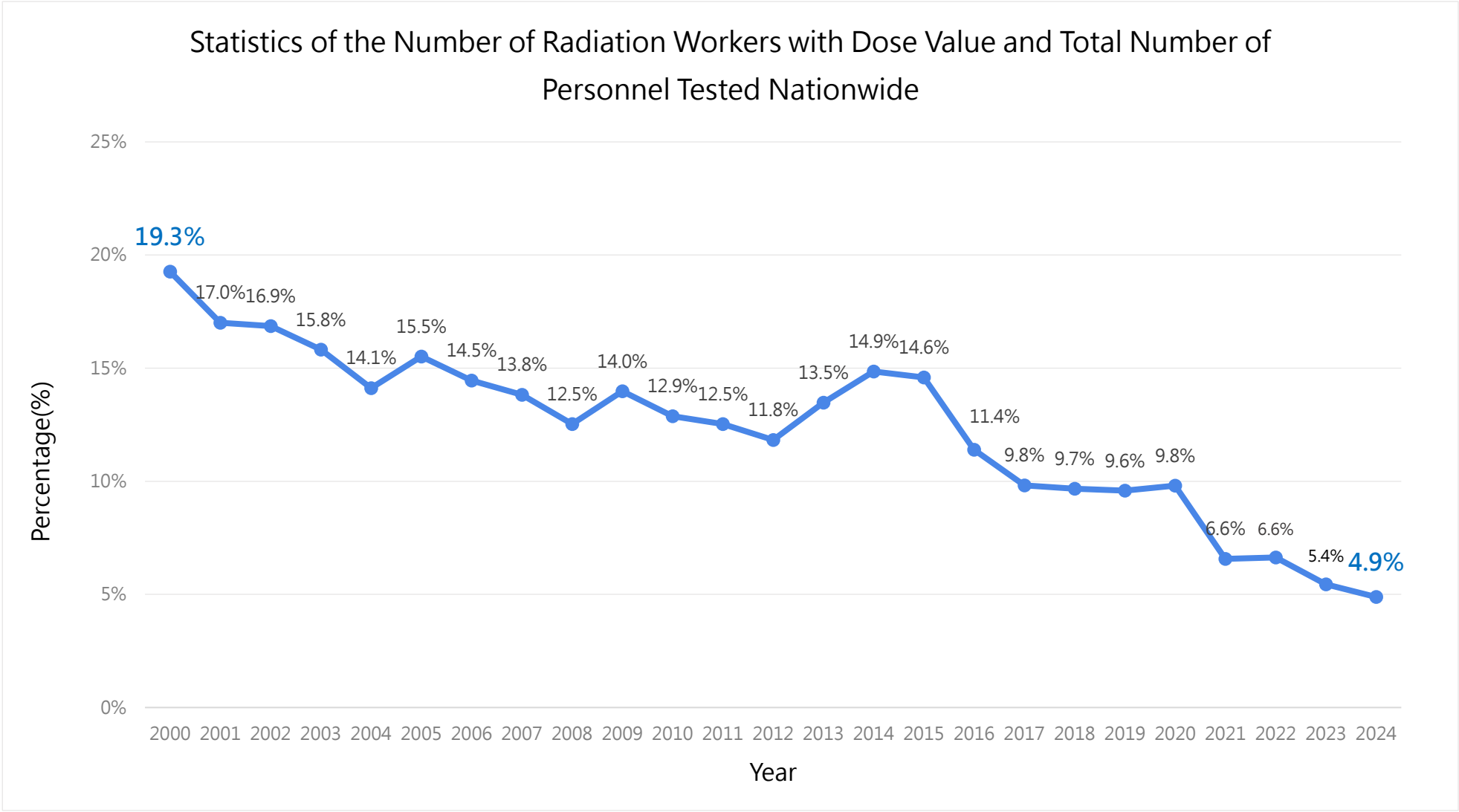
Remarks：

1. Natural radiation sources include civil aircraft, oil, gas, and mineral and ore processing.
2. Others category includes educational institutions, veterinarians and a few difficult to classify.
3. National dose badge usage statistics includes radiation workers and non-radiation workers as defined by law/regulations.
4. Because some workers are engaged in more than two types of radiation works, the total number of personnel tested nationwide will be less than the total number of various types of work.


Statistics of the Number of Radiation Workers Nationwide
Number of Radiation Workers
60,000
50,000
40,000
30,000
20,000
10,000
0
28,856
29,223
29,325
31,649
35,782
39,242
40,881
43,170
43,940
42,966
44,607
46,545
48,223
48,614
50,434
52,002
52,369
52,248
52,995
53,723
53,220
53,804
55,228
56,892
58,416
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024
Year
Nationwide
Nuclear Fuel Cycle
Medical Type
Industrial Type
Others
Natural Radiation Sources

(2) Statistics of the Number of Radiation Workers with Dose Value and Total Number of Personnel Tested Nationwide

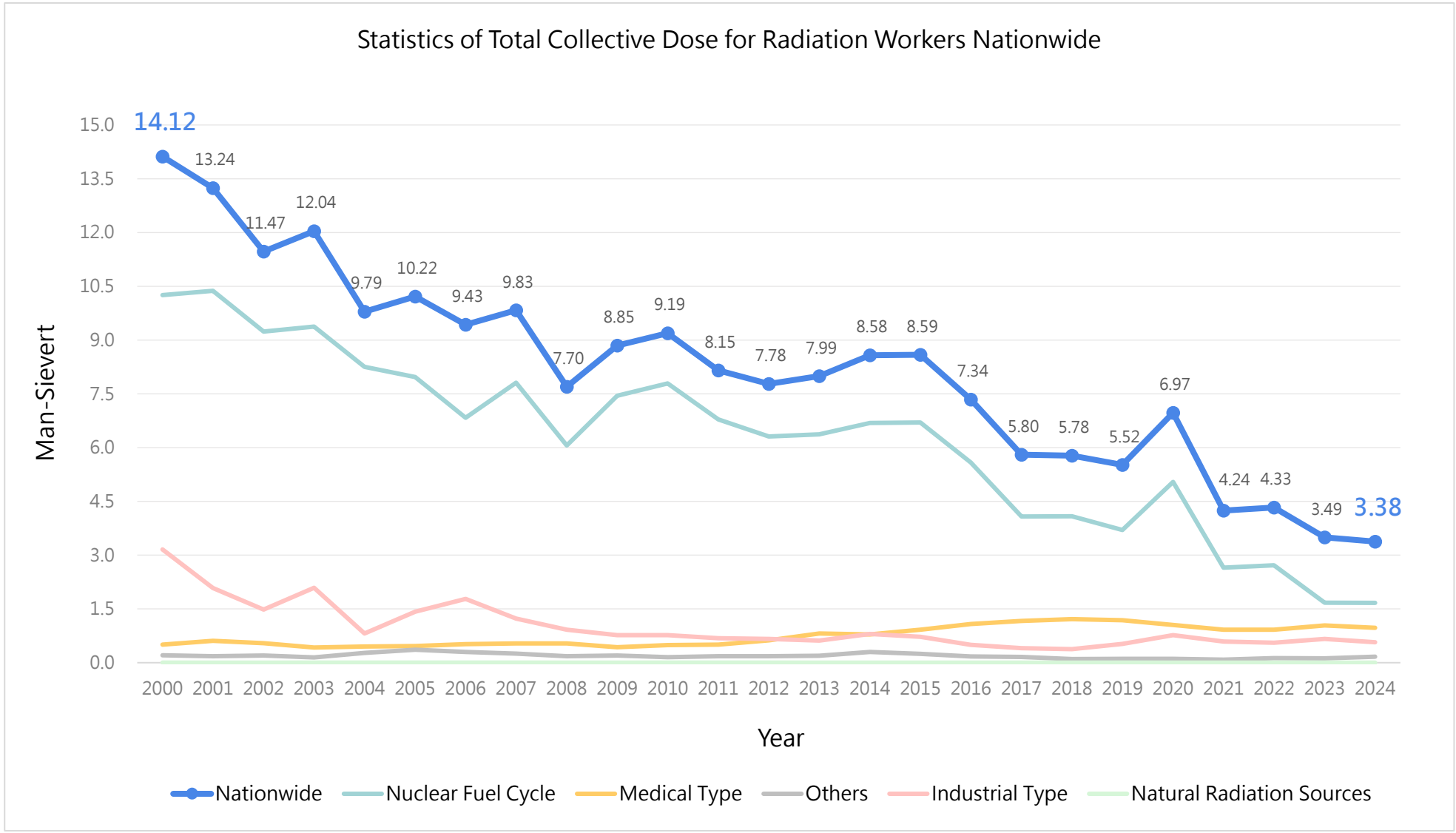
Year	Number of People with Dose Value	Total Number of Personnel Tested	Percentage
2000	5,559	28,856	19.3%
2001	4,970	29,223	17.0%
2002	4,943	29,325	16.9%
2003	5,006	31,649	15.8%
2004	5,052	35,782	14.1%
2005	6,088	39,242	15.5%
2006	5,908	40,881	14.5%
2007	5,969	43,170	13.8%
2008	5,504	43,940	12.5%
2009	6,008	42,966	14.0%
2010	5,745	44,607	12.9%
2011	5,831	46,545	12.5%
2012	5,704	48,223	11.8%
2013	6,551	48,614	13.5%
2014	7,490	50,434	14.9%
2015	7,589	52,002	14.6%
2016	5,966	52,369	11.4%
2017	5,132	52,248	9.8%
2018	5,127	52,995	9.7%
2019	5,148	53,723	9.6%
2020	5,220	53,220	9.8%
2021	3,537	53,804	6.6%
2022	3,661	55,228	6.6%
2023	3,100	56,892	5.4%
2024	2,854	58,416	4.9%


Statistics of the Number of Radiation Workers with Dose Value and Total Number of Personnel Tested Nationwide
Percentage(%)
25%
20%
15%
10%
5%
0%
19.3%
17.0%
16.9%
15.8%
14.1%
15.5%
14.5%
13.8%
12.5%
14.0%
12.9%
12.5%
11.8%
13.5%
14.9%
14.6%
11.4%
9.8%
9.7%
9.6%
9.8%
6.6%
6.6%
5.4%
4.9%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024
Year

