

# WP5- Report on Public Survey assessment and analysis



## Opinion pool related to radiation protection or radiation risk perception

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## **1. Introduction**

Work Package 5 (WP5) of the CONCERT European Joint Programme (CONCERT EJP) for the Integration of Radiation Protection Research deals with stakeholder engagement and communication strategies in radiation protection (RP). In particular, task 5.3 within WP5 concerns the development of survey activities for more efficient interaction with civil society and the use of social media for public communication. This task falls within the scope of the CONCERT EJP to address from an RP perspective the interests and needs of the public, occupationally exposed people, and medical patients.

Within this context, a public survey was developed and launched on 31 May 2017. The public survey aimed to gauge the perception of radiation risk among a wide range of people directly or indirectly linked to the radiation protection field.

The present report provides an overview of the public survey and its findings, including a description of the structure, implementation, dissemination, results, analysis, and main conclusions.

## **2. The structure of the public survey**

### **2.1 First section-Background (variables of respondents)**

This first part of the public survey consists of general questions relating to personal information about the respondent, such as gender, age, place and country of residence, job and level of education, as well as the level of experience within the ionizing radiation (IR) and RP field.

All the fields of this section, though providing precious information about the background profile of the respondent, have been set as non-mandatory for privacy and ethical issues.

### **2.2 Second section- (Radiation protection context)**

This is the main section of the questionnaire. The section includes questions about the attitude towards science and technology, the satisfaction with the bodies and actors in the radiation protection domain and the actions undertaken by radiation protection authorities and opinions on the communication channels about radiological and nuclear risk. A last question was added to the general section, in order to prepare the future consultation on the results of the research roadmap to help ensure that future scientific work is consistent with societal priorities. The drafting of a unified roadmap for radiation protection research is charged to CONCERT's WP3. The willingness of the respondents in giving their opinion on this topic is investigated.

This section represents the core part of the public survey, as it provides essential information about individual perception of radiation risk. For this reason, all the fields of this section are set as mandatory.

### **2.3 Third section- (Experiences within radiation protection)**

After the general part, the respondent is invited to fill only some specific subsections, according to their roles and/or experience in matters relating to ionizing radiation and the radiation protection field. The subsections are addressed to the following categories of respondent based on exposure or experience:

- S1 -Professional exposure
- S2- Medical exposure
- S3- Duty holders-decision makers
- S4- Specific categories of potentially exposed population
- S5- Cultural involvement or interest in radiation protection issues

The full English version of the public survey is attached as an Annex to the present report.

## **3. Implementation of the public survey**

In origin, the public survey has been drafted in English and subjected to discussions and reviews within task 5.3 members through an extensive email exchange and several teleconferences. Question formulation has been taken from the SCK•CEN and IRSN Barometers and modified accordingly to the CONCERT specifics (ref . Turcanu C., Perko T., Latré E. (2016). The SCK•CEN Barometer 2015. Perceptions and attitudes towards nuclear technologies in the Belgian population. Open Report of the Belgian Nuclear Research Centre; BLG-1108, Mol: Belgium). A final version has been sent by the WP5 leader to the EU CONCERT Management Board for a final approval.

Then, to reach a larger segment of the population, trying to minimize the impact of linguistic barriers, the text of the public survey has been translated into several European languages by CONCERT members who were native speakers of each language and volunteered for that. Fifteen versions were obtained.

All the translated versions of the public survey have been separately uploaded on Google Forms by the ISS team. A different link to the form was associated to each version and all the links were published on the CONCERT website. Of course, the same language version was planned to be

used for different countries (e.g. Slovak version has been used for both Slovak and Czech Republics).

The list of the different language versions, together with the respective links to the questionnaire (no longer active) and their translators and contributors is given below in Table 1.

**Table 1. Different versions, link to the questionnaire and translator or contributors for each language.**

Language	Link	Translators/contributors
<b>English</b>	<a href="https://goo.gl/forms/gEbhpJDeZcZSFLHt2">https://goo.gl/forms/gEbhpJDeZcZSFLHt2</a>	All TG
<b>Bulgarian</b>	<a href="https://goo.gl/forms/q2MgBBeiFQ8Bfr0t2">https://goo.gl/forms/q2MgBBeiFQ8Bfr0t2</a>	Nina Chobanova, CRRP, Bulgaria
<b>Croatian</b>	<a href="https://goo.gl/forms/Nh9LJN9x1N7NKFLk1">https://goo.gl/forms/Nh9LJN9x1N7NKFLk1</a>	Ivica Prlic, Marija Suric Mihic, IMROH, Croatia
<b>Dutch</b>	<a href="https://goo.gl/forms/QiJRNkutTyxshy042">https://goo.gl/forms/QiJRNkutTyxshy042</a>	Merlo Arnaud SCK CEN, Belgium
<b>Estonian</b>	<a href="https://goo.gl/forms/JSzIwrVVhVbZcrBM2">https://goo.gl/forms/JSzIwrVVhVbZcrBM2</a> <a href="http://tinyurl.com/kiirgus1">http://tinyurl.com/kiirgus1</a>	Alan Tkaczyk, Rein Koch, Rein Murakas, Heleene Suija, Lotta Leesmaa-Tuus  University of Tartu, Estonia
<b>Finnish</b>	<a href="https://goo.gl/forms/ssWQsJ26Khta4wO93">https://goo.gl/forms/ssWQsJ26Khta4wO93</a>	Sisko Salomaa, STUK, Finland
<b>French</b>	<a href="https://goo.gl/forms/Ae35in5Z0PWioN6A2">https://goo.gl/forms/Ae35in5Z0PWioN6A2</a>	Merlo Arnaud SCK CEN, Belgium
<b>German</b>	<a href="https://goo.gl/forms/JBz4LmLUqCOMofVv2">https://goo.gl/forms/JBz4LmLUqCOMofVv2</a>	Christine Willrodt, BFS, Germany
<b>Greek</b>	<a href="https://goo.gl/forms/KR0LyugXwo3p2s8R2">https://goo.gl/forms/KR0LyugXwo3p2s8R2</a>	Sotiris Economides, EEAE, Greece
<b>Italian</b>	<a href="https://goo.gl/forms/DDzaAUv7EfLPDtcE3">https://goo.gl/forms/DDzaAUv7EfLPDtcE3</a>	Sara Della Monaca, Valentina Dini, Sveva Grande, Alessandra Palma, Mauro Grigioni ISS, Italy

<b>Latvian</b>	<a href="https://goo.gl/forms/yKKrw9L25Palqf4X2">https://goo.gl/forms/yKKrw9L25Palqf4X2</a>	Elina Pajuste, LU, Latvia
<b>Polish</b>	<a href="https://goo.gl/forms/GeJKxrlTZdMQhPHp1">https://goo.gl/forms/GeJKxrlTZdMQhPHp1</a>	Michalik Bogusław, GIG, Poland
<b>Portuguese</b>	<a href="https://goo.gl/forms/sPPtCMUMIIVSRA1f2">https://goo.gl/forms/sPPtCMUMIIVSRA1f2</a>	Maria José Bação Madruga, IST, Portugal
<b>Slovak</b>	<a href="https://goo.gl/forms/jwCeXKGuvSNjHcSZ2">https://goo.gl/forms/jwCeXKGuvSNjHcSZ2</a>	Tatiana Duranova, VUJE, Slovakia
<b>Spanish</b>	<a href="https://goo.gl/forms/gqgzilqNw2JxAYJ3">https://goo.gl/forms/gqgzilqNw2JxAYJ3</a>	Almudena Real Gallego, CIEMAT, Spain

The deadline for submission of survey responses was first set for the 31<sup>st</sup> of October 2017, then postponed to the 31<sup>st</sup> of December 2017.

#### 4. Dissemination of the public survey

Regarding the dissemination routes employed to try to maximize response rates for the survey, an involvement of the POMs of each country was crucial. To have a widespread dissemination of the links, several ways have been followed, such as:

- Contact of consumer, patient, scientific and mediator associations (i.e. general practitioners);
- Publication of the link on social networks (LinkedIn, Twitter, Facebook, Instagram);
- Distribution in hospitals and local health units;
- Press release and exploitation of institutional press service
- Placing of notices on public noticeboards

Moreover, the survey was presented and publicized in different national and international conferences and workshops. A QR (Quick Response) code was produced and diffused to facilitate easy connection to the survey by smartphone/tablet devices.

The graph in Figure 1 reports on the time pattern of the received replies in Italy. Key dissemination events are labelled.

# Dissemination in Italy

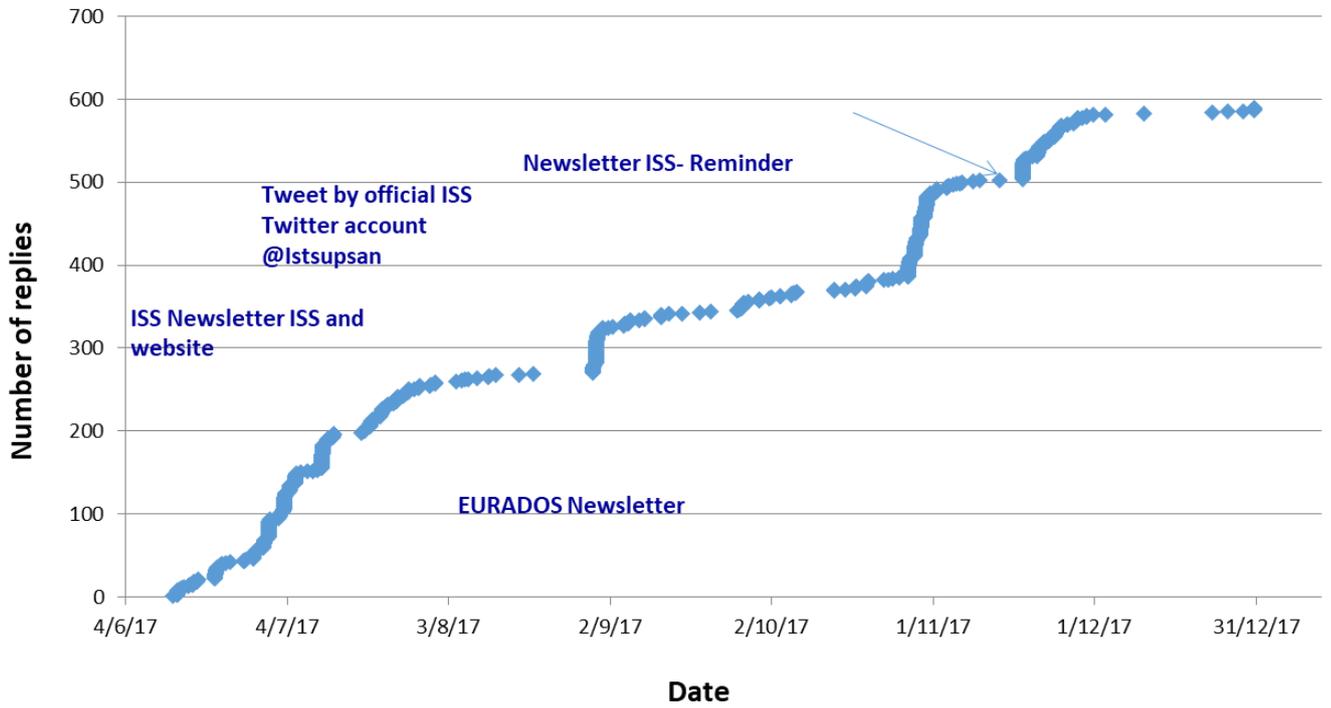


Figure 1. Time trend of replies received in Italy. The different ways of dissemination are labeled.

## 5. Methods of data analysis

### 5.1 Data management

The first action for data analysis was to download from Google Forms, for each language, the excel files containing the answer data matrix and to draw graphs from the EXCEL environment. We obtained a matrix for each language; in these matrices, each row corresponds to a different respondent, while each column relates to a different question.

1961 out of 1966 replies were considered valid.

A data cleaning procedure was then performed; for example in BG2 column ("Country of residence"), the misspellings were corrected and the spelling of the involved countries harmonised; in the BG4 column ("Year of birth") the year of birth was replaced with the age and a column indicating the language used to fill the survey was added.

Regarding the specific sections, only the replies of those who stated to belong to one (or more) categories in BG10 question ("Select from the list the roles you dealt with radiation protection field-multiple answers are allowed") were considered in the analysis. To give an example, the S1-Professional Exposure section was only analyzed for respondents who had declared to belong to the "Professional Exposure" category in the BG10 question. Obviously, this was required to be checked and verified for all the categories. This step was required due to an oversight made during the construction of the survey, when a filter over the proposed questions based on the previous answers should have been inserted.

Answers to the SP6 question ("What's the field you feel more necessary to be deepened in the professional training? -Please provide in the box below brief reasons for your responses above"), the only open question of the survey, were collected in separate files; each translator made the translation and a summarizing report of the results.

The next step of the operations to make a global analysis possible was to transform all the text strings, in the fifteen different languages, into numbers. This was necessary to obtain a harmonized data matrix, overcoming the obstacles due to the different languages and allowing making statistical inferences. Moreover, a numeric matrix can be used as input for the most commonly available software for basic and advanced (e.g. PCA, Principal Component Analysis) statistical analysis in the future.

For simple no/yes answers, 0 and 1 were used, substituting all the "Don't know/no answer" with 99. For answers expressing different levels of satisfaction or agreement, a ranking was assigned (e.g., from 1 to 6 depending on the number of possible choices; example, about the opinion about the

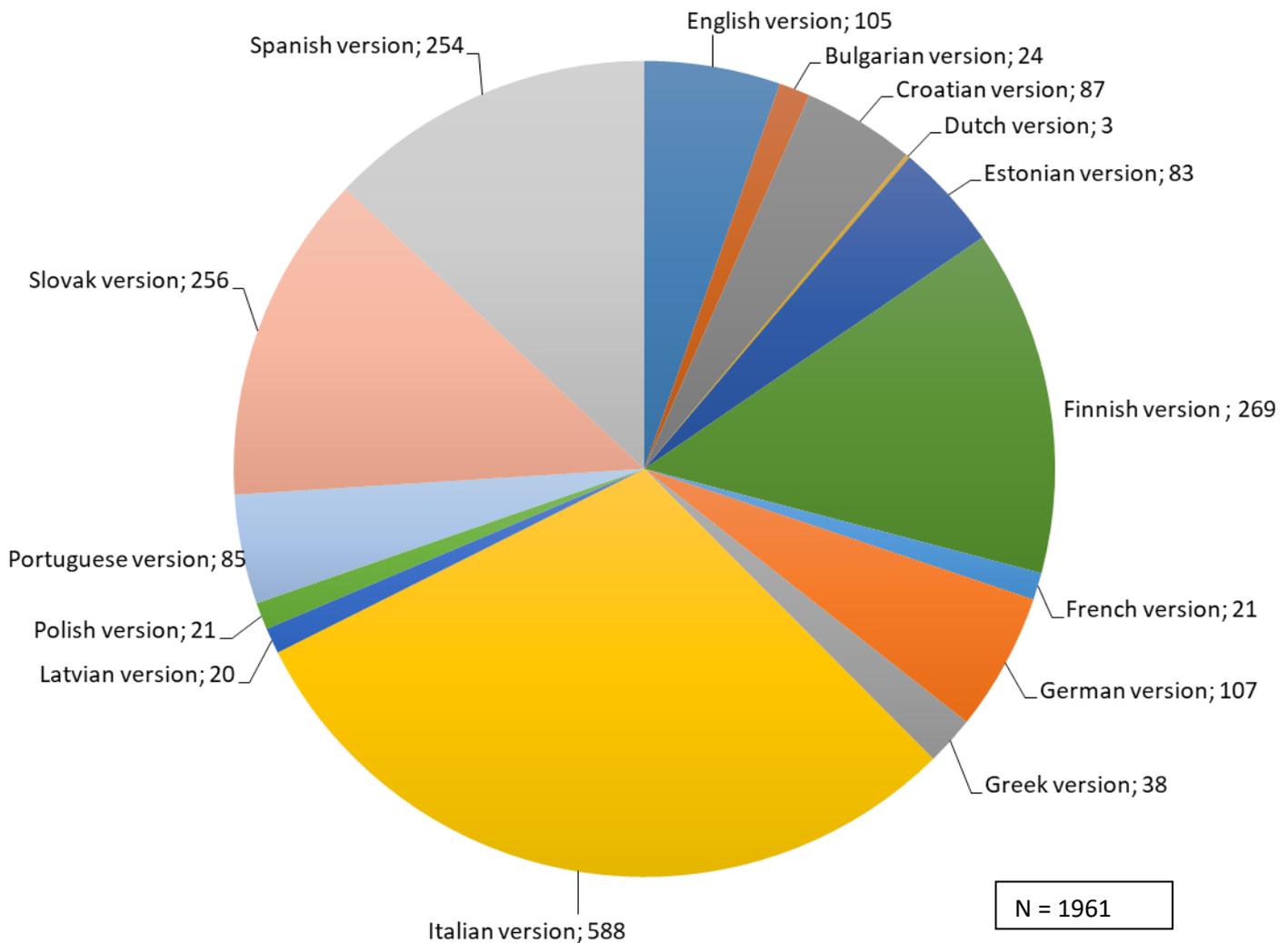
level of riskiness possible answers were: No risk at all, Very low, Low, Average, High and Very High, replaced in the matrix with 1, 2, 3, 4, 5 and 6, respectively).

For the multiple-choice questions, it was necessary to expand the answers in multiple columns.

Finally, all the matrices were merged in one, thus obtaining a unique data sheet containing the 1961 records.

## 6. Results of the Public Survey

A total number of 1961 replies were received at 31<sup>st</sup> December 2017. The pie chart in Figure 2 reports on the distribution of the answers in the different fifteen languages.