(3) Statistics of Total Collective Dose for Radiation Workers Nationwide

Year	Nationwide	Nuclear Fuel Cycle (Nuclear Power Plant)	Medical Type	Industrial Type (Non-Medical)	Others (Research)	Natural Radiation Sources
2000	14.12	10.25	0.50	3.16	0.20	0.00
2001	13.24	10.37	0.61	2.08	0.18	0.00
2002	11.47	9.24	0.55	1.48	0.20	0.00
2003	12.04	9.38	0.42	2.09	0.15	0.00
2004	9.79	8.25	0.45	0.82	0.27	0.00
2005	10.22	7.97	0.46	1.42	0.36	0.00
2006	9.43	6.83	0.52	1.78	0.30	0.00
2007	9.83	7.81	0.53	1.23	0.25	0.00
2008	7.70	6.06	0.54	0.92	0.18	0.00
2009	8.85	7.45	0.43	0.77	0.20	0.00
2010	9.19	7.79	0.49	0.77	0.15	0.00
2011	8.15	6.79	0.50	0.68	0.18	0.00
2012	7.78	6.31	0.62	0.66	0.18	0.00
2013	7.99	6.37	0.81	0.61	0.19	0.00
2014	8.58	6.69	0.79	0.80	0.30	0.00
2015	8.59	6.70	0.92	0.72	0.25	0.00
2016	7.34	5.59	1.08	0.50	0.17	0.00
2017	5.80	4.08	1.16	0.40	0.16	0.00
2018	5.78	4.08	1.21	0.38	0.10	0.00
2019	5.52	3.70	1.19	0.52	0.10	0.00
2020	6.97	5.05	1.05	0.77	0.11	0.00
2021	4.24	2.65	0.92	0.59	0.08	0.00
2022	4.33	2.72	0.92	0.56	0.13	0.00
2023	3.49	1.67	1.04	0.66	0.12	0.00
2024	3.38	1.67	0.97	0.57	0.17	0.00

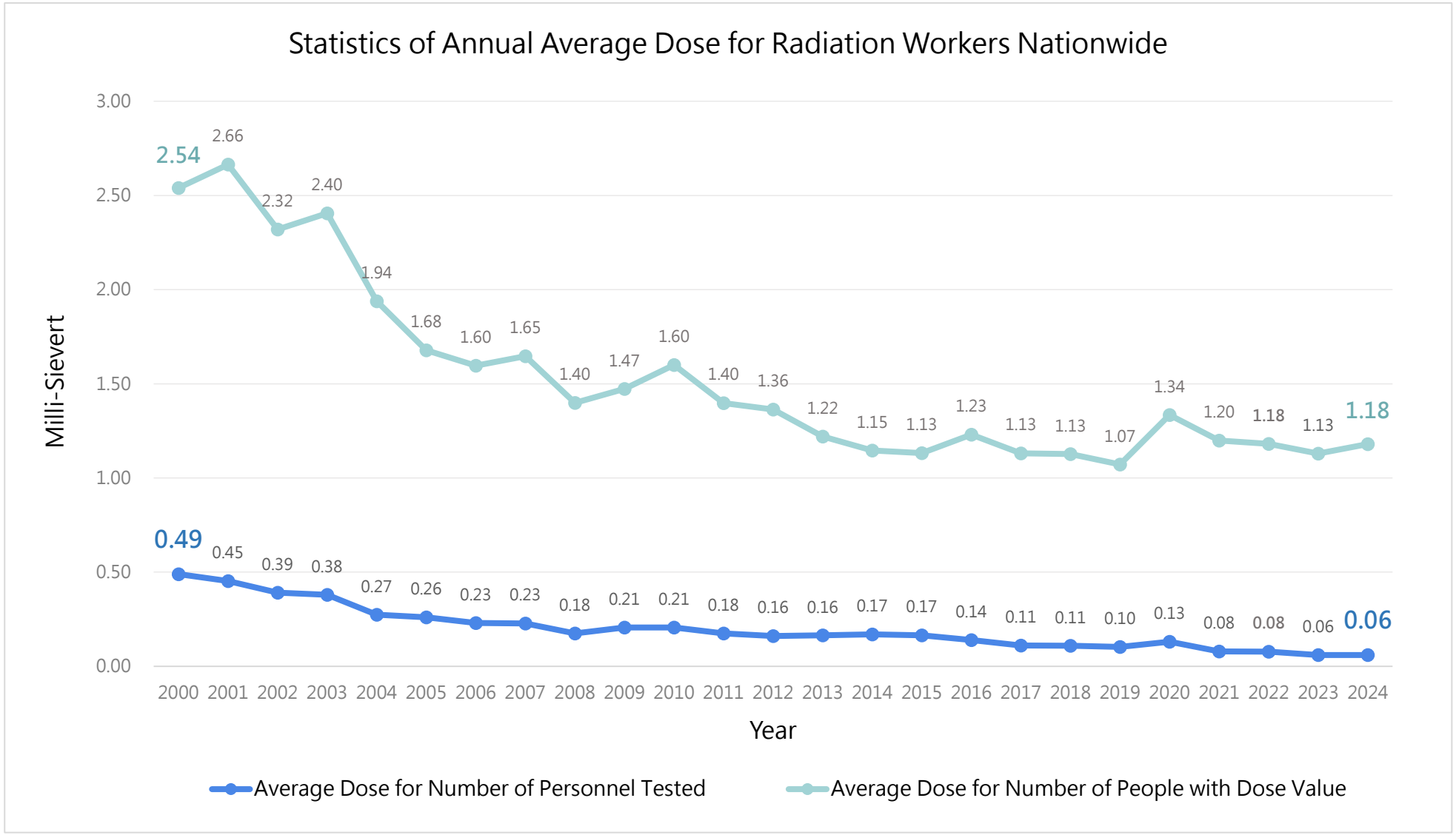
Unit：Man-Sievert (man-Sv)


Statistics of Total Collective Dose for Radiation Workers Nationwide
Man-Sievert
15.0
13.5
12.0
10.5
9.0
7.5
6.0
4.5
3.0
1.5
0.0
14.12
13.24
11.47
12.04
9.79
10.22
9.43
9.83
7.70
8.85
9.19
8.15
7.78
7.99
8.58
8.59
7.34
5.80
5.78
5.52
6.97
4.24
4.33
3.49
3.38
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024
Year
Nationwide
Nuclear Fuel Cycle
Medical Type
Others
Industrial Type
Natural Radiation Sources

(4) Statistics of Annual Average Dose for Radiation Workers Nationwide

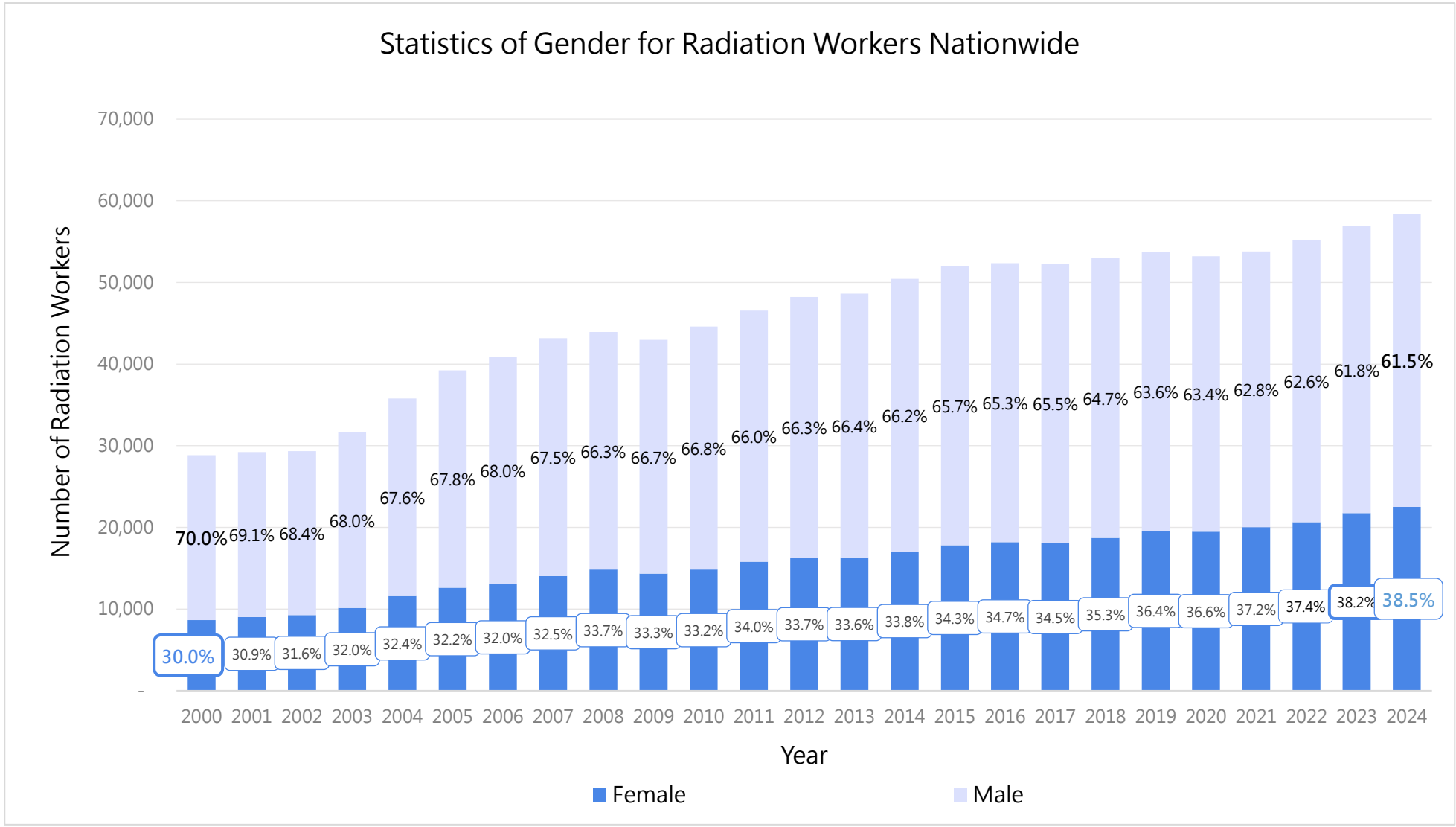
Year	Average Dose for Number of Personnel Tested	Average Dose for Number of People with Dose Value
2000	0.49	2.54
2001	0.45	2.66
2002	0.39	2.32
2003	0.38	2.40
2004	0.27	1.94
2005	0.26	1.68
2006	0.23	1.60
2007	0.23	1.65
2008	0.18	1.40
2009	0.21	1.47
2010	0.21	1.60
2011	0.18	1.40
2012	0.16	1.36
2013	0.16	1.22
2014	0.17	1.15
2015	0.17	1.13
2016	0.14	1.23
2017	0.11	1.13
2018	0.11	1.13
2019	0.10	1.07
2020	0.13	1.34
2021	0.08	1.20
2022	0.08	1.18
2023	0.06	1.13
2024	0.06	1.18

Unit：Milli-Sievert (mSv)


Statistics of Annual Average Dose for Radiation Workers Nationwide
Milli-Sievert
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2.54
2.66
2.32
2.40
1.94
1.68
1.60
1.65
1.40
1.47
1.60
1.40
1.36
1.22
1.15
1.13
1.23
1.13
1.13
1.07
1.34
1.20
1.18
1.13
1.18
0.49
0.45
0.39
0.38
0.27
0.26
0.23
0.23
0.18
0.21
0.21
0.18
0.16
0.16
0.17
0.17
0.14
0.11
0.11
0.10
0.13
0.08
0.08
0.06
0.06
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024
Year
Average Dose for Number of Personnel Tested
Average Dose for Number of People with Dose Value

(5) Statistics of Gender for Radiation Workers Nationwide

Year	Male	Female	Total	Male Ratio (%)	Female Ratio (%)
2000	20,201	8,655	28,856	70.01%	29.99%
2001	20,194	9,029	29,223	69.10%	30.90%
2002	20,069	9,256	29,325	68.44%	31.56%
2003	21,507	10,142	31,649	67.95%	32.05%
2004	24,194	11,588	35,782	67.62%	32.38%
2005	26,620	12,622	39,242	67.84%	32.16%
2006	27,816	13,065	40,881	68.04%	31.96%
2007	29,122	14,048	43,170	67.46%	32.54%
2008	29,112	14,828	43,940	66.25%	33.75%
2009	28,639	14,327	42,966	66.66%	33.34%
2010	29,778	14,829	44,607	66.76%	33.24%
2011	30,740	15,805	46,545	66.04%	33.96%
2012	31,948	16,275	48,223	66.25%	33.75%
2013	32,295	16,319	48,614	66.43%	33.57%
2014	33,396	17,038	50,434	66.22%	33.78%
2015	34,184	17,818	52,002	65.74%	34.26%
2016	34,178	18,191	52,369	65.26%	34.74%
2017	34,210	18,038	52,248	65.48%	34.52%
2018	34,283	18,712	52,995	64.69%	35.31%
2019	34,163	19,560	53,723	63.59%	36.41%
2020	33,750	19,470	53,220	63.42%	36.58%
2021	33,771	20,033	53,804	62.77%	37.23%
2022	34,574	20,654	55,228	62.60%	37.40%
2023	35,150	21,742	56,892	61.80%	38.20%
2024	35,904	22,512	58,416	61.46%	38.54%


Statistics of Gender for Radiation Workers Nationwide
Number of Radiation Workers
70,000
60,000
50,000
40,000
30,000
20,000
10,000
-
70.0% 69.1% 68.4% 68.0% 67.6% 67.8% 68.0% 67.5% 66.3% 66.7% 66.8% 66.0% 66.3% 66.4% 66.2% 65.7% 65.3% 65.5% 64.7% 63.6% 63.4% 62.8% 62.6% 61.8% 61.5%
30.0% 30.9% 31.6% 32.0% 32.4% 32.2% 32.0% 32.5% 33.7% 33.3% 33.2% 34.0% 33.7% 33.6% 33.8% 34.3% 34.7% 34.5% 35.3% 36.4% 36.6% 37.2% 37.4% 38.2% 38.5%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024
Year
Female
Male

(6) Statistics of the Number of Radiation Workers in Each Dose Interval Nationwide (Unit: person)

Dose Interval (mSv)	≦LLD	≦ 1	> 1 ≦ 2.5	> 2.5 ≦ 5	> 5 ≦ 7.5	> 7.5 ≦ 10	> 10 ≦ 15	> 15 ≦ 20	> 20 ≦ 25	> 25 ≦ 30	> 30 ≦ 35	> 35 ≦ 40	> 40 ≦ 45	> 45 ≦ 50	> 50 ≦ 100	> 100
2000	23,297	3,296	891	549	272	191	169	90	47	26	15	8	3	0	2	0
2001	24,253	2,774	891	539	251	161	187	86	36	24	17	0	3	0	1	0
2002	24,382	2,907	857	519	225	148	155	77	40	8	5	1	0	0	1	0
2003	26,643	3,001	801	520	228	157	135	84	43	21	7	7	2	0	0	0
2004	30,730	3,152	822	512	196	126	165	75	1	1	0	2	0	0	0	0
2005	33,154	4,018	935	528	245	143	159	52	3	1	2	1	1	0	0	0
2006	34,973	3,991	854	526	214	140	132	31	13	2	5	0	0	0	0	0
2007	37,201	3,922	909	586	221	126	156	43	3	2	1	0	0	0	0	0
2008	38,436	3,644	948	503	186	118	98	6	1	0	0	0	0	0	0	0
2009	36,958	3,968	941	593	254	145	99	8	0	0	0	0	0	0	0	0
2010	38,862	3,652	961	614	238	138	121	21	0	0	0	0	0	0	0	0
2011	40,714	3,884	977	507	238	134	81	10	0	0	0	0	0	0	0	0
2012	42,519	3,758	1,030	531	201	103	68	12	1	0	0	0	0	0	0	0
2013	42,063	4,601	1,008	556	196	93	77	19	0	1	0	0	0	0	0	0
2014	42,944	5,431	1,072	542	246	101	87	11	0	0	0	0	0	0	0	0
2015	44,413	5,413	1,188	569	220	111	81	7	0	0	0	0	0	0	0	0
2016	46,403	4,200	950	477	159	87	80	13	0	0	0	0	0	0	0	0
2017	47,116	3,716	756	394	136	75	50	5	0	0	0	0	0	0	0	0
2018	47,868	3,680	840	362	117	60	52	14	2	0	0	0	0	0	0	0
2019	48,575	3,713	823	364	139	60	41	8	0	0	0	0	0	0	0	0
2020	48,000	3,668	808	398	124	79	108	29	3	2	1	0	0	0	0	0
2021	50,267	2,369	719	290	83	40	32	4	0	0	0	0	0	0	0	0
2022	51,567	2,470	718	297	97	53	25	1	0	0	0	0	0	0	0	0
2023	53,792	2,181	535	241	79	33	27	4	0	0	0	0	0	0	0	0
2024	55,562	1,994	510	218	50	43	30	9	0	0	0	0	0	0	0	0

LLD：Lower limit of detection

(7) Statistics of Relative Percentage of Radiation Workers in Each Dose Interval Nationwide (unit: %)

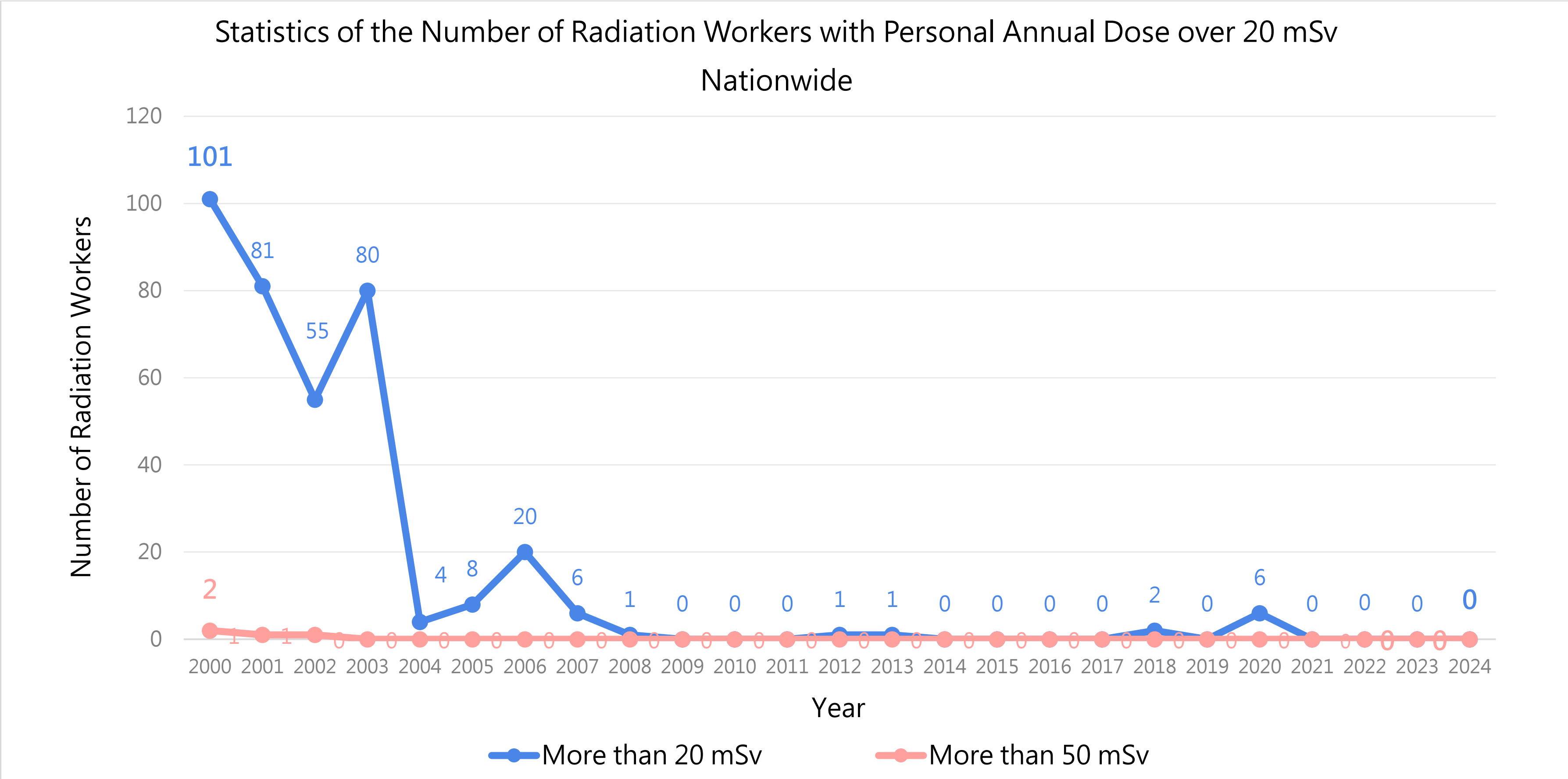
Dose Interval (mSv)	≦LLD	≦ 1	> 1 ≦ 2.5	> 2.5 ≦ 5	> 5 ≦ 7.5	> 7.5 ≦ 10	> 10 ≦ 15	> 15 ≦ 20	> 20 ≦ 25	> 25 ≦ 30	> 30 ≦ 35	> 35 ≦ 40	> 40 ≦ 45	> 45 ≦ 50	> 50 ≦ 100	> 100	Percentage of People with Dose Value
2000	80.7	11.4	3.1	1.9	0.9	0.7	0.6	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	19.3%
2001	83.0	9.5	3.1	1.8	0.9	0.6	0.6	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	17.0%
2002	83.1	9.9	2.9	1.8	0.8	0.5	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.9%
2003	84.2	9.5	2.5	1.6	0.7	0.5	0.4	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	15.8%
2004	85.9	8.8	2.3	1.4	0.6	0.4	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.1%
2005	84.5	10.2	2.4	1.4	0.6	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.5%
2006	85.6	9.8	2.1	1.3	0.5	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.5%
2007	86.2	9.1	2.1	1.4	0.5	0.3	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.8%
2008	87.5	8.3	2.2	1.1	0.4	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5%
2009	86.0	9.2	2.2	1.4	0.6	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0%
2010	87.1	8.2	2.2	1.4	0.5	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.9%
2011	87.5	8.3	2.1	1.1	0.5	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5%
2012	88.2	7.8	2.1	1.1	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.8%
2013	86.5	9.5	2.1	1.1	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5%
2014	85.2	10.8	2.1	1.1	0.5	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.9%
2015	85.4	10.4	2.3	1.1	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.6%
2016	88.6	8.0	1.8	0.9	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.4%
2017	90.2	7.1	1.5	0.8	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.8%
2018	90.3	6.9	1.6	0.7	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.7%
2019	90.4	6.9	1.5	0.7	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.6%
2020	90.2	6.9	1.5	0.8	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.8%
2021	93.4	4.4	1.3	0.5	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6%
2022	93.4	4.5	1.3	0.5	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6%
2023	94.6	3.8	0.9	0.4	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4%
2024	95.1	3.4	0.9	0.4	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9%