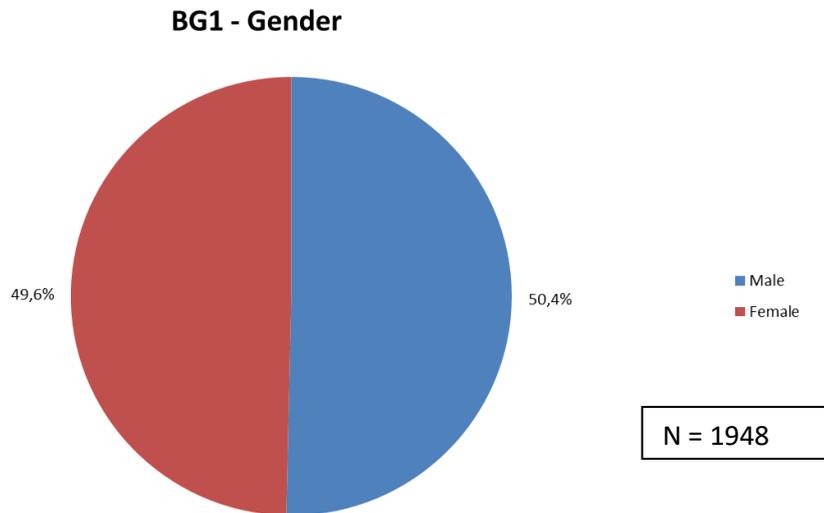


**Figure 2.** Distribution of the answers by language version.

In the following paragraphs, the responses to all questionnaire questions are reported and commented upon.

## 6.1 Background (variables of respondents)

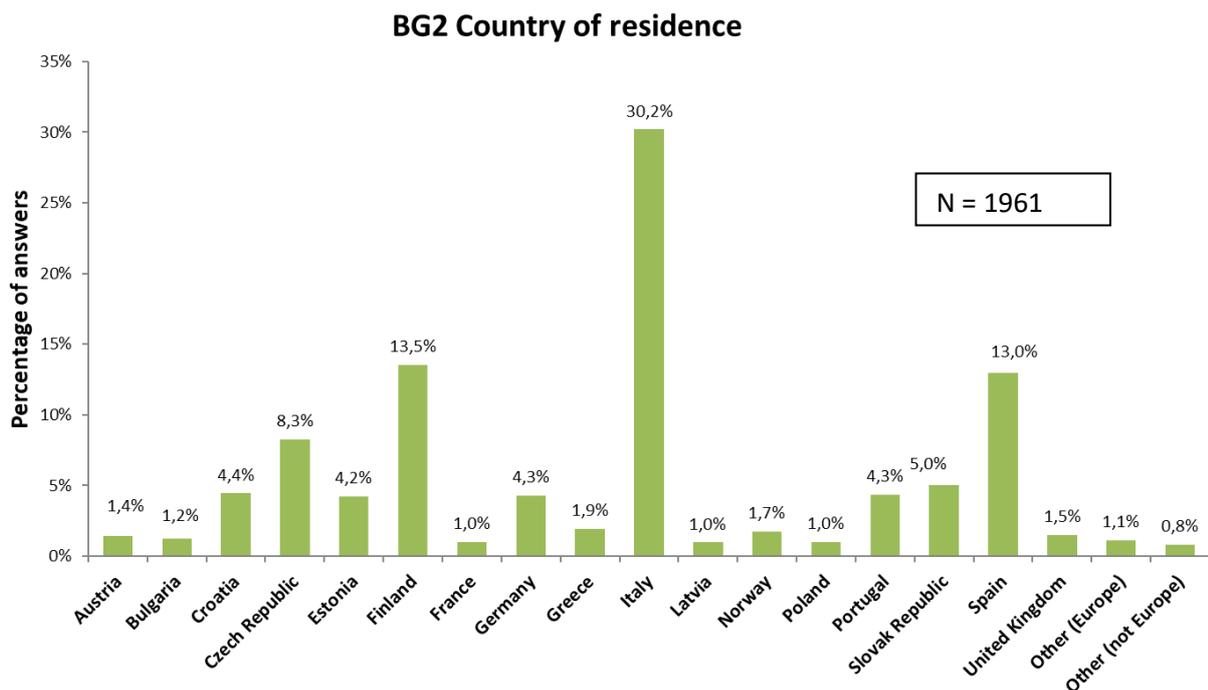
### BG 1 Gender of the respondent



**Figure 3.** Distribution of the respondents by gender.

The respondents to the public survey are almost equally distributed between men and women; this global result is true also when analysing data from individual countries.

### BG 2 Country of residence



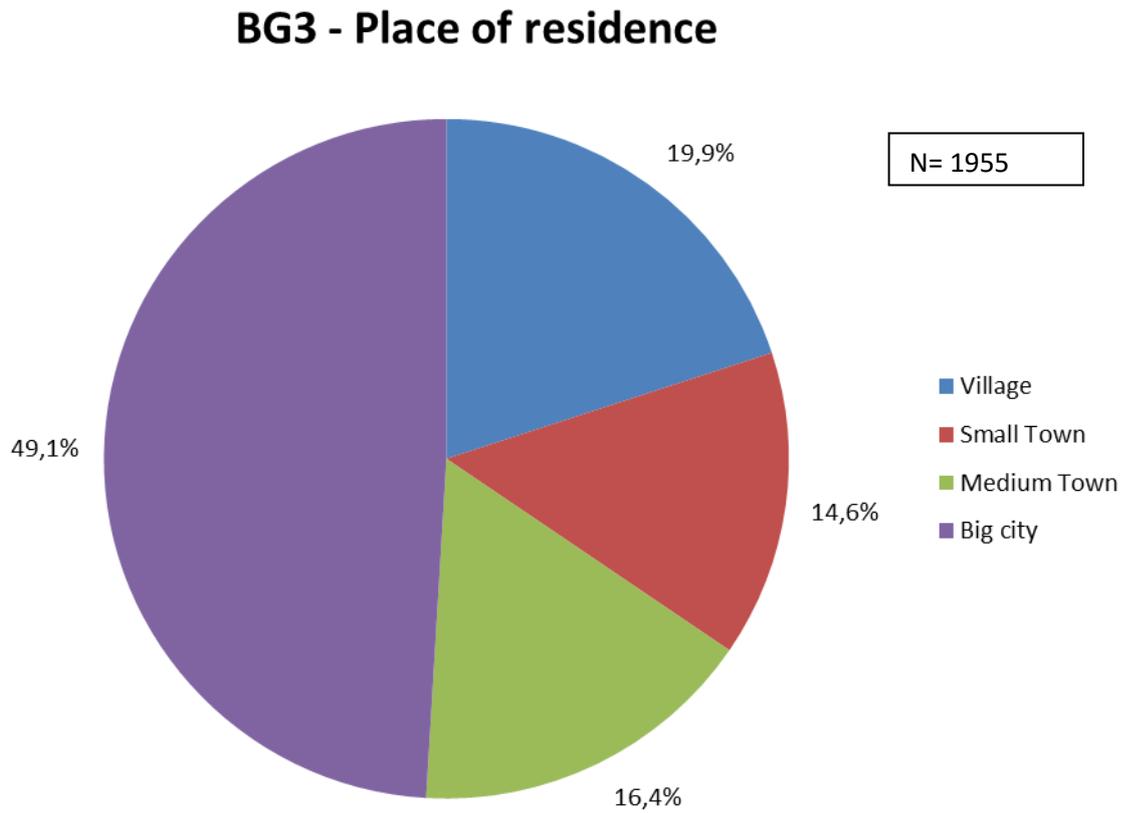
**Figure 4.** Distribution of the respondents by country of residence.

The bar graph in Figure 4 shows the percentage of responses coming from people living in different countries, independently from the language version they used. This data is different with respect to the number of answers for language (previously reported), as expected. In particular, the English version of the questionnaire was selected from people living in the United Kingdom but also from Norway (34 replies). Interestingly, the most responding countries (number of replies >200) are Italy, Spain and Finland: the first one is a country without nuclear energy production, unlike the other two. It is important to note that given the response rates in different countries, the results cannot be taken as necessarily representative of all EU nations overall. Some questions will be analysed taking into account this difference. Moreover, Estonia (83 replies) and Croatia (87 replies) have provided a good number of replies, considering that these countries have a small number of inhabitants (see the percentage of respondents with respect to the population in Table 2). The category “Other (Europe)” includes replies from Belgium, Netherlands, Switzerland, Sweden, Ireland, Slovenia, Serbia, Hungary, Cyprus, Denmark and Romania, belonging to the European Community. The category “Other (not Europe)” includes replies from Japan, United States of America, Australia, Canada, Algeria, Colombia and Argentine.

**Table 2. Country’s population and percentage of population responding**

Country	Population	Replies	% respondents to the survey
<b>Austria</b>	8783198	28	0,0003%
<b>Bulgaria</b>	7050034	24	0,0003%
<b>Croatia</b>	4105493	87	0,002%
<b>Czech Republic</b>	10553843	162	0,002%
<b>Estonia</b>	1319133	83	0,006%
<b>Finland</b>	5522015	265	0,005%
<b>France</b>	67372000	20	0,00003%
<b>Germany</b>	82887000	84	0,0001%
<b>Greece</b>	10768193	38	0,0004%
<b>Italy</b>	60395921	592	0,001%
<b>Latvia</b>	1921300	19	0,001%
<b>Norway</b>	5328212	34	0,0006%
<b>Poland</b>	38433600	20	0,0001%
<b>Portugal</b>	10291027	85	0,0008%
<b>Slovak Republic</b>	5421349	99	0,002%
<b>Spain</b>	46733038	254	0,0005%
<b>United Kingdom</b>	66040229	29	0,00004%

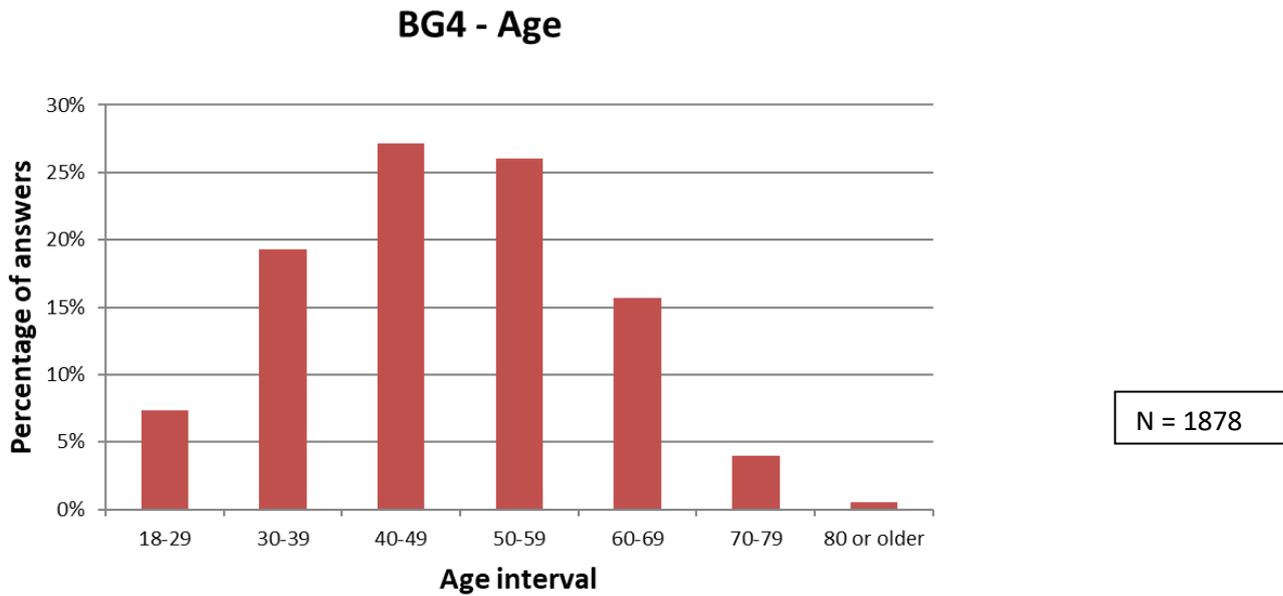
## BG3 Place of residence



**Figure 5.** Distribution of the respondents by place of residence.

About the place of residence, most of the respondents lives in big cities, while the inhabitants in medium towns, small towns and villages are almost equally distributed (see Figure 5).

## BG4 Age (previously “Year of Birth”)



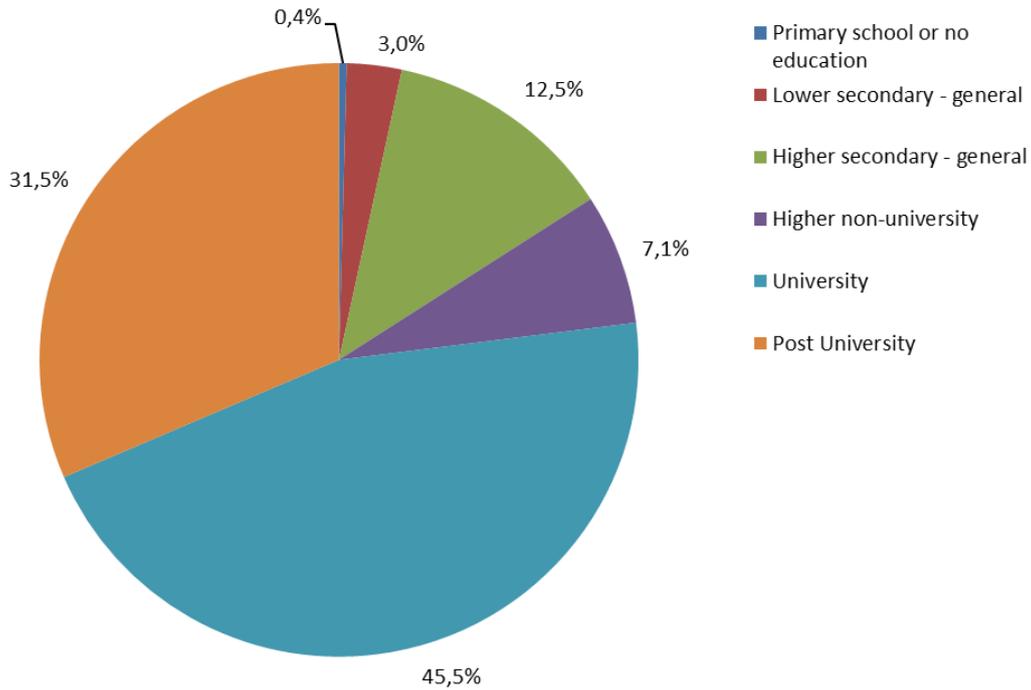
**Figure 6.** : Distribution of the respondents by age.

The age of the respondents at the response time was calculated from the year of birth. Values are reported in the bar graph in Figure 6, merged into age groups. Mean age was equal to 47.3 years.

## BG5 What is the highest qualification you have obtained?

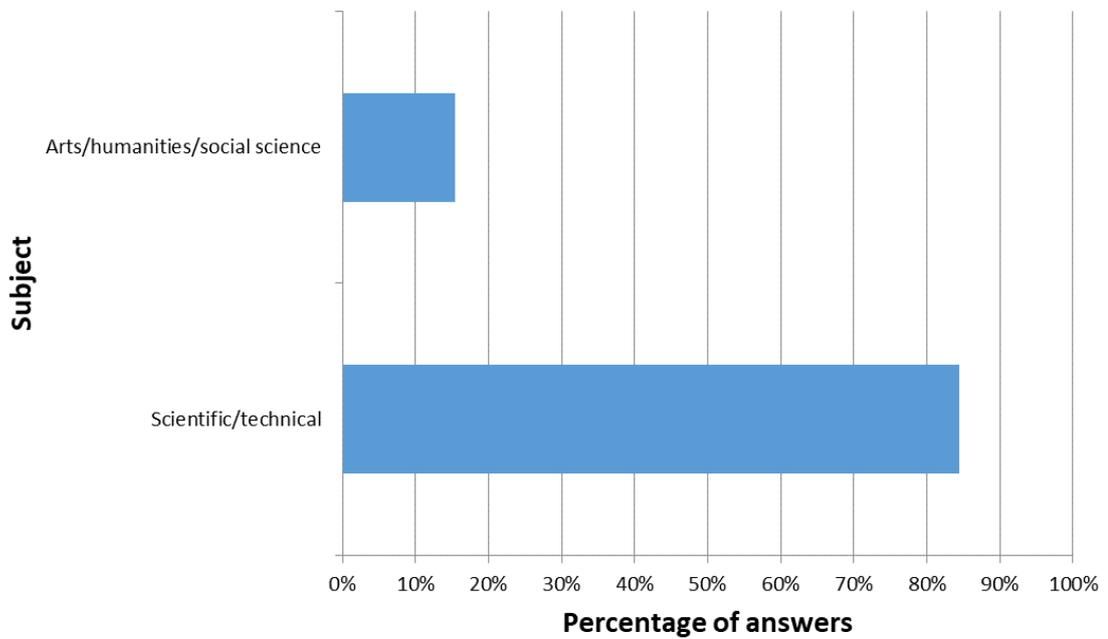
The pie graph in Figure 7 shows that the respondents are characterized by a very high level of schooling; indeed, 77% of the respondents have a university or post-university qualification. Only 3.4% had a primary or lower secondary school qualifications alone. The share of persons aged 30 to 34 in the European Union (EU) who have completed tertiary education was of 39.1% in 2016 (official EUROSTAT document: <https://ec.europa.eu/eurostat/documents/2995521/8001730/3-26042017-BP-EN.pdf/c22de270-ea00-4581-89bc-501056f9cae2>), thus our data seem to be biased, most likely due to the chosen dissemination routes of the questionnaire. The bar graph in Figure 8 shows the distribution of the respondents (University qualification) between arts/humanities/social science (15%) and scientific/technical subject (85%).