LLD：Lower limit of detection

(8) Statistics of the Number of Radiation Workers with Personal Annual Dose over 20 mSv Nationwide

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
More than 20 mSv	101	81	55	80	4	8	20	6	1	0	0	0	1
More than 50 mSv	2	1	1	0	0	0	0	0	0	0	0	0	0

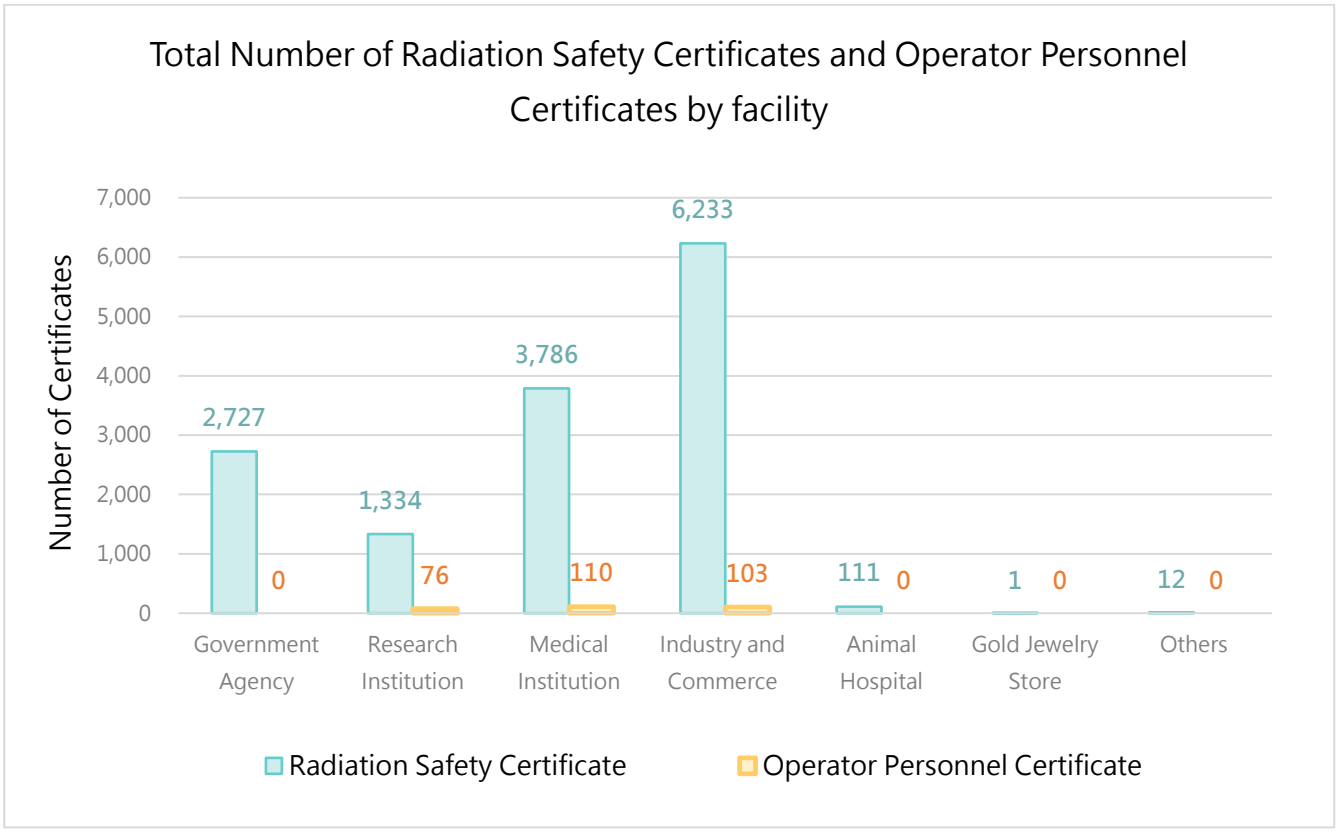
Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
More than 20 mSv	1	0	0	0	0	2	0	6	0	0	0	0
More than 50 mSv	0	0	0	0	0	0	0	0	0	0	0	0



4. Personnel with Certificates (Radiation Safety Certificates, Operator Personnel, Radiation Protection Personnel) and Radiation Protection Business with Certificates

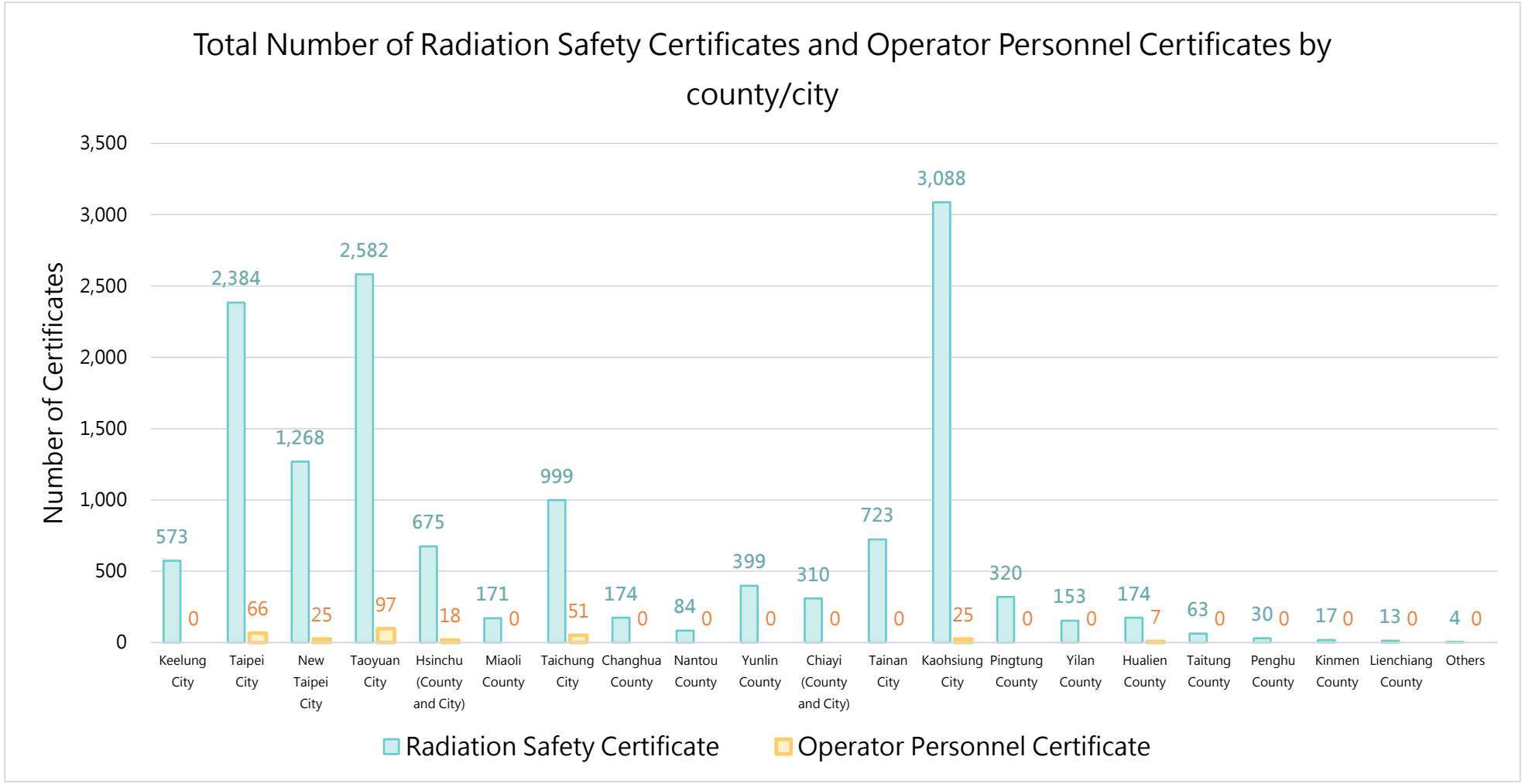
(1) Total Number of Radiation Safety Certificates and Operator Personnel Certificates by facility

Facility / Certificate Type	Government Agency	Research Institution	Medical Institution	Industry and Commerce	Animal Hospital	Gold Jewelry Store	Others (Including unemployed people)	Total
Radiation Safety Certificate	2,727	1,334	3,786	6,233	111	1	12	14,204
Operator Personnel Certificate	0	76	110	103	0	0	0	289
Total	2,727	1,410	3,896	6,336	111	1	12	14,493



(2) Total Number of Radiation Safety Certificates and Operator Personnel Certificates by county/city

Certificate type / County/City	Radiation Safety Certificate	Operator Personnel Certificate	Total
Keelung City	573	0	573
Taipei City	2,384	66	2,450
New Taipei City	1,268	25	1,293
Taoyuan City	2,582	97	2,679
Hsinchu (County and City)	675	18	693
Miaoli County	171	0	171
Taichung City	999	51	1,050
Changhua County	174	0	174
Nantou County	84	0	84
Yunlin County	399	0	399
Chiayi (County and City)	310	0	310
Tainan City	723	0	723
Kaohsiung City	3,088	25	3,113
Pingtung County	320	0	320
Yilan County	153	0	153
Hualien County	174	7	181
Taitung County	63	0	63
Penghu County	30	0	30
Kinmen County	17	0	17
Lienchiang County	13	0	13
Others	4	0	4
Total	14,204	289	14,493

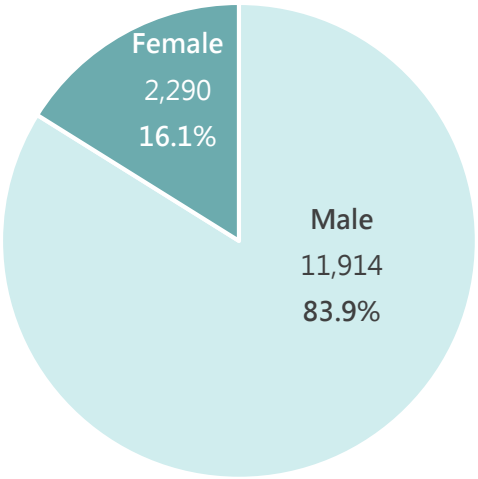

Total Number of Radiation Safety Certificates and Operator Personnel Certificates by county/city
Number of Certificates
3,500
3,000
2,500
2,000
1,500
1,000
500
0
573
0
2,384
66
1,268
25
2,582
97
675
18
171
0
999
51
174
0
84
0
399
0
310
0
723
0
3,088
25
320
0
153
0
174
7
63
0
30
0
17
0
13
0
4
0
Keelung City
Taipei City
New Taipei City
Taoyuan City
Hsinchu (County and City)
Miaoli County
Taichung City
Changhua County
Nantou County
Yunlin County
Chiayi (County and City)
Tainan City
Kaohsiung City
Pingtung County
Yilan County
Hualien County
Taitung County
Penghu County
Kinmen County
Lienchiang County
Others
Radiation Safety Certificate
Operator Personnel Certificate

(3) Total Number of Radiation Safety Certificates and Operator Personnel Certificates by gender

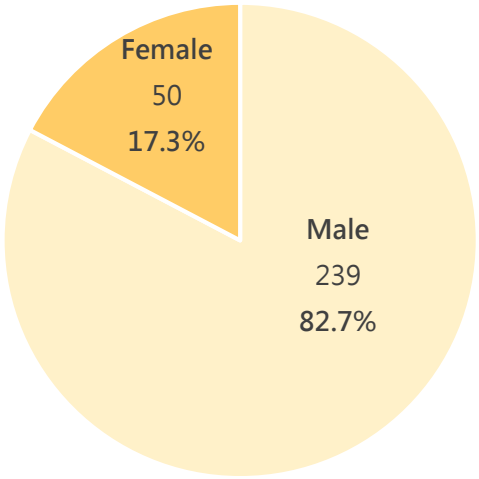
Gender / Certificate Type	Male	Female	Total	Male Ratio	Female Ratio
Radiation Safety Certificate	11,914	2,290	14,204	83.9%	16.1%
Operator Personnel Certificate	239	50	289	82.7%	17.3%
Total	12,153	2,340	14,493	83.9%	16.1%

Total Number of Radiation Safety Certificates and Operator Personnel Certificates by gender

Radiation Safety Certificate

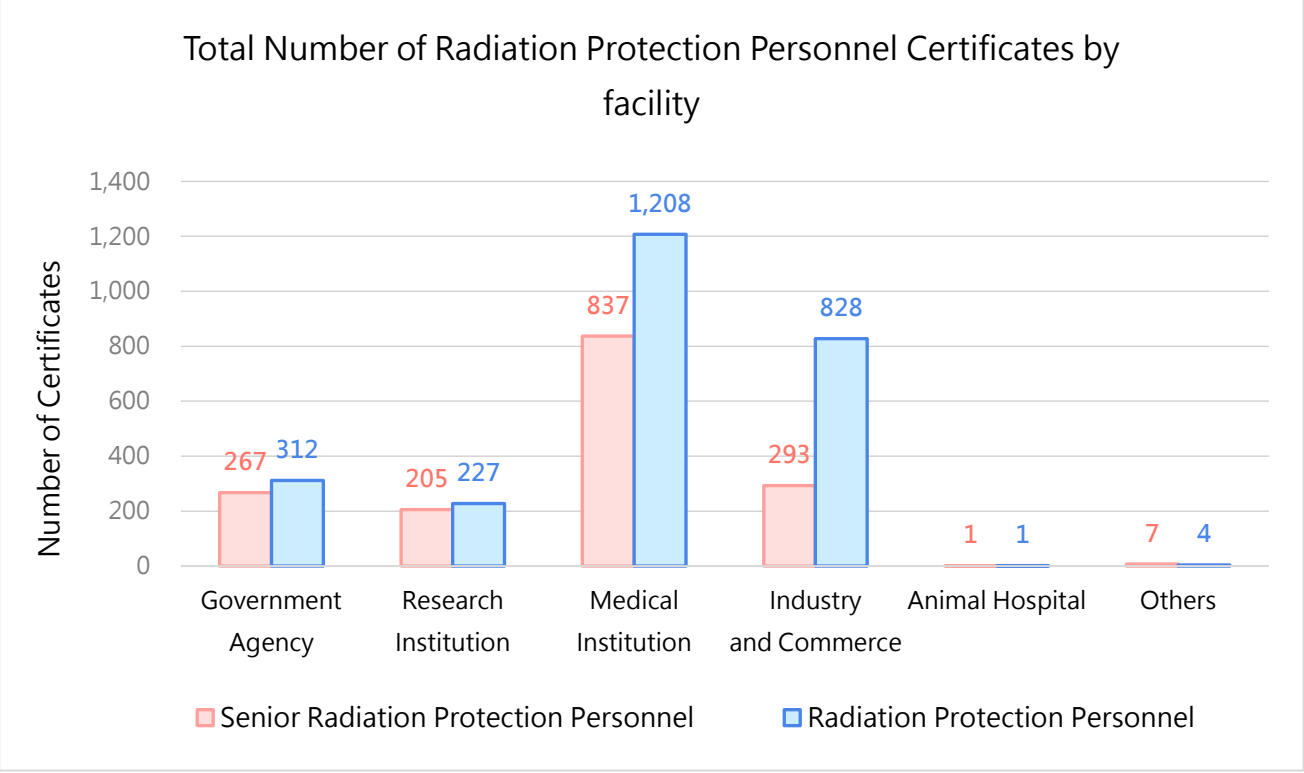


Operator Personnel Certificate



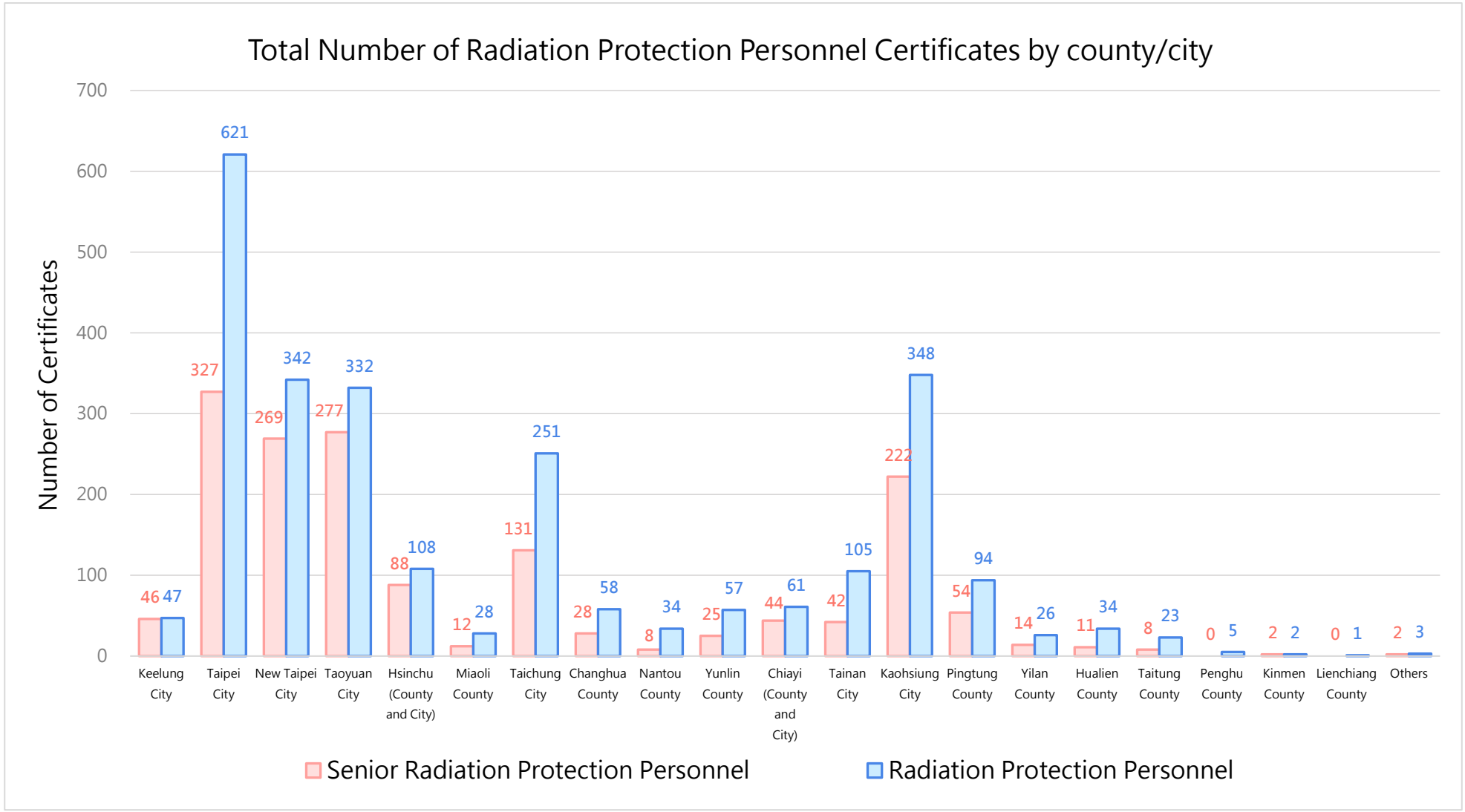
(4) Total Number of Radiation Protection Personnel with Certificates by facility