**BG5 - What is the highest qualification you have obtained?**



**Figure 7.** Distribution of the respondents by highest qualification obtained

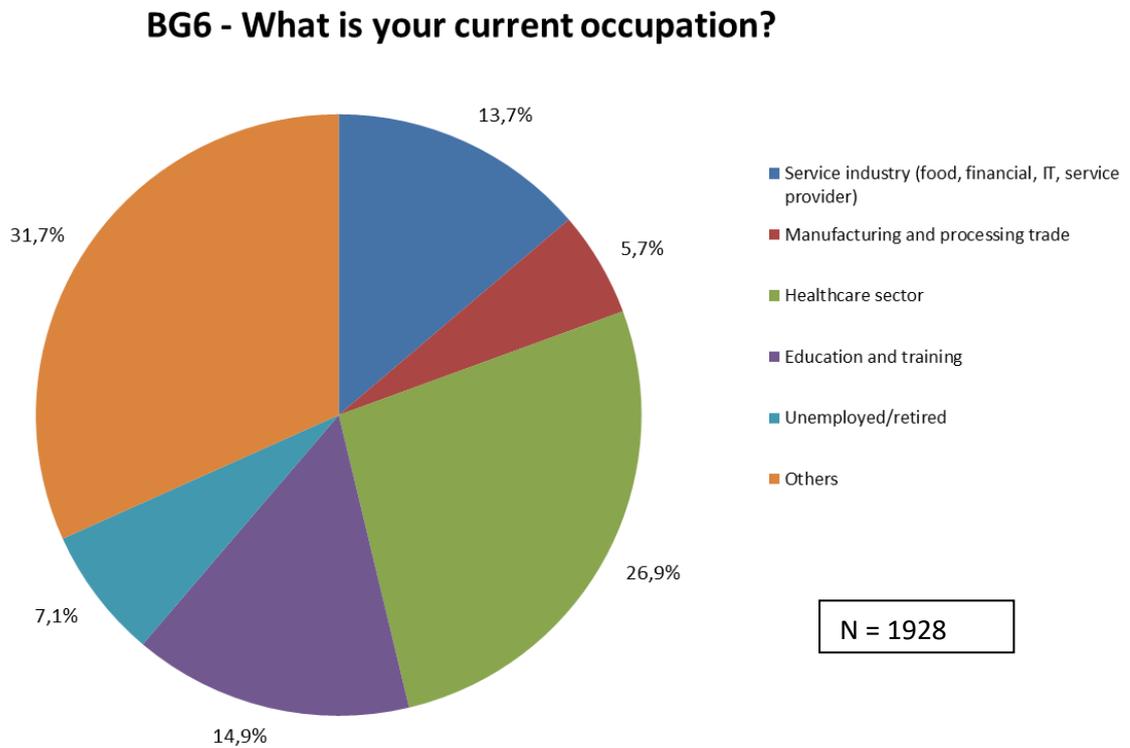
**BG5-University subject**



**Figure 8.** Distribution of the respondents by University qualification (arts/humanities/social science or scientific/technical subject).

### BG6 What is your current occupation?

The answers reported in the pie graph in Figure 9 shows a uniform distribution between the six options; the most frequent selected options were the healthcare sector, and “Other”.

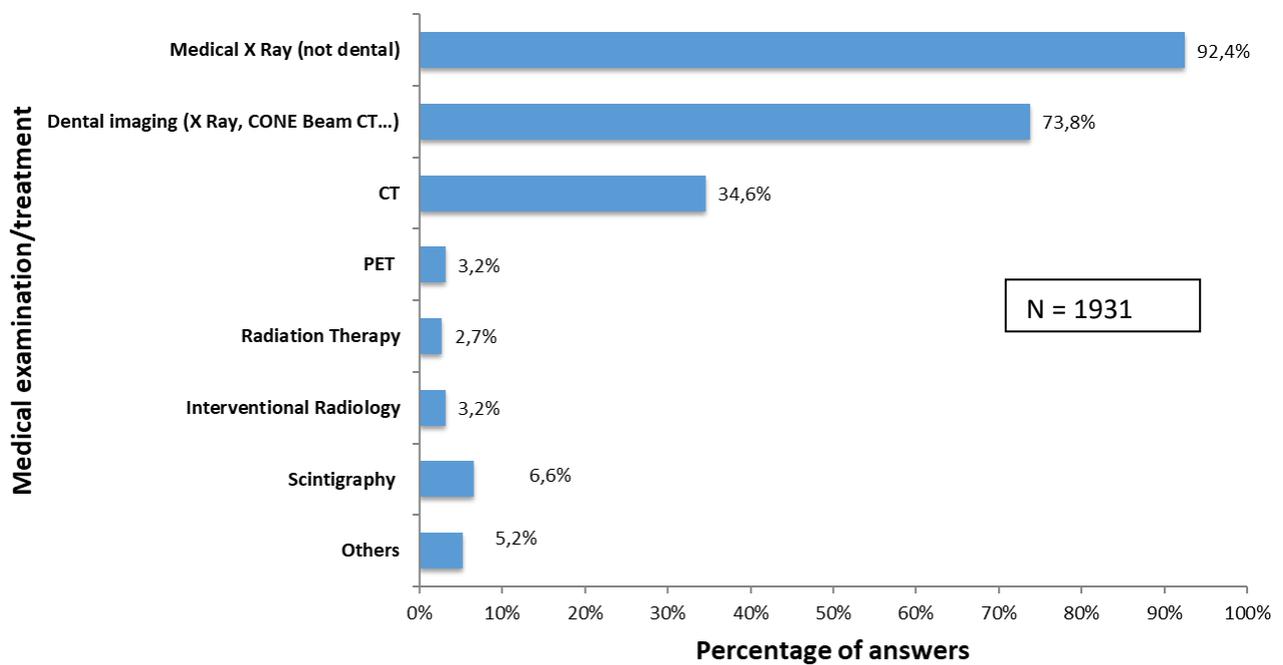


**Figure 9.** Distribution of the respondents by current occupation.

**BG7 Have you ever undergone one of the following medical examination/treatment involving the use of ionizing radiation? (Multiple answers are allowed)**

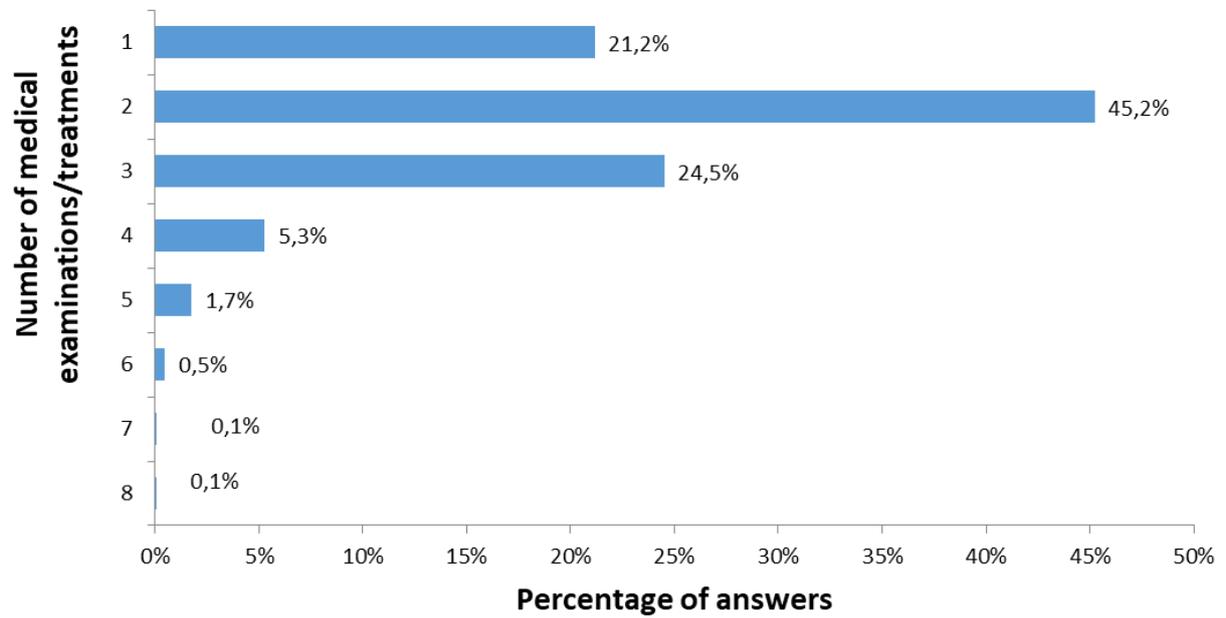
As expected (see the bar graph in Figure 10) most of the people (92.4%) underwent a medical-X ray (not dental) and/or a dental imaging examination. A fewer number of respondents underwent a CT scan. Scintigraphy, Interventional Radiology, Radiation Therapy and Positron Emission Tomography (PET) are less diffuse examinations/treatments. The 45% of the respondents underwent two different examinations/treatments (bar graph below).

**BG7 Have you ever undergone one of the following medical examination/treatment involving the use of ionizing radiation?**



**Figure 10.** Medical treatments involving Ionizing Radiation (IR) to which respondents declared to have undergone. Multiple answers were allowed.

### BG7 - Number of medical examinations/treatments involving IR undergone

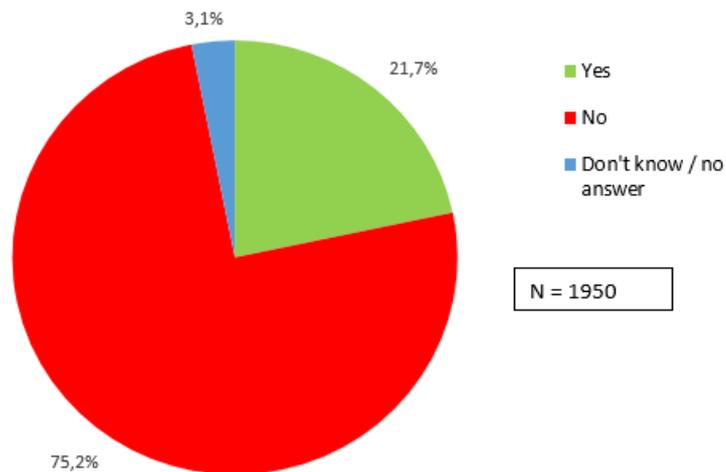


**Figure 11.** Number of medical examinations/treatments involving IR, among those listed in the BG7 question and shown in figure 10, to which respondents declared to have undergone.

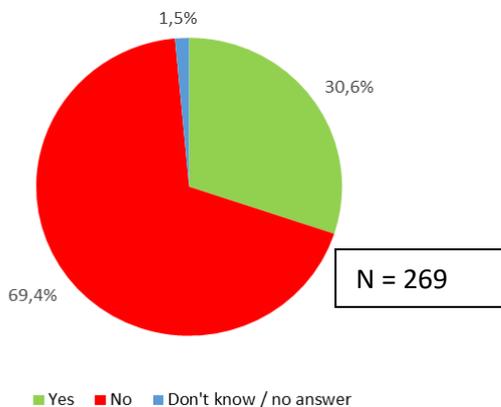
**BG8: Have you ever lived in an area close (within a 20 km radius) to a nuclear installation (power plant, nuclear research reactor)?**

The 21.7% of the total respondents have declared to have ever been living close to a nuclear power plant (a radius of 20 km) in their lifetime. Of course, this percentage is strongly dependent on the country of origin of the respondent (Figure 12a). As an example, only the 5.6% of Italians have answered affirmatively to the question, as Italy is non-nuclear energy country since 1987 (Figure 12b). On the opposite, in Finland, a country with more people living close to the nuclear power plant, a percentage of 30.6% respondents stated that they have been living close to a nuclear installation in their lifetime (Figure 12c).

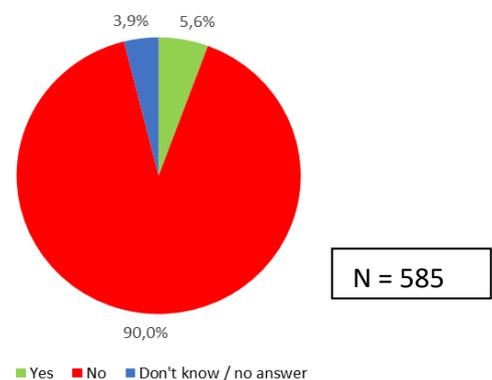
**a** **BG8 - Have you ever lived in an area close (within a 20 km radius) to a nuclear installation (power plant, nuclear research reactor)?**



**b** **BG8 - Finland**



**c** **BG8 - Italy**

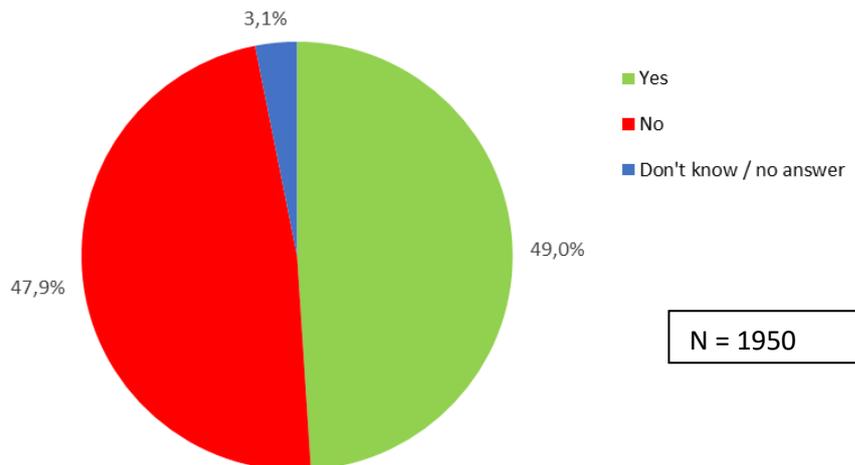


**Figure 12.** a) Percentage of respondents who declared to have been living close to a nuclear installation. Separate analysis for Finland (b) and Italy (c) are shown.

**BG9: Have you ever had a job that involved the use or exposure to ionizing radiation?**

From the answers to question BG9, it comes out that the 49% over the total of the respondents have a job involving the use of ionizing radiation (Figure 13).

**BG9 - Have you ever had a job that involved the use or exposure to ionizing radiation?**



**Figure 13.** Percentage of respondents who declared to have ever had a job that involved the use or exposure to IR.

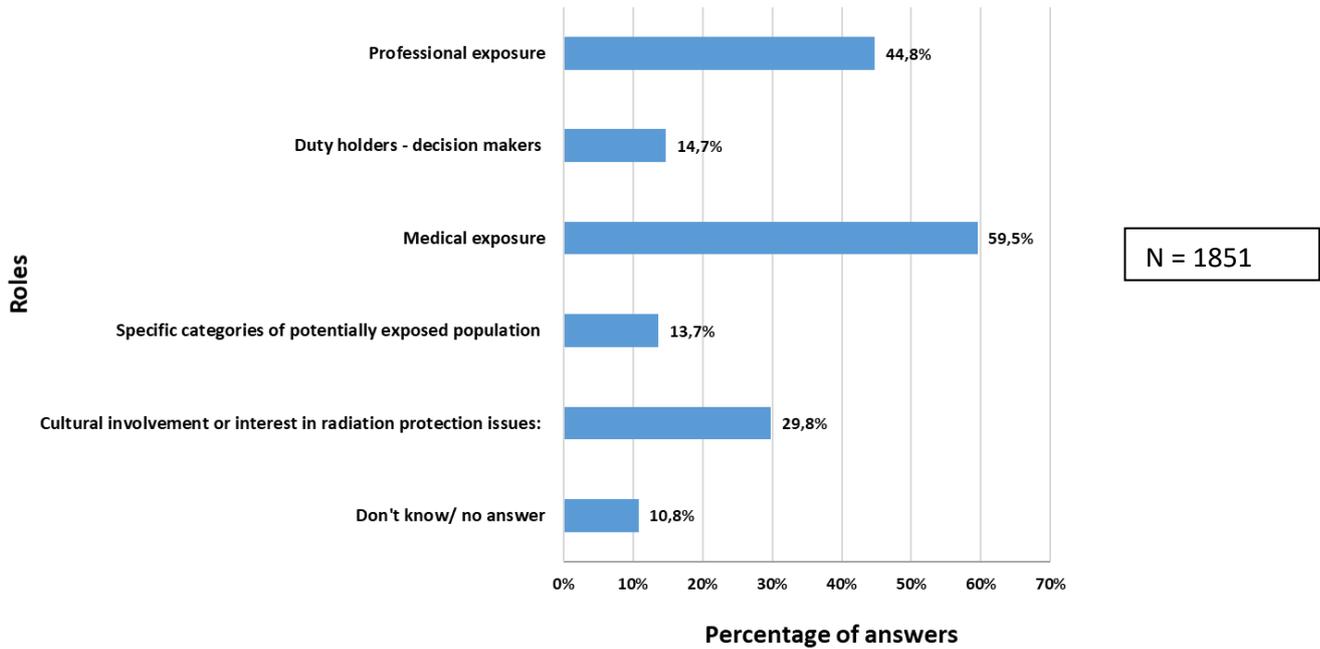
**BG10: Select from the list the roles you dealt with radiation protection field (multiple answers are allowed).**

An overview of the composition of the respondents and about their role in the radiation protection field is illustrated in Figure 14, from which it comes up that many respondents, about the 56.2%, are subjected to a medical exposure.

A significant part of the respondents answered that they were subject to professional exposure (once again, a bias due to the sampling, including many researchers and hospital personnel working in the field of ionizing radiation) and about the 27% declared to have a cultural involvement or personal interest.

About the 43.8 % of the respondents have indicated more than one option and the 6% indicated none of the options.