Facility / Certificate Type	Government Agency	Research Institution	Medical Institution	Industry and Commerce	Animal Hospital	Others (Including unemployed people)	Total
Senior Radiation Protection Personnel	267	205	837	293	1	7	1,610
Radiation Protection Personnel	312	227	1,208	828	1	4	2,580
Total	579	432	2,045	1,121	2	11	4,190



(5) Total Number of Radiation Protection Personnel Certificates by county/city

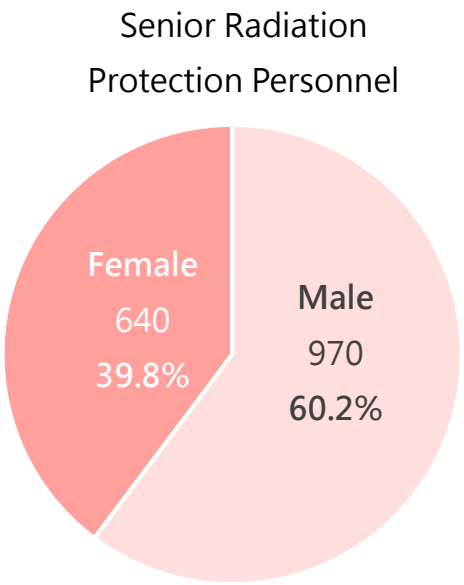
Certificate Type / County/City	Senior Radiation Protection Personnel	Radiation Protection Personnel	Total
Keelung City	46	47	93
Taipei City	327	621	948
New Taipei City	269	342	611
Taoyuan City	277	332	609
Hsinchu (County and City)	88	108	196
Miaoli County	12	28	40
Taichung City	131	251	382
Changhua County	28	58	86
Nantou County	8	34	42
Yunlin County	25	57	82
Chiayi (County and City)	44	61	105
Tainan City	42	105	147
Kaohsiung City	222	348	570
Pingtung County	54	94	148
Yilan County	14	26	40
Hualien County	11	34	45
Taitung County	8	23	31
Penghu County	0	5	5
Kinmen County	2	2	4
Lienchiang County	0	1	1
Others	2	3	5
Total	1,610	2,580	4,190

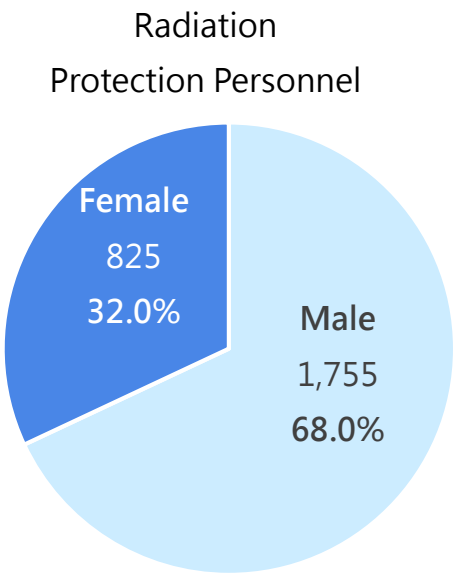

Total Number of Radiation Protection Personnel Certificates by county/city
Number of Certificates
700
600
500
400
300
200
100
0
46 47
327 621
269 342
277 332
88 108
12 28
131 251
28 58
8 34
25 57
44 61
42 105
222 348
54 94
14 26
11 34
8 23
0 5
2 2
0 1
2 3
Keelung City
Taipei City
New Taipei City
Taoyuan City
Hsinchu (County and City)
Miaoli County
Taichung City
Changhua County
Nantou County
Yunlin County
Chiayi (County and City)
Tainan City
Kaohsiung City
Pingtung County
Yilan County
Hualien County
Taitung County
Penghu County
Kinmen County
Lienchiang County
Others
Senior Radiation Protection Personnel
Radiation Protection Personnel

(6) Total Number of Radiation Protection Personnel Certificates by gender

Gender / Certificate Type	Male	Female	Total	Male Ratio	Female Ratio
Senior Radiation Protection Personnel	970	640	1,610	60.2%	39.8%
Radiation Protection Personnel	1,755	825	2,580	68.0%	32.0%
Total	2,725	1,465	4,190	65.0%	35.0%

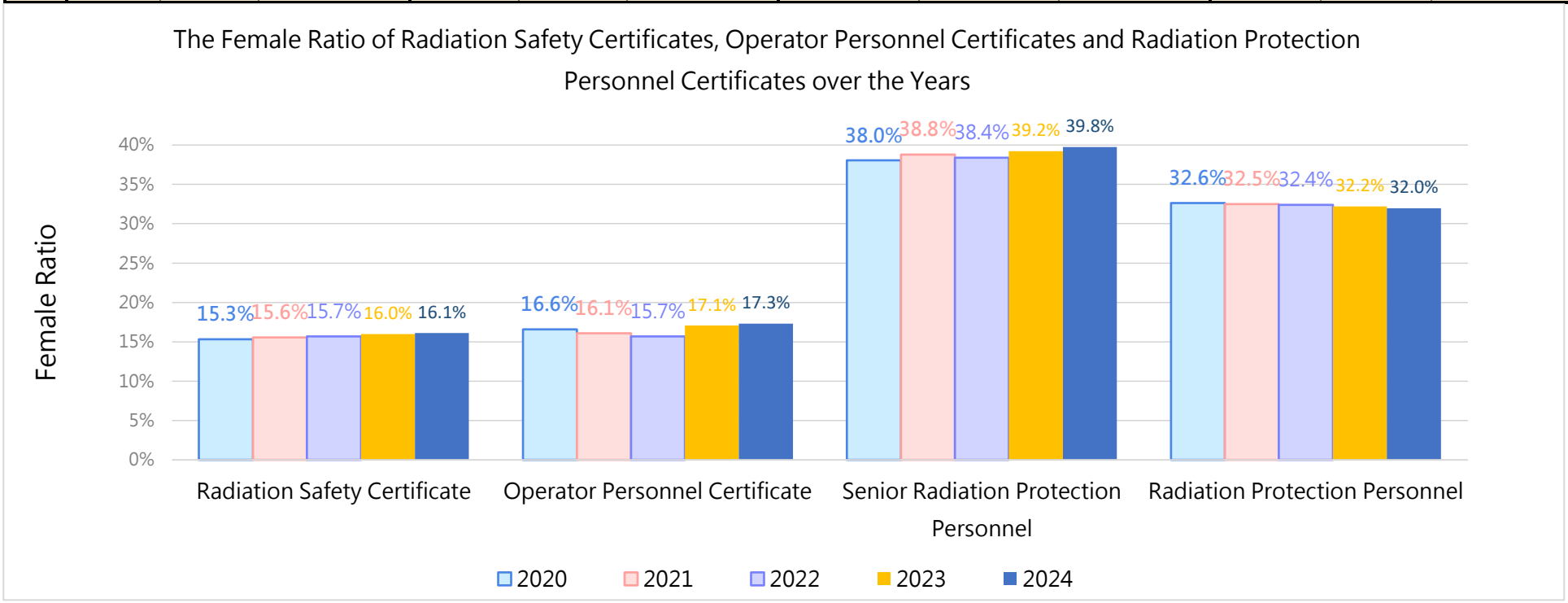
Total Number of Radiation Protection Personnel Certificates by gender





(7) The Female Ratio of Radiation Safety Certificates, Operator Personnel Certificates and Radiation Protection Personnel Certificates over the Years

	Radiation Safety Certificate			Operator Personnel Certificate			Senior Radiation Protection Personnel			Radiation Protection Personnel		
Year	Male	Female	Female Ratio	Male	Female	Female Ratio	Male	Female	Female Ratio	Male	Female	Female Ratio
2020	11,395	2,061	15.3%	151	30	16.6%	868	533	38.0%	1,669	808	32.6%
2021	11,496	2,120	15.6%	167	32	16.1%	884	560	38.8%	1,674	806	32.5%
2022	11,585	2,154	15.7%	188	35	15.7%	914	570	38.4%	1,699	813	32.4%
2023	11,788	2,241	16.0%	233	48	17.1%	939	606	39.2%	1,719	817	32.2%
2024	11,914	2,290	16.1%	239	50	17.3%	970	640	39.8%	1755	825	32.0%

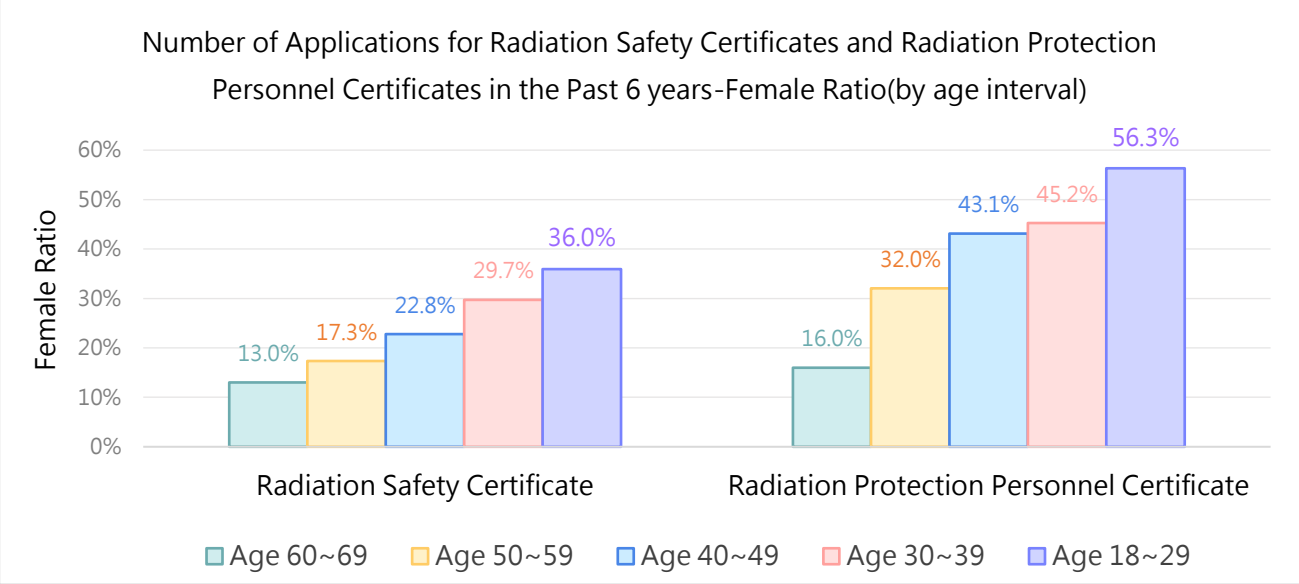


(8) Number of Applications for Radiation Safety Certificates and Radiation Protection Personnel Certificates in 2024