**BG10 - Select from the list the roles you dealt with radiation protection field:**

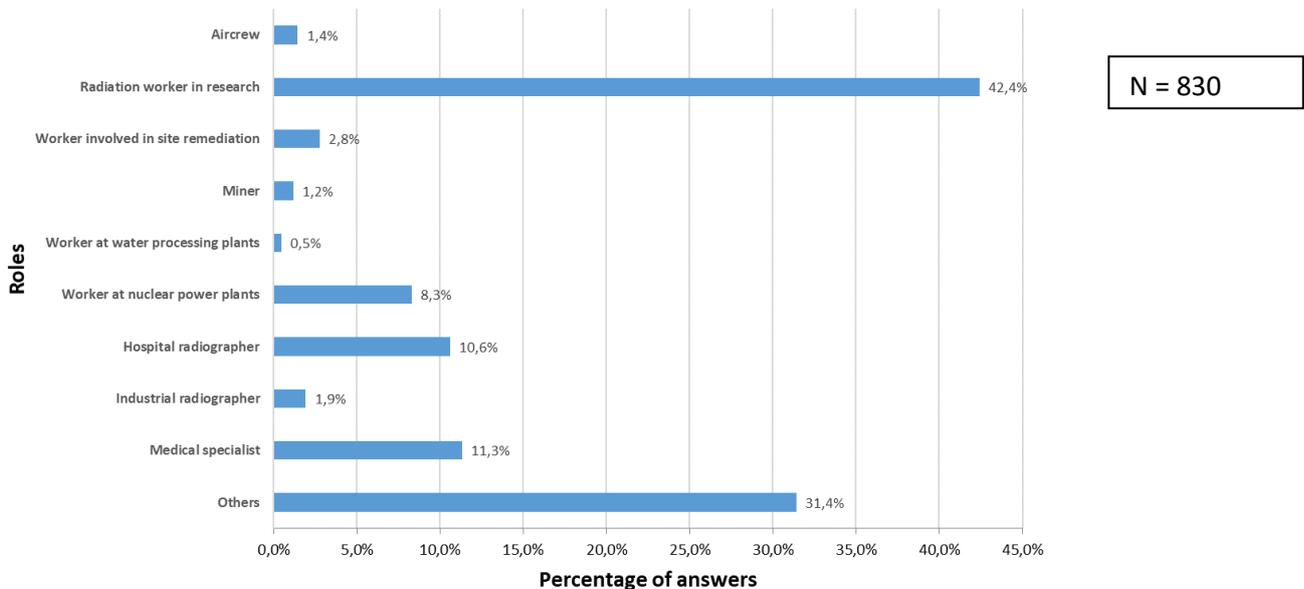


**Figure 14.** Distribution of the respondents who recognized themselves in one of the mentioned categories. Multiple answers were allowed.

**BG11 a-e**

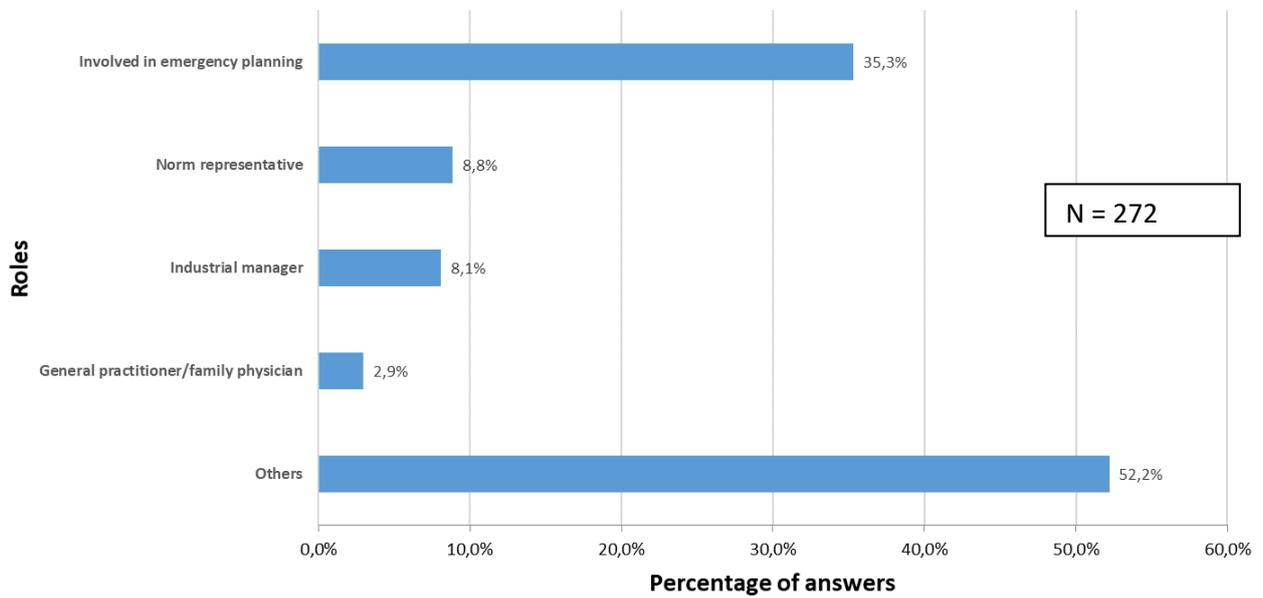
Figures 15-19 show a more detailed composition regarding the five different sections indicated in question BG10 and illustrated in Figure 14.

**BG11a Composition of those answering "Professional exposure" to BG10 question**



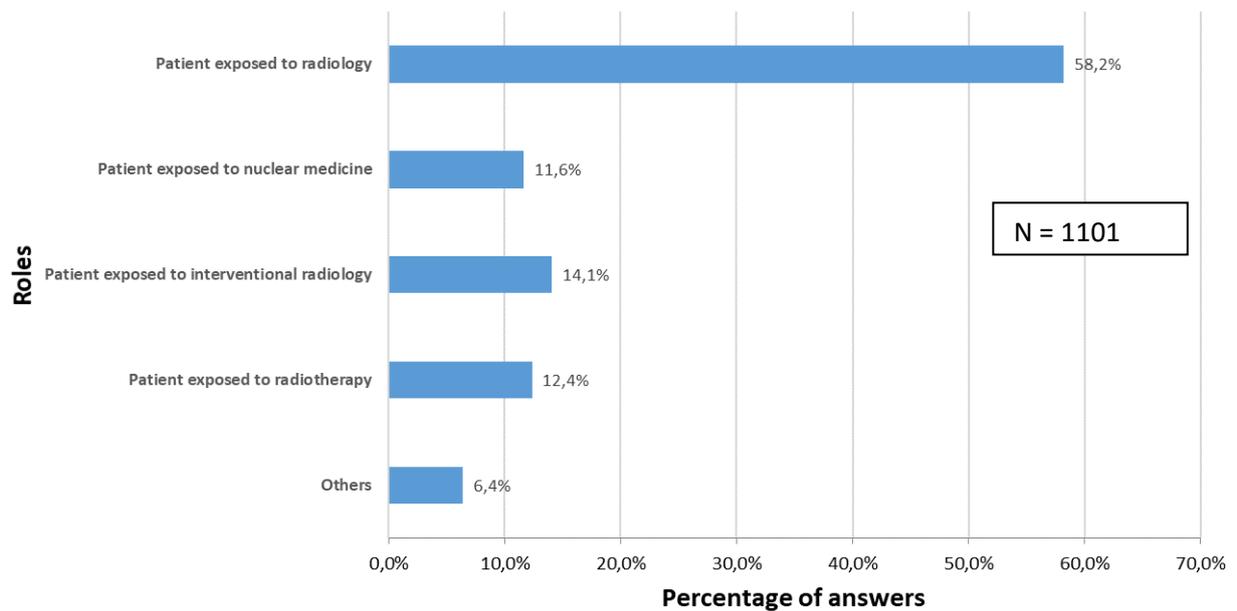
**Figure 15.** Detailed composition of those answering "Professional exposure" to BG10 question. Multiple answers were allowed

**BG11b Composition of those answering "Duty holders - decision makers" to BG10 question**



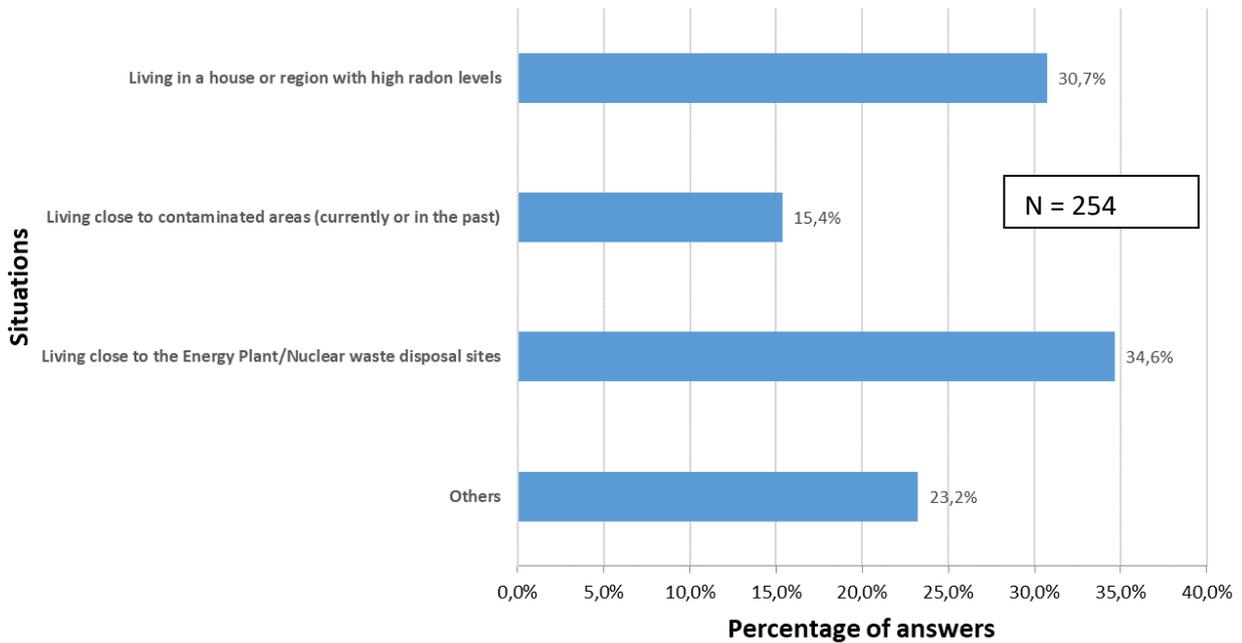
**Figure 16.** Detailed composition of those answering "Duty holders - decision makers" to BG10 question. Multiple answers were allowed.

**BG11c Composition of those answering "Medical exposure" to BG10 question**



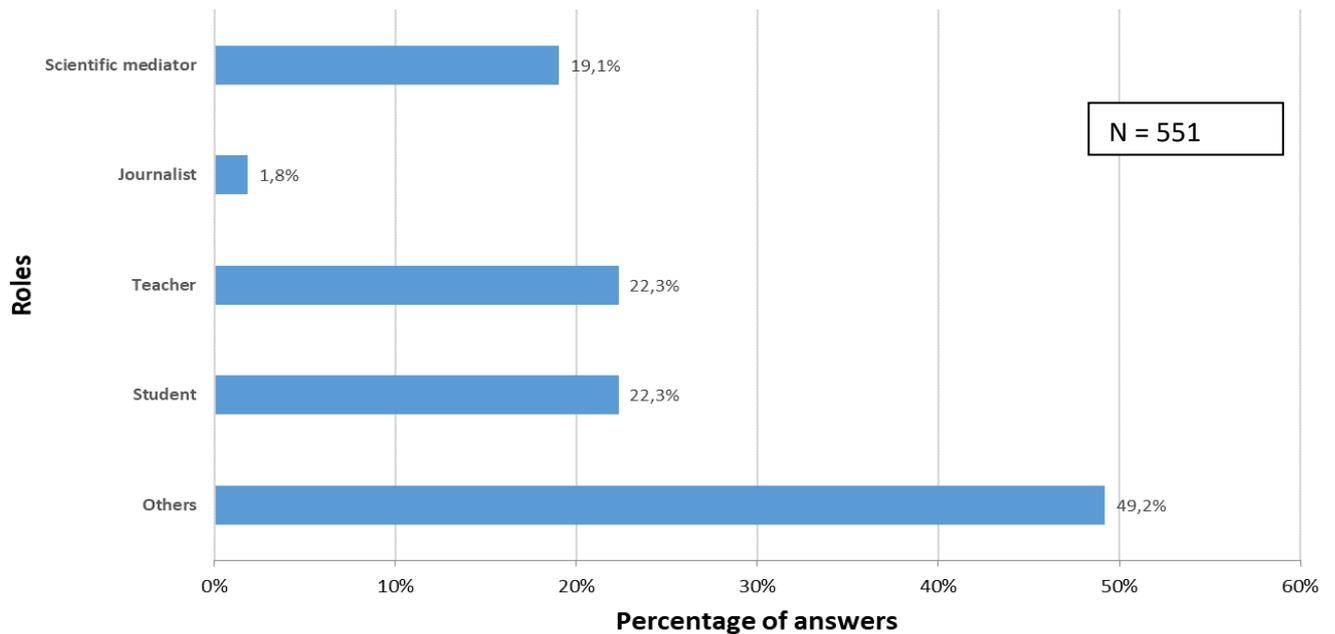
**Figure 17.** Detailed composition of those answering "Medical exposure" to BG10 question. Multiple answers were allowed.

**BG11d Composition of those answering "Specific categories of potentially exposed population" to BG10 question**



**Figure 18.** Detailed composition of those answering "Specific categories of potentially exposed population" to BG10 question. Multiple answers were allowed.

**BG11e Composition of those answering "Cultural involvement or interest in radiation protection issues" to BG10 question**



**Figure 19.** Detailed composition of those answering "Cultural involvement or interest in radiation protection issues" to BG10 question. Multiple answers were allowed.

**BG12: What kind of training have you had in radiation protection field? (multiple answers are allowed)**

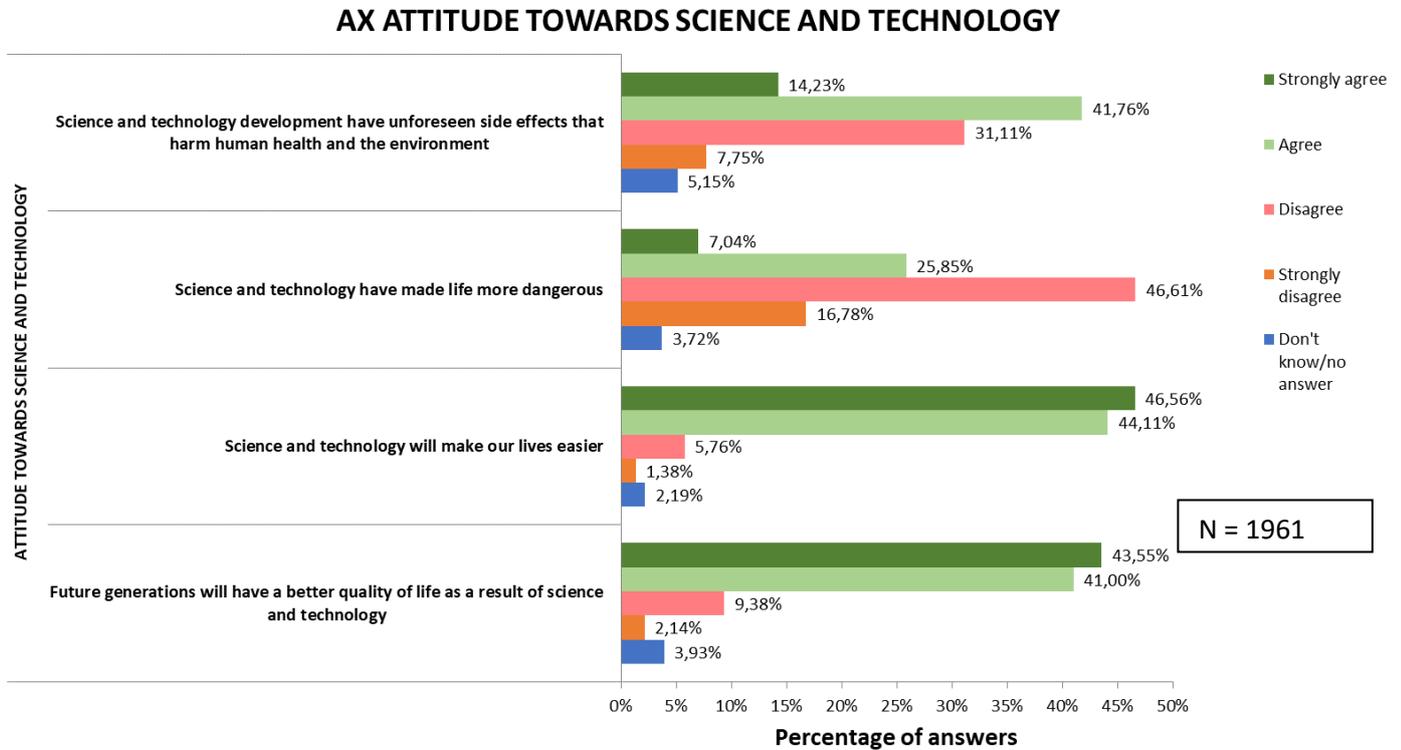
The results are shown in the Figure 20. A percentage equal to the 41% of the respondents declared to have received more than one form of training (selecting multiple answers).



**Figure 20.** Different kinds of training received in radiation protection field by the respondents. Multiple answers were allowed.

## 6.2 Second section- General part

In the following, all the questions were set as mandatory; the number of respondents is always 1961, except for question C1 and F1.



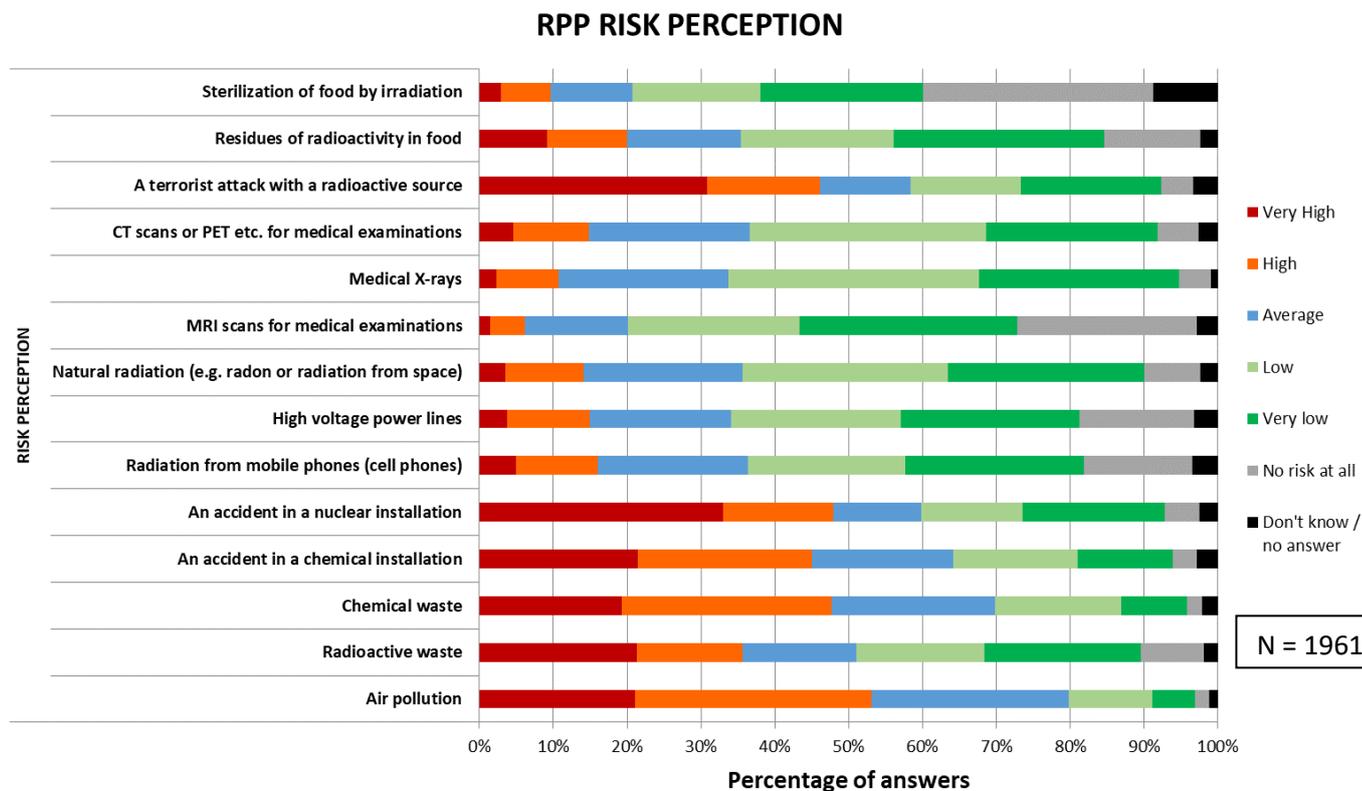
**Figure 21.** Extent of agreement or disagreement with the reported statements about attitude towards science and technology.

### AX1 Attitude towards science and technology

The first question of the main section of the questionnaire investigated on the attitude of the respondents towards science and technology.

Figure 21 shows that almost the 50% of the respondents strongly agree that “Science and technology will make our lives easier” (46.6%) and also that future generations will have a better quality of life as a result of science and technology (43.5%). A strong agreement (41.8% percentage of answer “Agree”) is shown also with the statement “*Science and technology development have unforeseen side effects that harm human health and the environment*”. Finally, almost 33% of the respondents agreed that science and technology have made life more dangerous.

RPP Risk perception – “Please indicate to what extent you think each of the following affects your relatives’ health.”



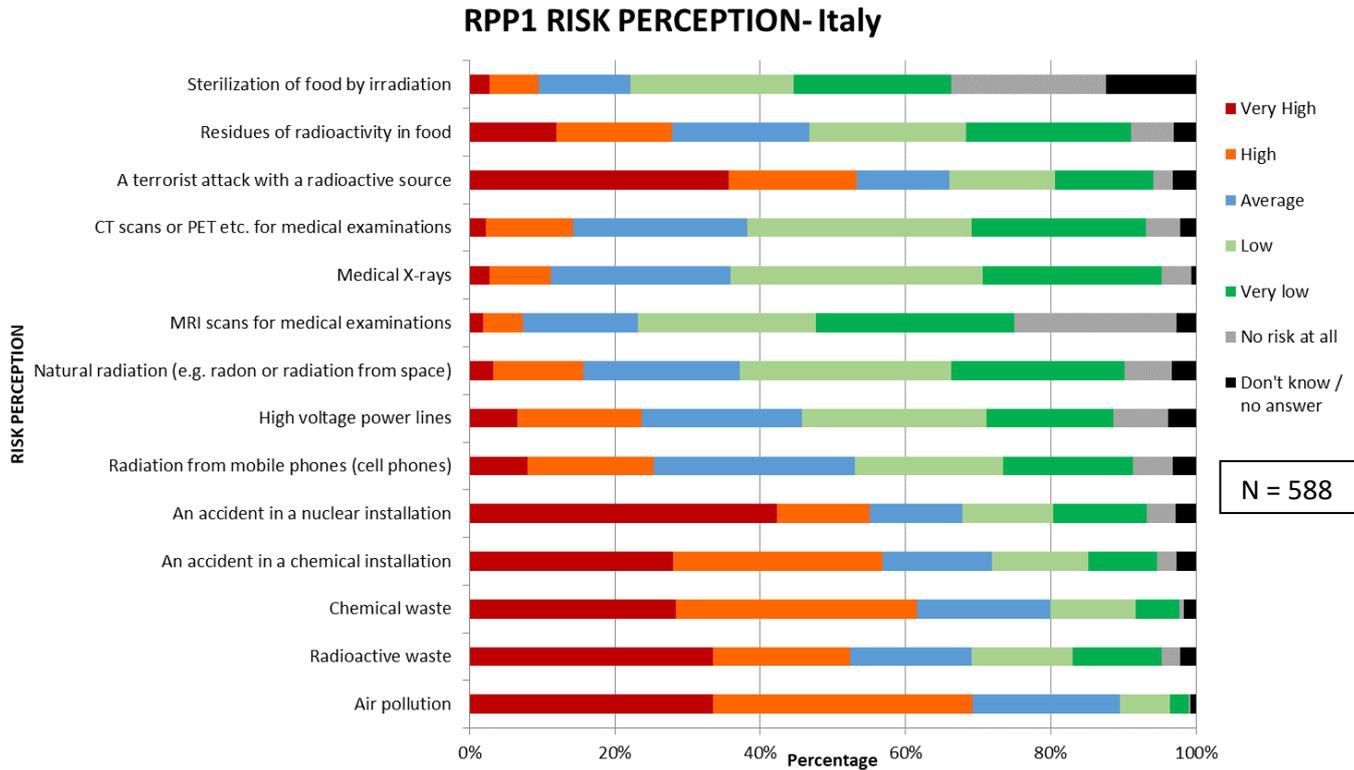
**Figure 22.** Risk perception towards relatives’ health risk perception about items involving or not IR

The situations mainly considered at very high risk by the respondents are an accident in a nuclear installation (33.0% -“Very high”) and a terrorist attack with a radioactive sources (30.9% - “Very high”), followed by air pollution, chemical waste and an accident in a chemical installation.

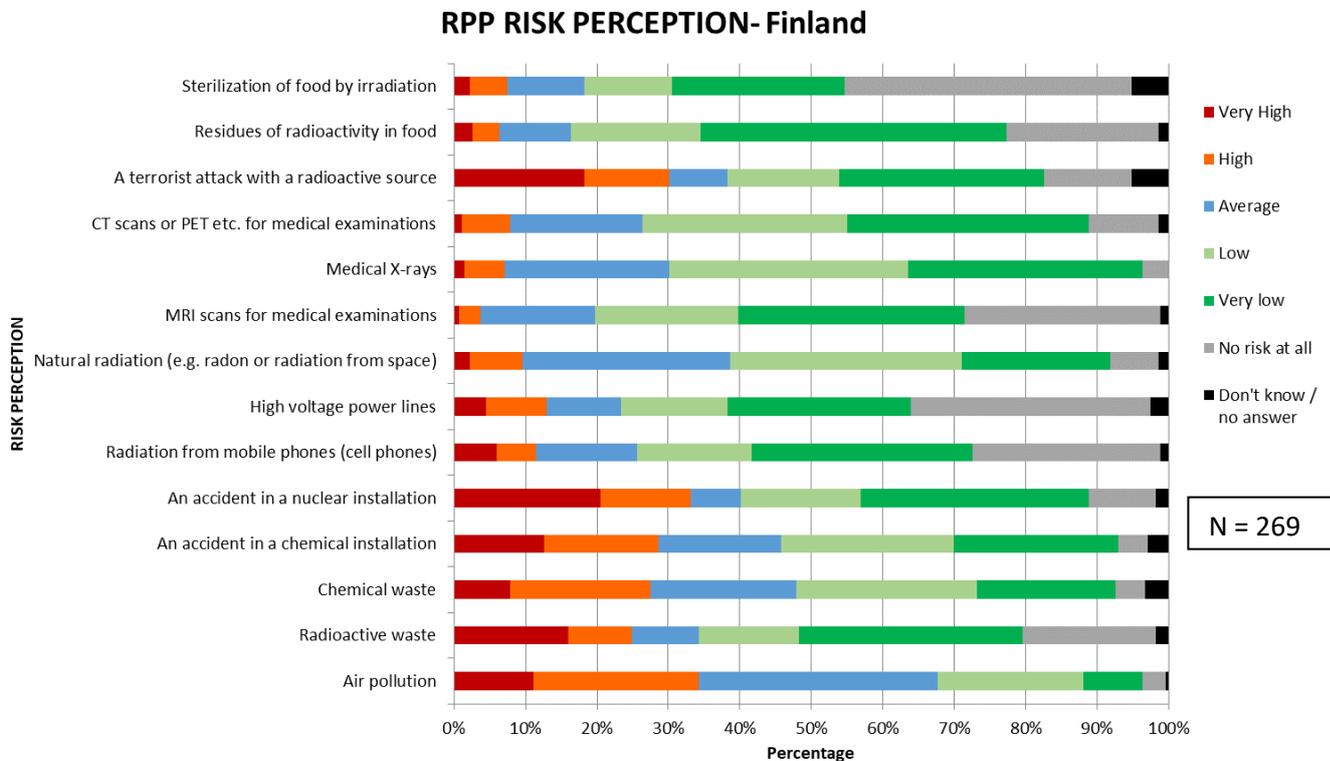
On the other hand, the lowest risk perception of the respondents were Medical X-rays, CT Scans or PET for medical examinations but also the sterilization of food by irradiation.

Interestingly, the separate analysis for Italy and Finland showed very different results about the perception of risk.

In particular, the percentage of respondents who have high risk perception of an accident at a nuclear installation is indeed much lower in Finland than the overall result (20.4% in Finland with respect to 33% in all participating countries), while it is higher for the Italian respondents (42.3%). The analysis for responses from Spain, shows very similar results to the results from Finland. Nonetheless, at this stage only a qualitative analysis has been performed and the significance of each data, by means of the definition of levels of confidence should be estimated before drawing any conclusion

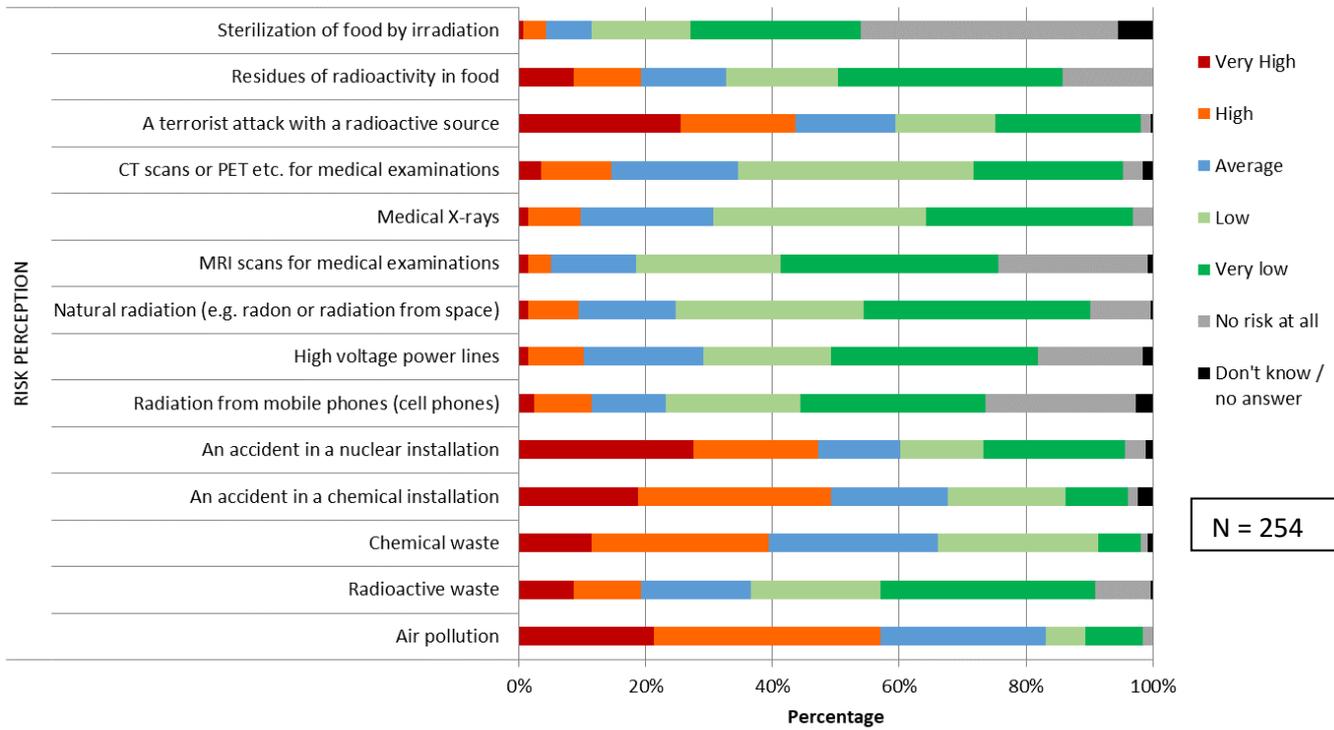


**Figure 23.** Risk perception towards relatives' health risk perception about items involving or not IR (restricted to Italy).



**Figure 24.** Risk perception towards relatives' health risk perception about items involving or not IR (restricted to Finland).

### RPP RISK PERCEPTION- Spain



**Figure 25.** Risk perception towards relatives' health risk perception about items involving or not IR (restricted to Spain).

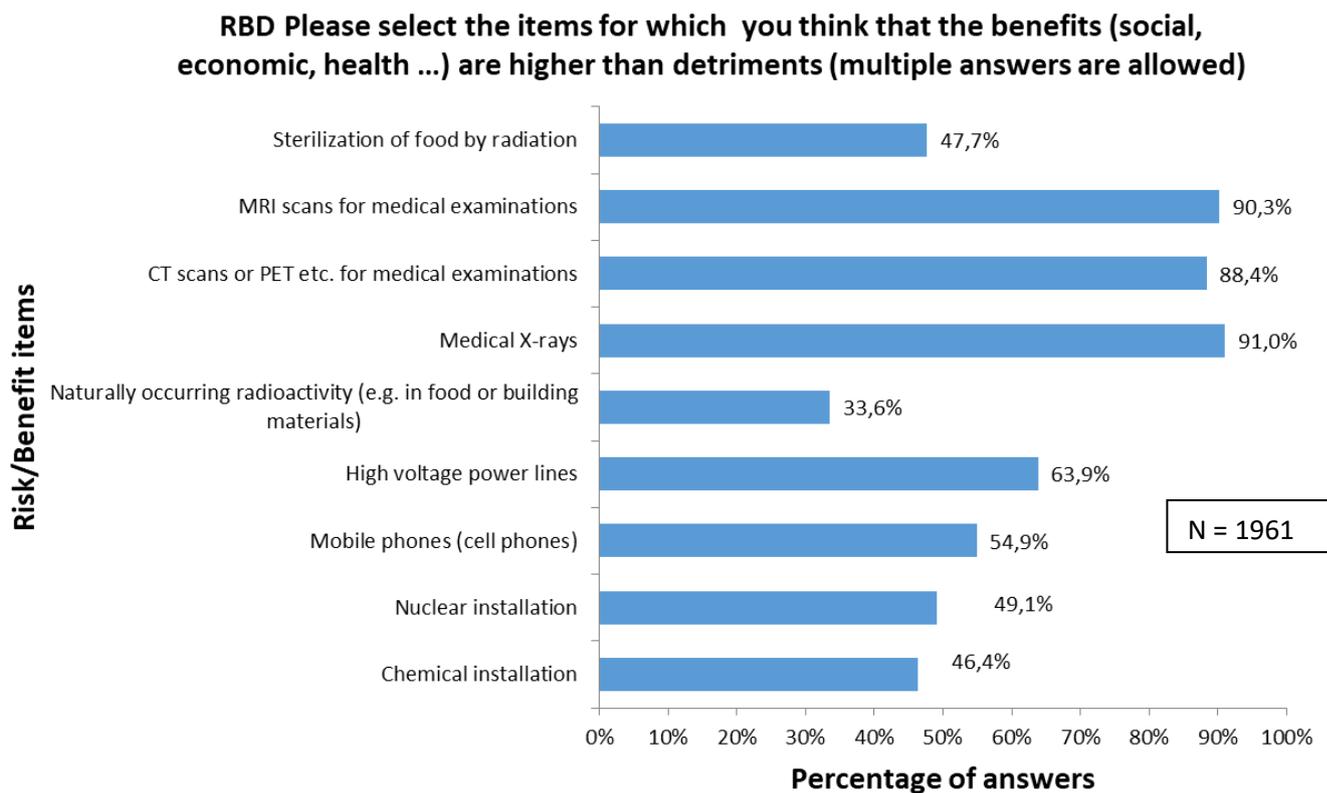
**RBD- “Please select the items for which you think that the benefits (social, economic, health, ...) are higher than detriments”**

The fields for which the benefits are considered higher than detriment are mostly medical diagnostic examinations. Surprisingly, only slightly more than a half of the respondents considers the benefits of the high voltage power lines higher than detriments.