	Year	Female	Male	Total	Female Ratio	Male Ratio
Radiation Safety Certificate	2024	1,027	3,550	4,577	22.4%	77.6%
Radiation Protection Personnel Certificate	2024	1,018	1,739	2,757	36.9%	63.1%

(9) Number of Applications for Radiation Safety Certificates and Radiation Protection Personnel Certificates by age interval and gender in 2024

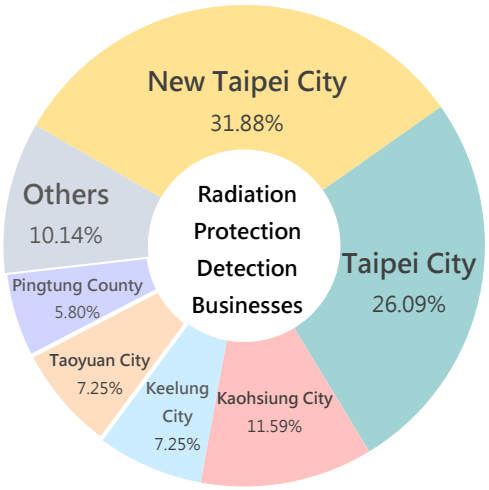
	Age Interval	Female	Male	Total	Female Ratio	Male Ratio
Radiation Safety Certificate	80~	0	7	7	0.0%	100.0%
	70~79	0	42	42	0.0%	100.0%
	60~69	78	522	600	13.0%	87.0%
	50~59	192	916	1,108	17.3%	82.7%
	40~49	336	1,139	1,475	22.8%	77.2%
	30~39	298	705	1,003	29.7%	70.3%
	18~29	123	219	342	36.0%	64.0%
	Total	1,027	3,550	4,577	22.4%	77.6%
Radiation Protection Personnel Certificate	80~	0	4	4	0.0%	100.0%
	70~79	3	67	70	4.3%	95.7%
	60~69	64	336	400	16.0%	84.0%
	50~59	203	431	634	32.0%	68.0%
	40~49	355	468	823	43.1%	56.9%
	30~39	295	357	652	45.2%	54.8%
	18~29	98	76	174	56.3%	43.7%
	Total	1,018	1,739	2,757	36.9%	63.1%



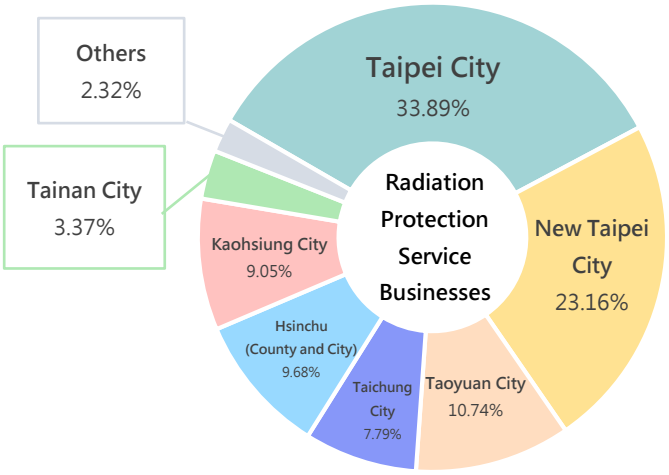
(10)Total Number of Radiation Protection Business with Certificates by business category and county/city

Business category / County/City	Radiation Protection Detection Businesses	Radiation Protection Service Businesses	Institutions of Radiation Protection Training Affairs	Total
Keelung City	5	1	1	7
Taipei City	18	161	2	181
New Taipei City	22	110	5	137
Taoyuan City	5	51	3	59
Hsinchu (County and City)	2	46	6	54
Miaoli County	0	2	0	2
Taichung City	3	37	2	42
Changhua County	1	1	1	3
Nantou County	0	1	0	1
Yunlin County	0	0	0	0
Chiayi (County and City)	0	4	0	4
Tainan City	1	16	1	18
Kaohsiung City	8	43	4	55
Pingtung County	4	1	0	5
Yilan County	0	0	1	1
Hualien County	0	0	0	0
Taitung County	0	0	0	0
Penghu County	0	1	0	1
Kinmen County	0	0	0	0
Lienchiang County	0	0	0	0
Total	69	475	26	570

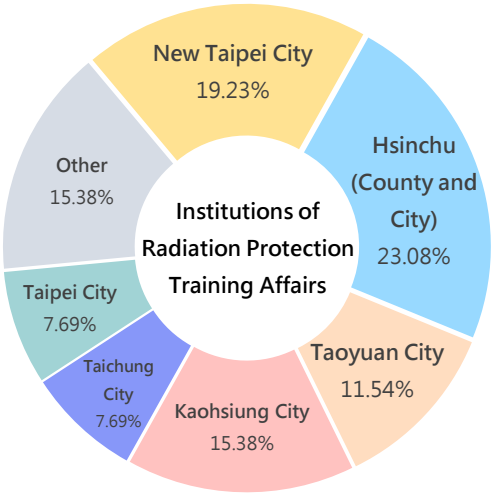
Total Number of Radiation Protection Business with Certificates by business category and county/city



* Others county/city includes Taichung City (4.35%), Hsinchu County and City (2.90%), Tainan City (1.45%), and Changhua County (1.45%).



* Others county/city includes Chiayi County and City (0.84%), Changhua County (0.21%), Pingtung County (0.21%), Keelung City (0.21%), Miaoli County (0.42%), Nantou county (0.21%), and Penghu County (0.21%).



* Others county/city includes Keelung City (3.85%), Changhua County (3.85%), Tainan City (3.85%), and Yilan County (3.85%).

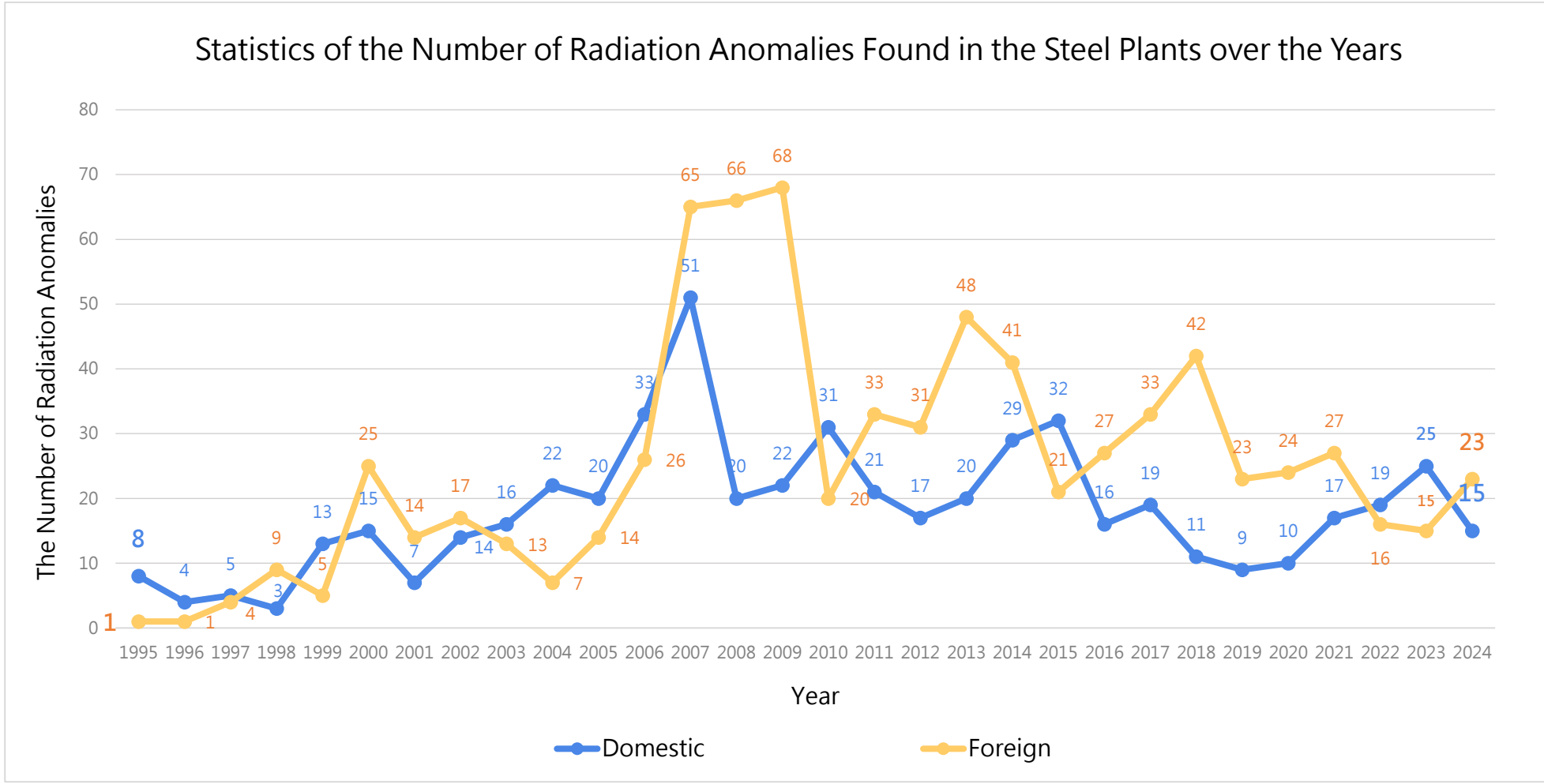
5. Radiation Anomalies Found in the Steel Plants over the Years

(1) Statistics of the Number of Radiation Anomalies Found in the Steel Plants over the Years

Year / Source	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Domestic	8	4	5	3	13	15	7	14	16	22	20
Foreign	1	1	4	9	5	25	14	17	13	7	14
Total	9	5	9	12	18	40	21	31	29	29	34

Year / Source	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Domestic	33	51	20	22	31	21	17	20	29	32	16
Foreign	26	65	66	68	20	33	31	48	41	21	27
Total	59	116	86	90	51	54	48	68	70	53	43

Year / Source	2017	2018	2019	2020	2021	2022	2023	2024	Total
Domestic	19	11	9	10	17	19	25	15	544
Foreign	33	42	23	24	27	16	15	23	759
Total	52	53	32	34	44	35	40	38	1,303