It is interesting, in this respect, to investigate the possible link of this percentage with the education level of the respondents, as the suspect arises that many respondents do not know the exact meaning of the high voltage power lines; but, considering only respondents having a graduate or a postgraduate education, this data has only a slight increase.

Again comparing the percentage of people considering that there is more benefit than detriment for nuclear installation, for countries non-nuclear energy countries like Estonia and Italy the percentage is rather smaller than the total.

Answers are shown in Figure 26.



**Figure 26.** Selection of items for which respondents thought that the benefits were higher than detriments.

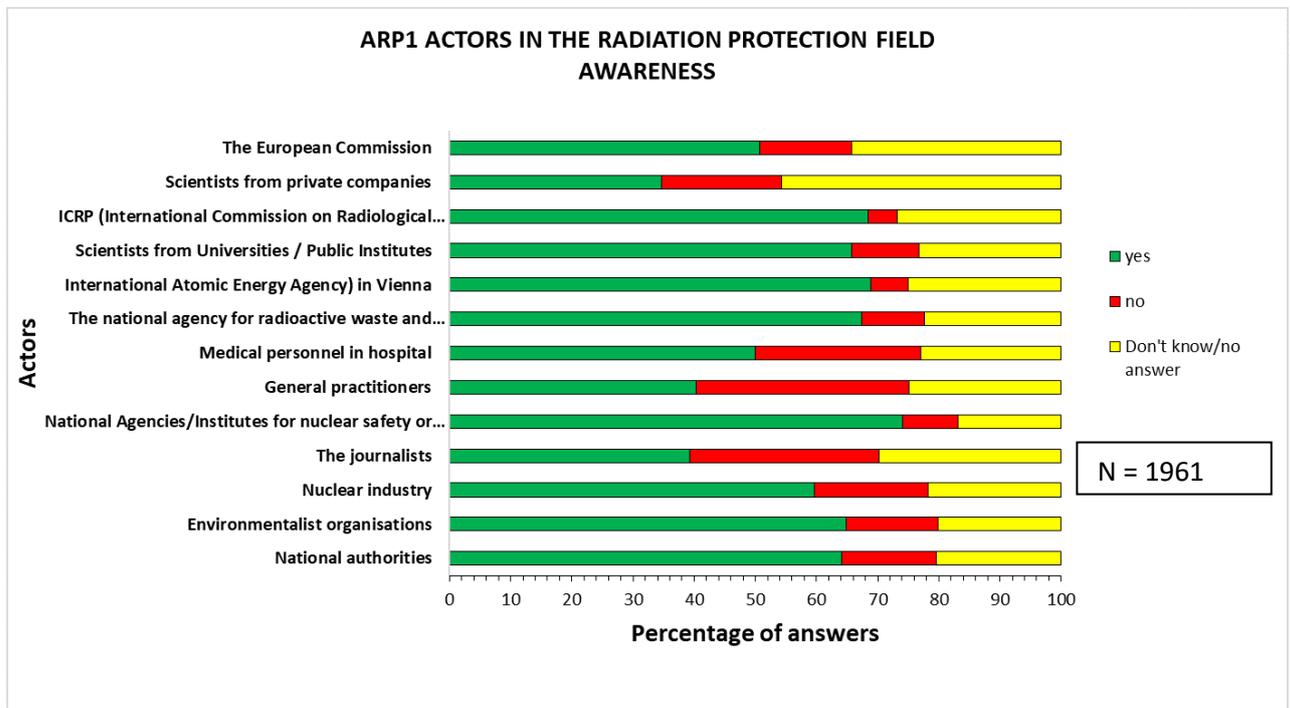
## ARP - ACTORS IN THE RADIATION PROTECTION FIELD

Attitudes towards the actors in the field of radioprotection investigated in this study are:

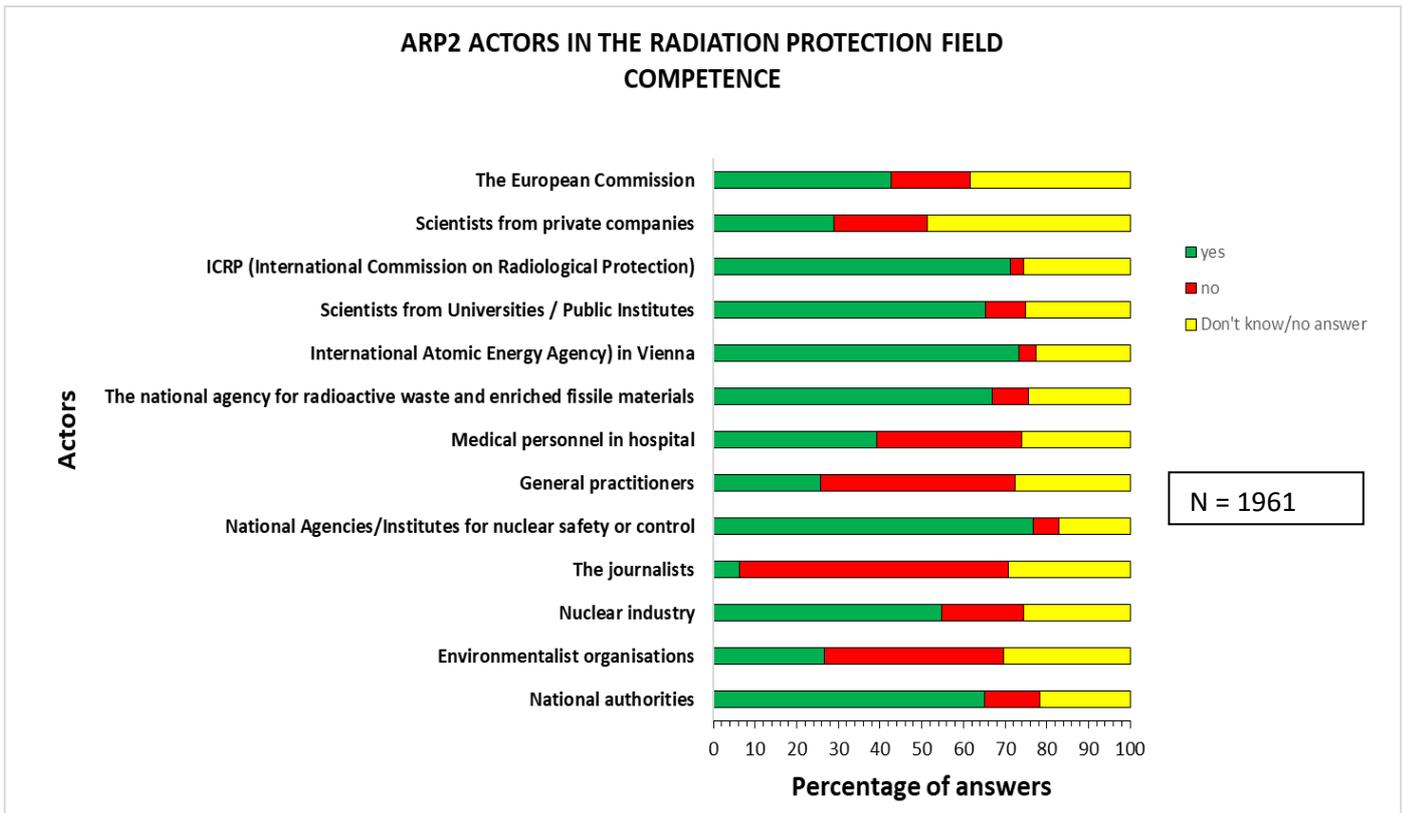
- National radiation protection authorities
- Environmentalist organisations
- Nuclear industry
- The journalists
- National Agencies/Institutes for nuclear safety or control
- General practitioners
- Medical personnel in hospital
- The national agency for radioactive waste and enriched fissile materials
- IAEA (International Atomic Energy Agency) in Vienna
- Scientists from Universities / Public Research Institutes
- ICRP (International Commission on Radiological Protection)
- Scientists from private companies
- The European Commission

In this section, divided into ARP1, ARP2, ARP3, respondents were asked whether these actors are: aware of public concerns about radiation (ARP1) technically and scientifically competent to point out the risks and benefits of the use of ionising radiation (ARP2), telling the truth about risks and benefits of the use of ionising radiation (ARP3). The respondents were asked to answer only for the actors that they know. The answering categories are:

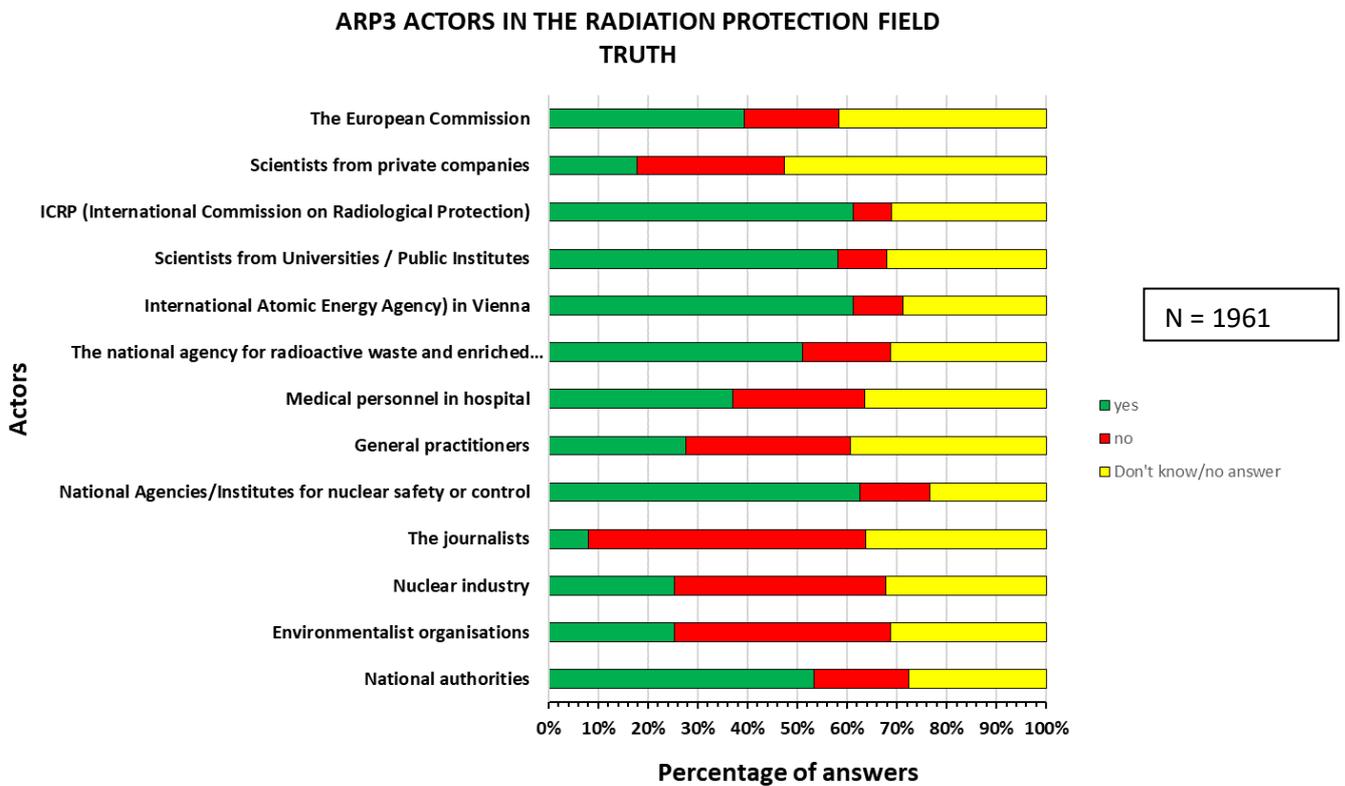
- Yes
- No
- Don't know / no answer



**Figure 27.** Opinion about the awareness of public concerns about radiation of the actors in the radiation protection field.



**Figure 28.** Opinion about the technical and scientific competence to point out the risks and benefits of the use of IR of the actors in the radiation protection field.



**Figure 29.** Opinion about the veracity about risks and benefits of the use of IR of the actors in the radiation protection field.

The figures show the opinion of the respondents about the different actors. Overall, it can be seen that, considering a percentage of more than 50% of the positive answers, of the thirteen actors identified, most are considered aware of public concerns about radiation by the respondents. Some of them are also considered technically and scientifically competent to point out the risks and benefits of the use of ionising radiation and that they are telling the truth about risks and benefits of the use of ionising radiation . In fact, it is interesting to underline that although the industries were considered aware and competent (59.7 % and 54.7 % respectively) they were not perceived to tell the truth (42.3 %) in the opinion of the respondents. On the other hand, the environmentalist organizations and the journalists, despite being considered aware (64.8% and 39.3% respectively), were considered competent (26.7% and 6.2% respectively) and truthful in spreading the news about the radioprotection (25.4% and 8.0% respectively) in very low percentages.

## **RC - SATISFACTION WITH ACTIONS OF THE AUTHORITIES**

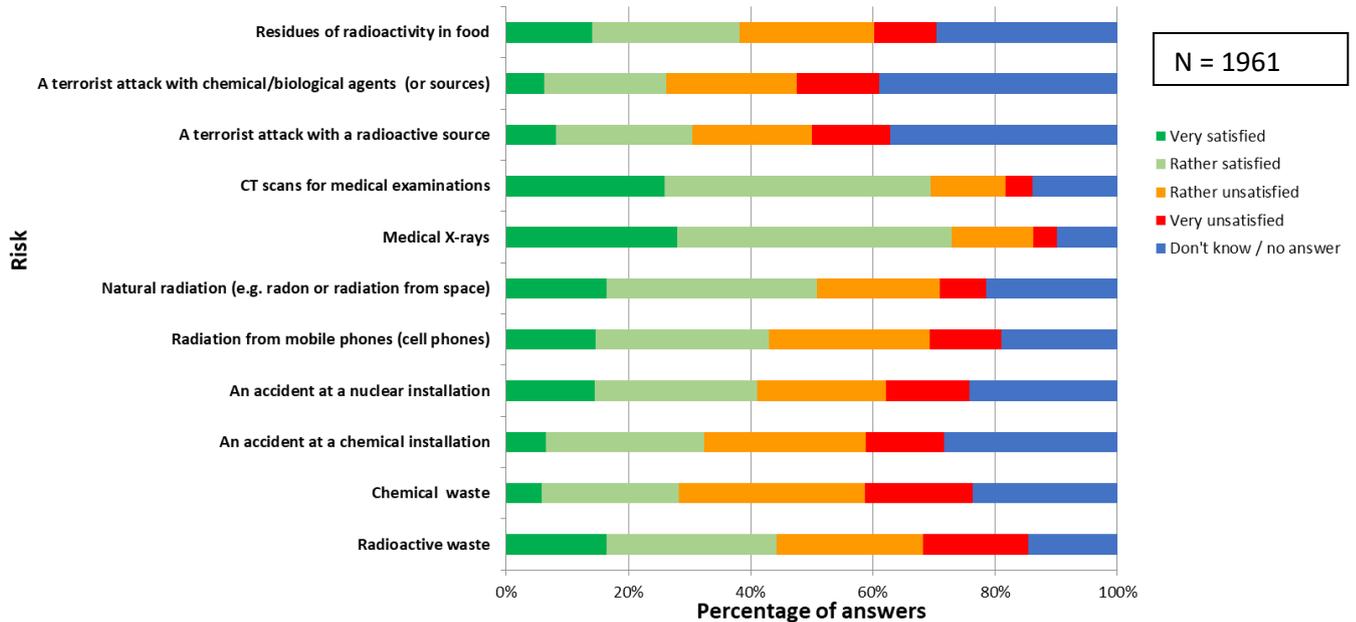
“How satisfied are you with the actions the authorities undertake in the following contexts to protect the population against the risks below?”

- Radioactive waste
- Chemical waste
- An accident in a chemical installation
- An accident in a nuclear installation
- Radiation from mobile phones (cell phones)
- Natural radiation (e.g. radon or radiation from space)
- Medical X-rays
- CT scans for medical examinations
- A terrorist attack with a radioactive source
- A terrorist attack with chemical/biological agents (or sources)
- Residues of radioactivity in food

Answering categories:

- Very unsatisfied
- Rather unsatisfied
- Rather satisfied
- Very satisfied
- Don't know/no answer

## RC - Satisfaction with actions the authorities undertake to protect the population against risks



**Figure 30.** Percentage of satisfaction with the actions the authorities undertaken to protect the population against the reported risks.

Figure 30 shows the satisfaction with the actions that authorities undertake to protect the population against different risks. About risk such as “an accident at a chemical installation”, “a terrorist attack with a radioactive source”, “a terrorist attack with chemical/biological agents (or sources)” and “residues of radioactivity in food”, 30% of the respondents answered “Don't know/no answer” while there is rather high satisfaction for the actions undertaken by authorities in case of “medical X-rays” and “CT scans for medical examinations” (overall about 70%). Instead, respondents are rather dissatisfied with actions that authorities undertake in case of chemical waste, and to a lesser extent in case of radioactive waste.

## AW - KNOWLEDGE ABOUT THE RADIATION PROTECTION DOMAIN

“The following questions concern the use of radiation in general. What do you think about the following issues?”

- Does exposure to radiation always lead to radioactive contamination?
- Is radioactive waste produced only by nuclear power plants?
- Is it true that vegetables grown near a nuclear power plant are not good for consumption because of radioactivity?

- Is it true that natural radioactivity is never dangerous because we are used and adapted to it?
- Is it true that the human body is naturally radioactive?
- Is it true that with time, every radioactive substance becomes more and more radioactive?
- Is it true that food sterilization by irradiation makes food radioactive?

Answering categories:

- Yes
- No
- Don't know/ no answer

**Table 3. AW - KNOWLEDGE ABOUT THE RADIATION PROTECTION DOMAIN**

N = 1961

	Does exposure to radiation always lead to radioactive contamination?	Is radioactive waste produced only by nuclear power plants?	Is it true that vegetables grown near a nuclear power plant are not good for consumption because of radioactivity?	Is it true that natural radioactivity is never dangerous because we are used and adapted to it?	Is it true that human body is naturally radioactive?	Is it true that, with time, every radioactive substance becomes more and more radioactive?	Is it true that food sterilisation by irradiation makes food radioactive?
Correct answer	NO	NO	NO	NO	YES	NO	NO
% of correct answers	71,6	92,9	57	75,5	54,9	88	68,3
% of wrong answers	16,1	2	26,1	13,4	23,1	2,8	7,3
% of "Don't know/no answer"	12,3	5,1	16,9	11,1	22	9,2	24,4

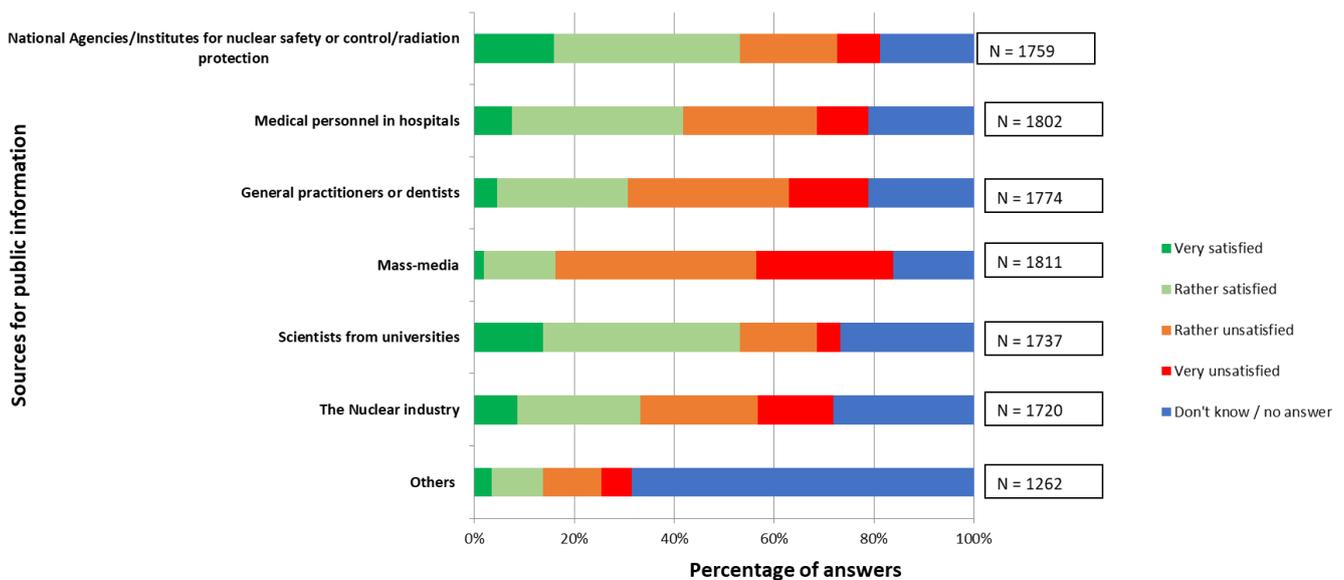
In Table 3, results of question AW are reported to make the distinction between the percentages of correct and wrong answers. It is clear that for all questions more than the 50% of the respondents gave the correct answer. Nonetheless, for four over seven questions the sum of percentages of wrong answer and "don't know/no answer" is more than the 25%, in two over seven questions it is even close to 45%. These results are quite surprising, especially considering that almost half of the respondents declared to work in the ionizing radiation field.

## C - COMMUNICATION ABOUT IONISING RADIATION IN GENERAL

“In general, how satisfied are you with the public information related to ionizing radiation provided by the following sources? (Skip the item if you have never received any information related to ionising radiation from the specific source). “

- National Agencies/Institutes for nuclear safety or control/radiation protection
- Medical personnel in hospitals
- General practitioners or dentists
- Mass-media
- Scientists from universities
- The Nuclear industry
- Others

### C - COMMUNICATION ABOUT IONISING RADIATION IN GENERAL



**Figure 31.** Satisfaction with public information related to IR.

About the degree of satisfaction with the communication on the ionizing radiation received from different actors, the respondents showed satisfaction towards national agencies/institutes for nuclear safety and towards scientists from universities, while they declared clear dissatisfaction towards mass media. Almost the same percentage of satisfaction and dissatisfaction towards medical personnel in hospital, general practitioners or dentists and nuclear industry was declared (see graph above).

**F1-The European CONCERT Project is currently developing a "research roadmap" to help ensure that future scientific work is consistent with societal priorities with respect to issues related to the protection of the public and ecosystems from ionising radiation exposure.**

Table 4 shows the results of the question F1: *“Would you, as a stakeholder invited to respond to this questionnaire, be interested in further giving your opinion on future research needs in the course of the elaboration of the above mentioned European Roadmap?”*

**Table 4.** Interest in further giving opinion on future research needs in the course of the elaboration of the European Roadmap

F1 - Would you, as a stakeholder invited to respond to this questionnaire, be interested in further giving your opinion on future research needs in the course of the elaboration of the above-mentioned European Roadmap?	
N = 1961	
<b>Yes</b>	39.6%
<b>No</b>	33.4%
<b>Don't know / no answer</b>	27.1%

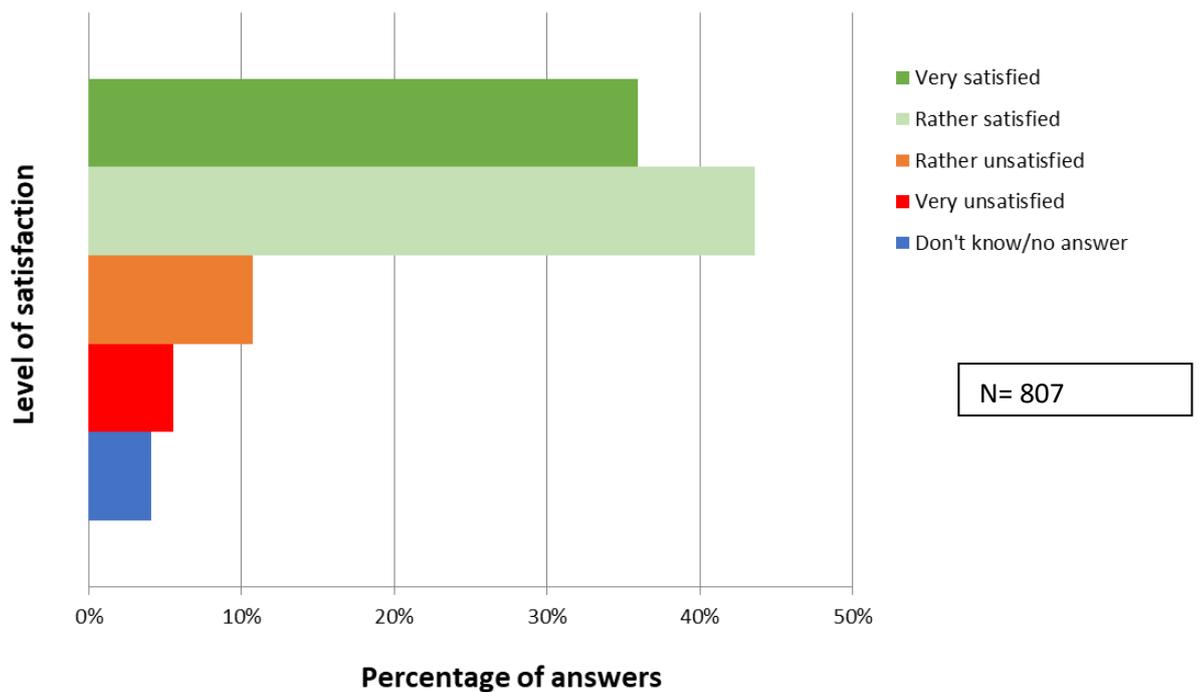
## 6.3 Specific sections

### 6.3.1 S1 PROFESSIONAL EXPOSURE

The S1 section of the questionnaire is aimed at professionally exposed workers to ionizing radiation. 830 people out of 1961 declared to belong to this category and consequently replied to this section.

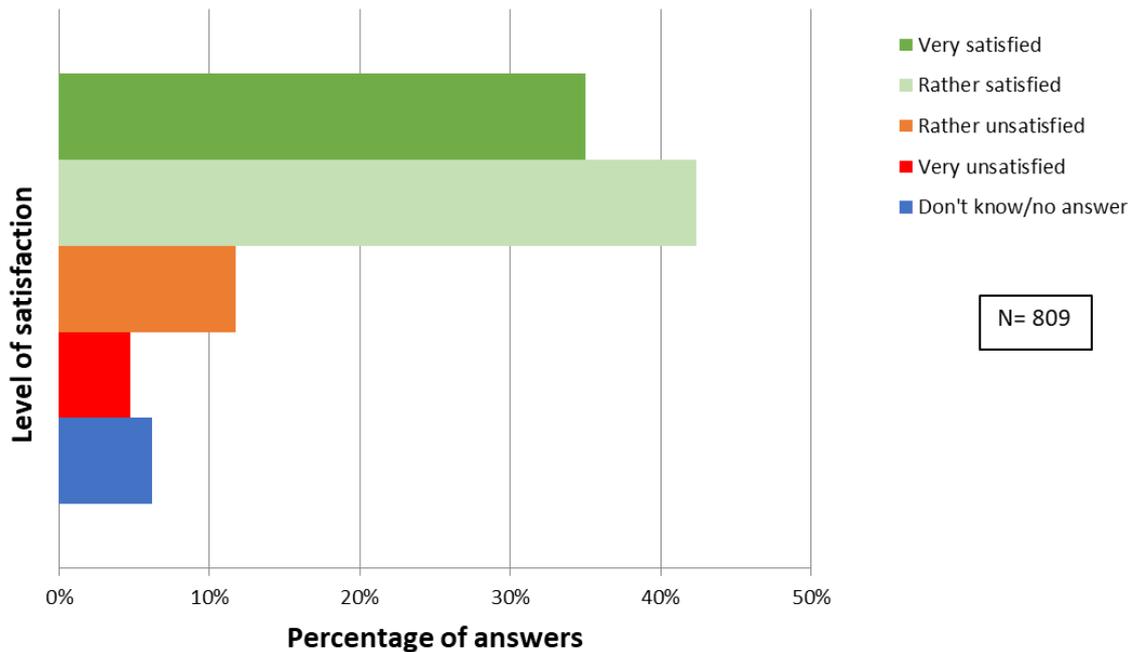
From the answers received, it emerges that for both the implementation of radiation protection provisional plans and for professional training in radiation protection, the majority of the respondents declare to be satisfied. Nonetheless, for both questions there is still about the 22% who declared to be rather or very unsatisfied or didn't answer at all. (question SP1 and SP2, see the bar graphs).

#### SP1 - How satisfied are you with the professional training in radiation protection received?



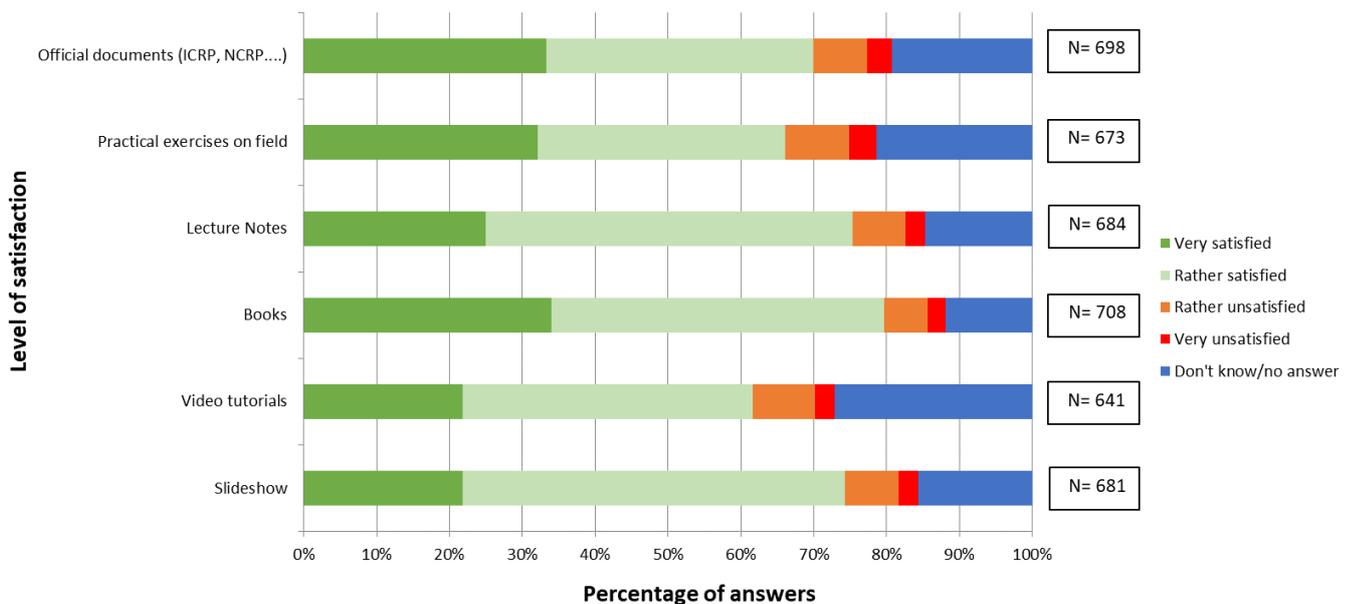
**Figure 32.** Level of satisfaction of professionally exposed workers with the professional training in radiation protection received.

## SP2 - How satisfied are you with the implementation of radiation protection provisions by your employer?



**Figure 33.** Level of satisfaction of professionally exposed workers with the implementation of radiation protection provisions by their employer.

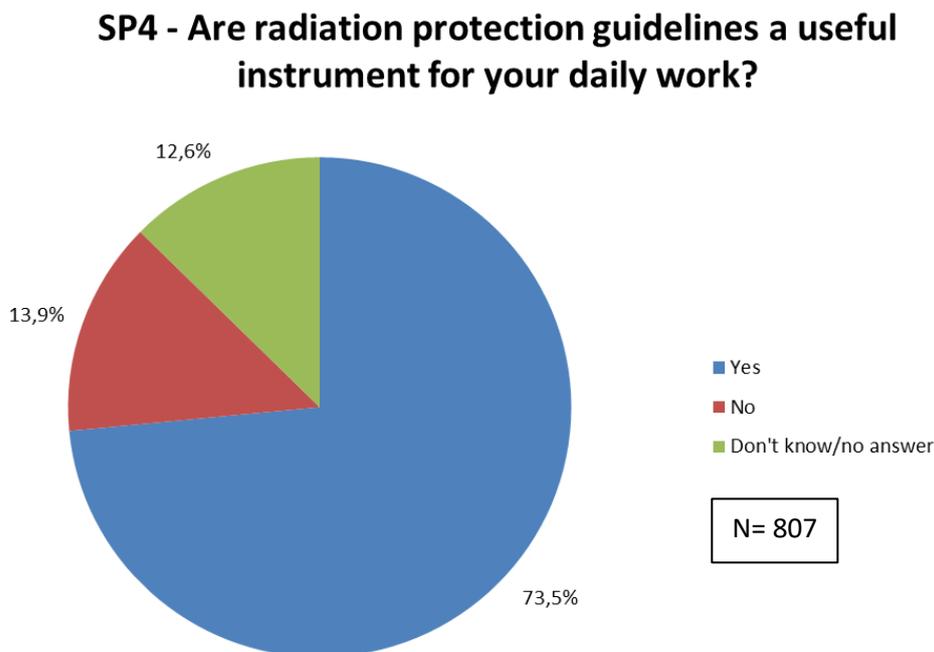
## SP3 - How satisfied are you with the following learning material?



**Figure 34.** Level of satisfaction of professionally exposed workers with different types of learning material. Multiple answers were allowed.

Respondents indicated that they were satisfied with the different learning materials used, in particular with official documents and books, but also with practical experience on field. It is encouraging to note this high level of satisfaction in the documentation provided by national and international radiation protection organisations. Nonetheless, as in the previous question there is still about the 30% or even 35% of respondents who declared to be rather or very unsatisfied and the percentage of “don’t know/no answer” is in some cases very high. The option “other” does not make any sense and was removed from the graph

Moreover, a very high percentage of respondents (73%) said they considered the guidelines a useful working tool.