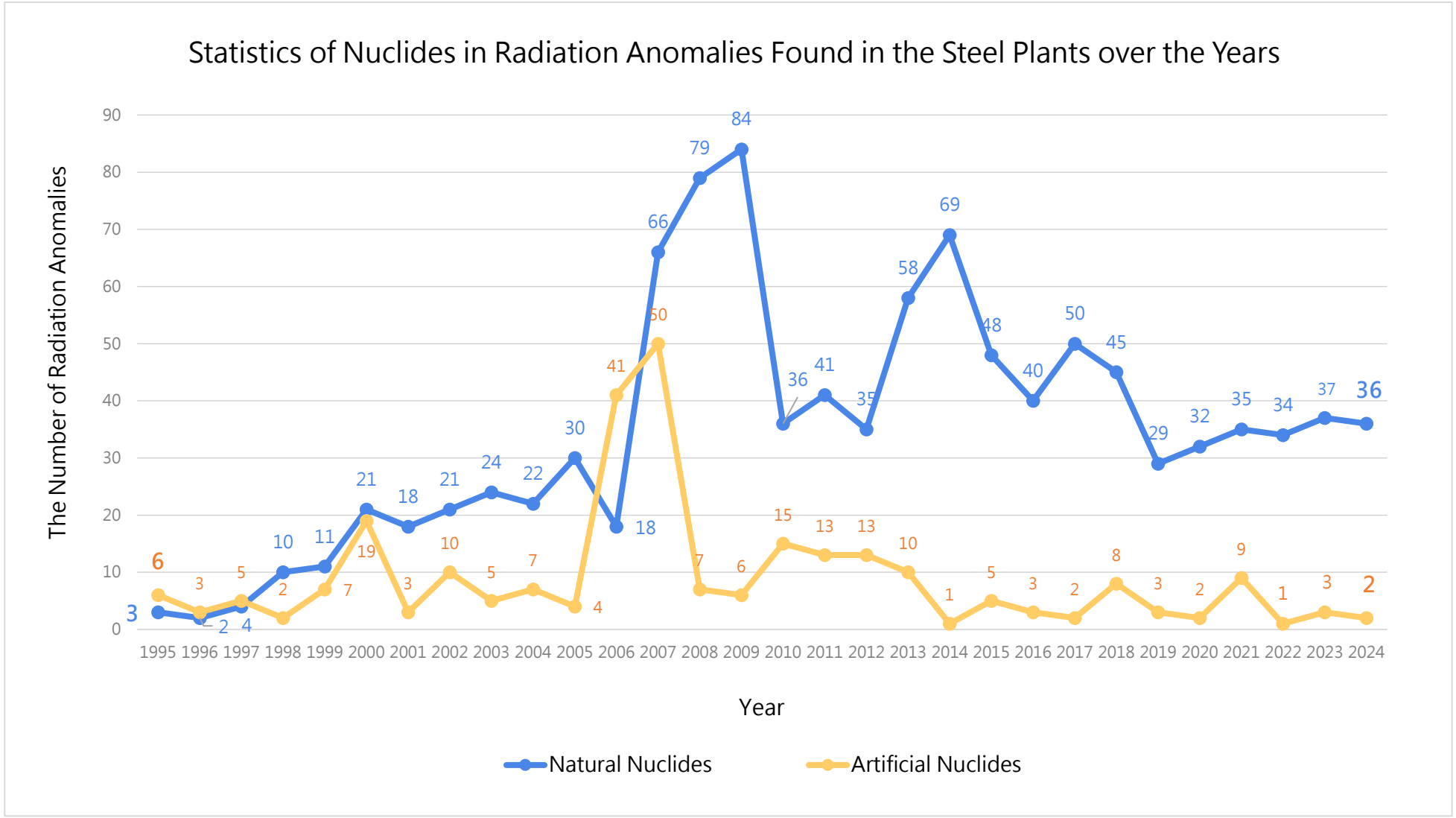

Statistics of the Number of Radiation Anomalies Found in the Steel Plants over the Years
The Number of Radiation Anomalies
Year
Domestic
Foreign
0
10
20
30
40
50
60
70
80
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024
8 4 5 3 13 15 7 14 16 22 20 33 51 20 22 31 21 17 20 29 32 16 19 11 9 10 17 19 25 15
1 1 4 9 5 25 14 17 14 13 7 14 26 65 66 68 20 33 31 48 41 21 27 33 42 23 24 27 16 15 23

(2) Statistics of Nuclides in Radiation Anomalies Found in the Steel Plants over the Years

Year / Nuclides	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Natural Nuclides	3	2	4	10	11	21	18	21	24	22	30
Artificial Nuclides	6	3	5	2	7	19	3	10	5	7	4
Total	9	5	9	12	18	40	21	31	29	29	34

Year / Nuclides	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Natural Nuclides	18	66	79	84	36	41	35	58	69	48	40
Artificial Nuclides	41	50	7	6	15	13	13	10	1	5	3
Total	59	116	86	90	51	54	48	68	70	53	43

Year / Nuclides	2017	2018	2019	2020	2021	2022	2023	2024	Total
Natural Nuclides	50	45	29	32	35	34	37	36	1038
Artificial Nuclides	2	8	3	2	9	1	3	2	265
Total	52	53	32	34	44	35	40	38	1303


Statistics of Nuclides in Radiation Anomalies Found in the Steel Plants over the Years
The Number of Radiation Anomalies
Year
Natural Nuclides
Artificial Nuclides
0
10
20
30
40
50
60
70
80
90
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024
3 2 4 10 11 21 18 21 24 22 30 18 66 79 84 36 41 35 58 69 48 40 50 45 29 32 35 34 37 36
6 3 5 2 7 19 3 10 5 7 4 41 50 7 6 15 13 13 10 1 5 3 2 8 3 2 9 1 3 2

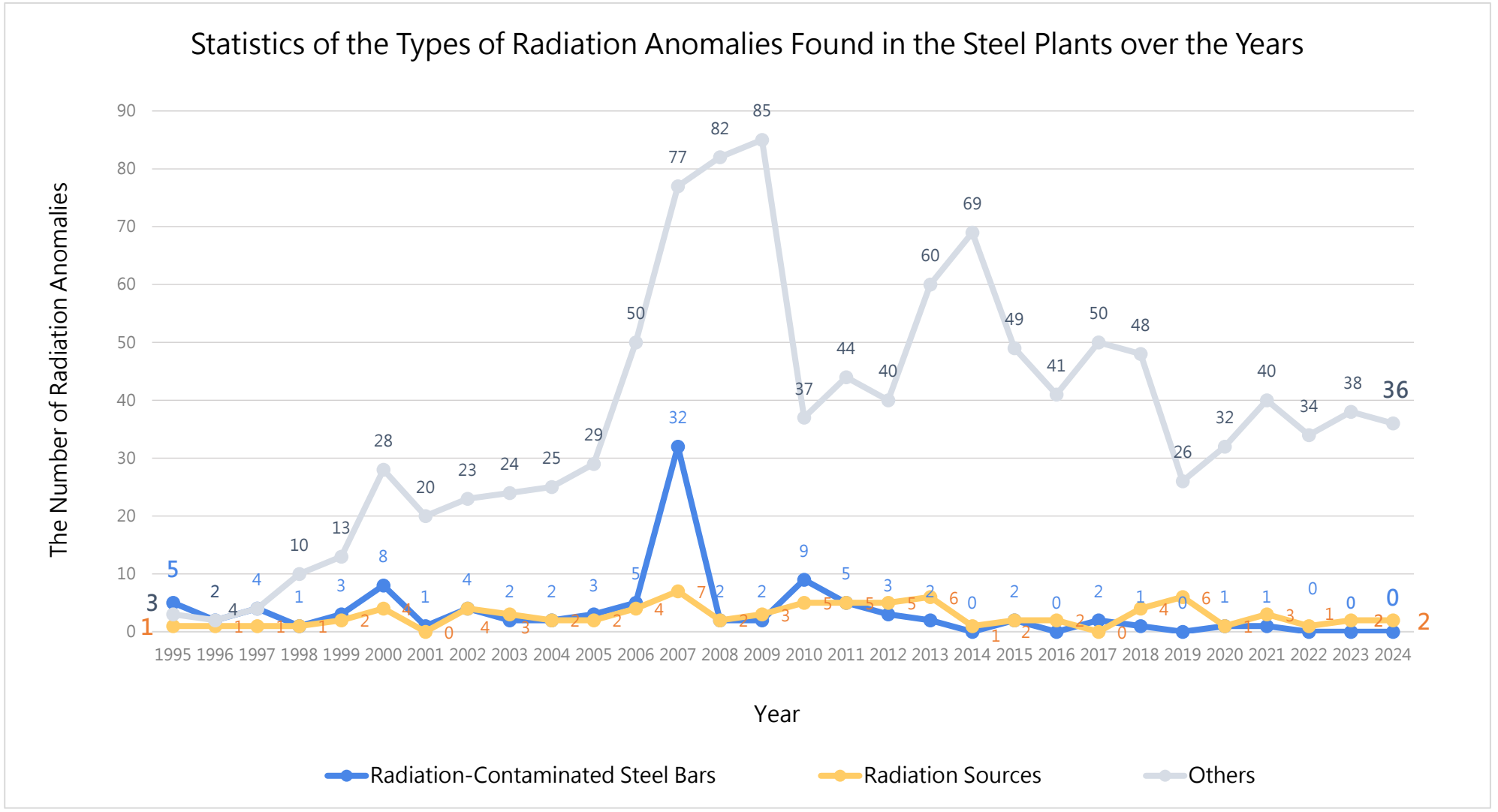
(3) Statistics of the Types of Radiation Anomalies Found in the Steel Plants over the Years

Year / Types of Radiation Anomalies	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Radiation Contaminated Steel Bars	5	2	4	1	3	8	1	4	2	2	3
Radiation Sources	1	1	1	1	2	4	0	4	3	2	2
Others*	3	2	4	10	13	28	20	23	24	25	29
Total	9	5	9	12	18	40	21	31	29	29	34

Year / Types of Radiation Anomalies	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Radiation Contaminated Steel Bars	5	32	2	2	9	5	3	2	0	2	0
Radiation Sources	4	7	2	3	5	5	5	6	1	2	2
Others*	50	77	82	85	37	44	40	60	69	49	41
Total	59	116	86	90	51	54	48	68	70	53	43

Year / Types of Radiation Anomalies	2017	2018	2019	2020	2021	2022	2023	2024	Total
Radiation Contaminated Steel Bars	2	1	0	1	1	0	0	0	102
Radiation Sources	0	4	6	1	3	1	2	2	82
Others*	50	48	26	32	40	34	38	36	1119
Total	52	53	32	34	44	35	40	38	1303

* "Others" refers to those that are difficult to classify, and most are naturally occurring radioactive materials.


Statistics of the Types of Radiation Anomalies Found in the Steel Plants over the Years
The Number of Radiation Anomalies
Year
Radiation-Contaminated Steel Bars
Radiation Sources
Others