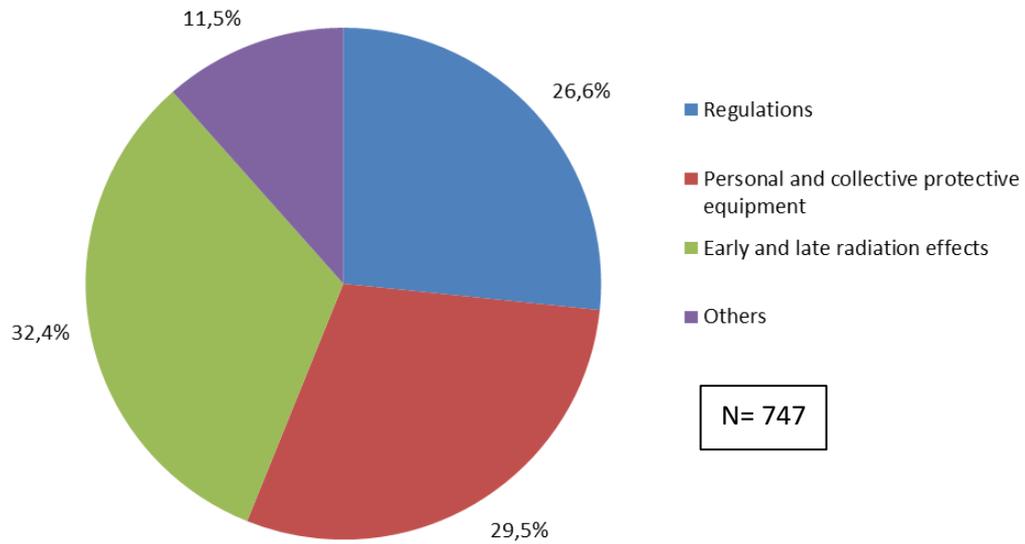


**Figure 35.** Exposed workers’ opinion on the usefulness of radiation protection guidelines for the daily work.

Finally, from responses to question SP5 it emerged that professionally exposed workers think that: regulations, early and late radiation effects and the use of personal and collective protective equipment require further attention in the professional training. This suggests that there are opportunities to improve and increase the provision of training for professionals in each of these

areas. This might be considered by those responsible for training in CONCERT and the RP platforms in the development of future activities.

### SP5 - What's the field you feel more necessary to be deepened in the professional training?



**Figure 36.** Exposed workers' opinion about the field that they believe should be more deepened in the professional training.

## **Resume of answers to question SP6**

The most frequent request emerging by the answers to question SP6 (open comments about SP5, “*What’s the field you feel more necessary to be deepened in the professional training?*”) was the strong desire for more information concerning early, intermediate and late effects caused by acute and chronic radiation exposure. This need is particularly felt by physicians who are often questioned about this issue and do not feel confident in giving clear and indisputable answers.

Another issue concerns individual and collective protection devices, which are often misused or not used at all mainly because of the lack of appropriate practical training. It was observed by some respondents that professional trainers are sometimes expert in radiation protection but not very familiar with practical aspects of the use of protection devices. In addition, the need arose for more education and training in verification of radiological safety plans and real time simulations in case of radiological emergencies situations

Besides the practical training about protection devices, the need for a deeper knowledge and understanding of radiation protection rules emerged, possibly following the updates of the radiation protection laws in order to keep workers constantly aware of the legal scopes of the actions taken. An important issue linked to this aspect is the accessibility to the radiation protection norms, too often written exclusively in English, thus not easily accessible to everyone. In this respect, it was also indicated that an increase of the communication of RP experts with journalists, NGO and public could help, for a clear and wider explanation of the RP rules.

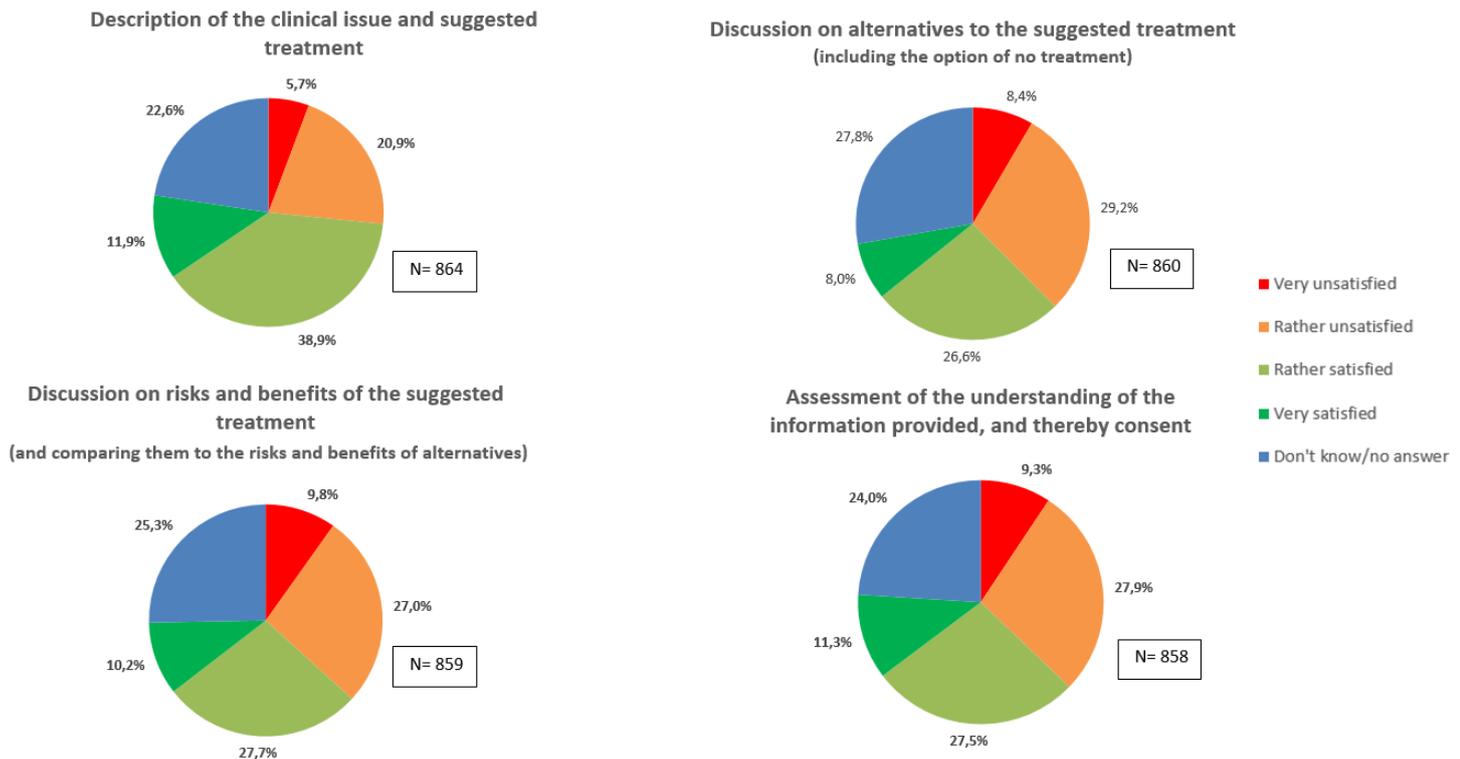
### 6.3.2 S2 MEDICAL EXPOSURE

The S2 section of the questionnaire is aimed at investigating opinion and attitudes related to medical exposure to ionizing radiation and only people that have declared to belong to this category in BG10 or answering to BG7, replied to this section.

Question SP7 concerned the degree of satisfaction of four different aspects of Informed Consent:

- Description of the clinical issue and suggested treatment
- Discussion on alternatives to the suggested treatment (including the option of no treatment)
- Discussion on risks and benefits of the suggested treatment (and comparing them to the risks and benefits of alternatives)
- Assessment of the understanding of the information provided, and thereby consent

SP7 - How satisfied are you with the following Informed Consent steps?

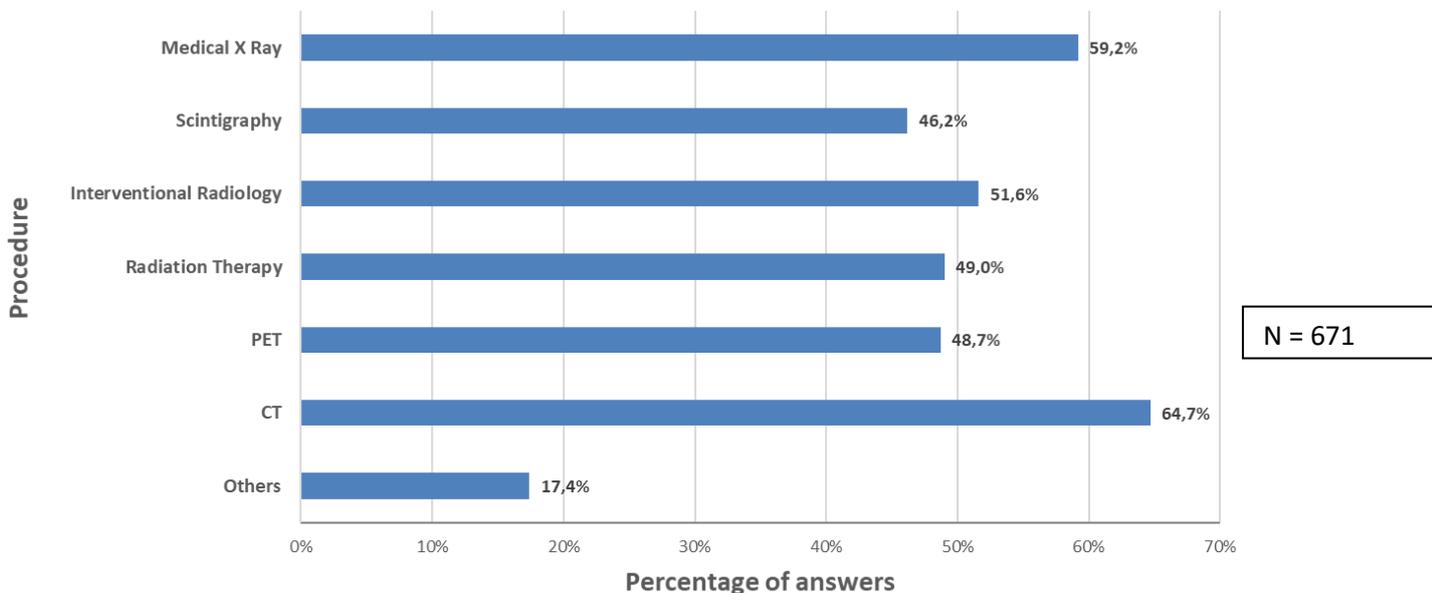


**Figure 37.** Percentage of the degree of patient satisfaction with the various steps of informed consent.

The pie graphs 37 above show the percentage of satisfaction with the different steps of the Informed Consent. The most significant data is that 40.1% of the respondents consider themselves rather satisfied of the description of the clinical issue and suggested treatment. This percentage decreased considering other aspects, e.g. “Discussion on alternatives to the suggested treatment (including the option of no treatment)”; “Discussion on risks and benefits of the suggested treatment (and comparing them to the risks and benefits of alternatives)”; “Assessment of the understanding of the information provided, and thereby consent”. In particular, the percentage of satisfaction is almost similar to the percentage of dissatisfaction.

In SP8 question, on the other hand, it was asked for which procedures, among those listed, respondents would like to have more information. From the answers received (1118), it emerges that the percentage is higher than 40% for each procedure. In particular, the diagnostic tests for which respondents would like to receive more information are CT scans (60.9%) followed by Medical X Ray (55.5%) and Interventional Radiology (48,5%). Interestingly, PET is the procedure with the lowest percentage of responses (43.7%). For more details, see the graph below. Ways to improve on the provision of information on medical procedures might be considered by the EURAMED platform in the future.

### SP8 - For which procedures would you like to receive more information?



**Figure 38.** Percentage of answers about the procedures for which respondents would like more information.

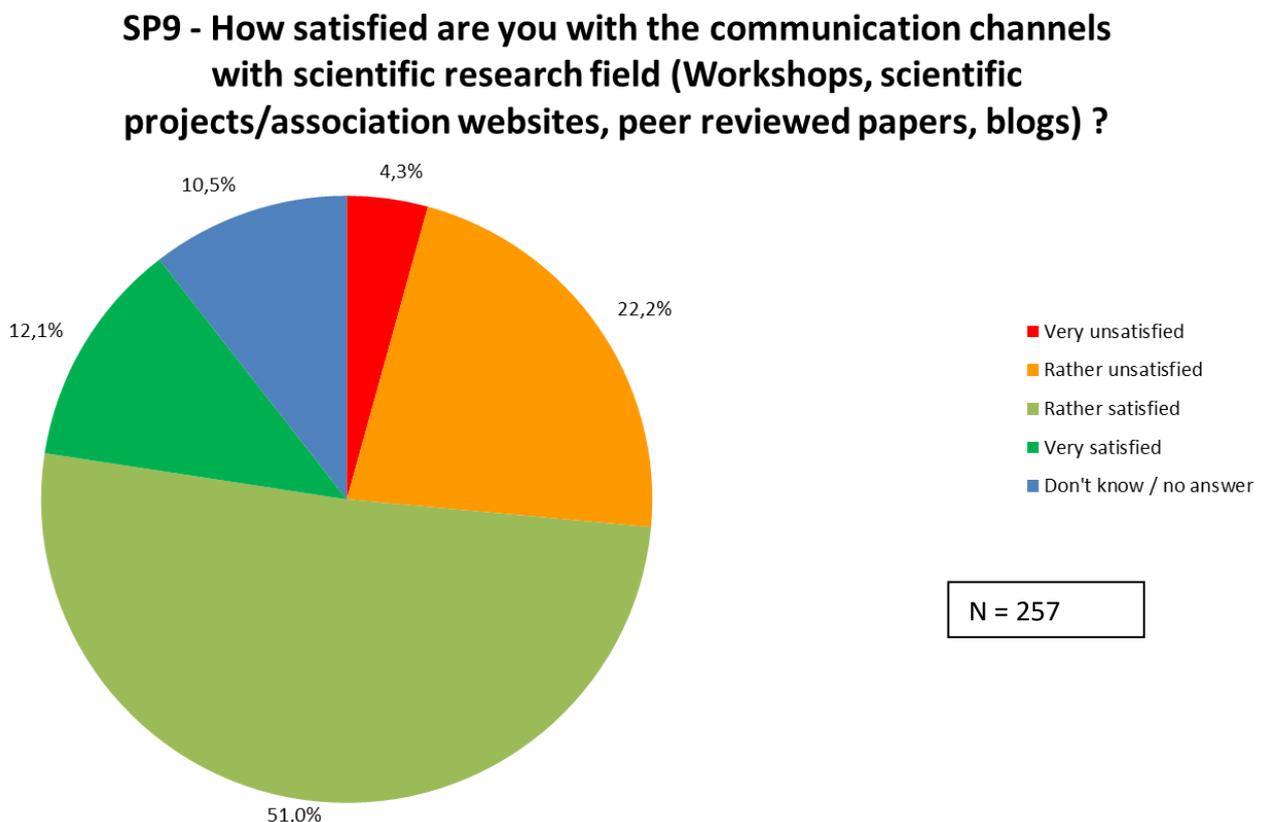
### 6.3.3 S3 DUTY HOLDERS-DECISION MAKERS

The S3 section of the questionnaire is aimed at duty holders-decision makers category (e.g. general practitioners, industrial managers, norm representatives...), and only people that have declared to belong to this category in BG10 replied to this section (272 replies).

Out of 257 respondents, 51.0 % consider themselves satisfied with the communication channels with the scientific research field (SP9 question); out of 260 a very high percentage (80.0%) thinks that the quality of his work would take advantage from a correct radiation protection culture spreading among the population (SP10 question, see graph 40 below).

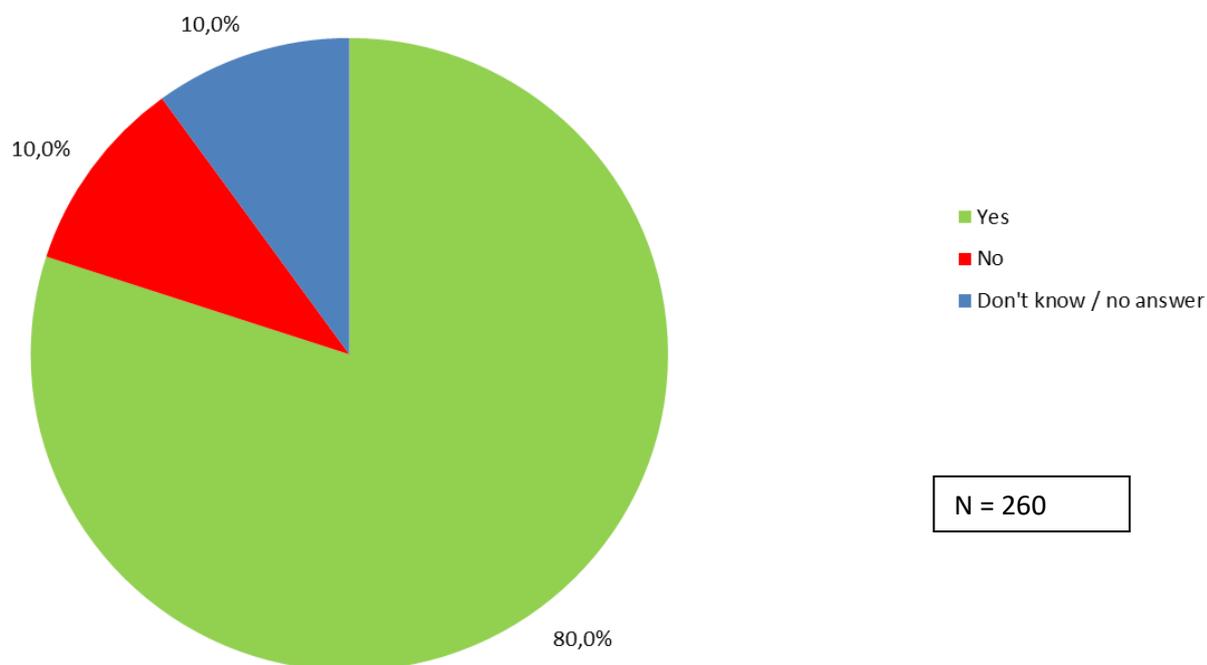
Moreover, in their experience a more direct involvement of the population, already in the early stage, could make a radiation protection decision process easier and more efficient (54.1%) (SP11 question).

While these responses can be viewed as generally encouraging with respect to communication to decision makers, there is clearly room for improvement to try to reduce the numbers indicating 'very' or 'rather' unsatisfied that in sum amount to more than 25% of respondents



**Figure 39.** Level of satisfaction of duty holders and decision makers with communication channels in scientific research field.

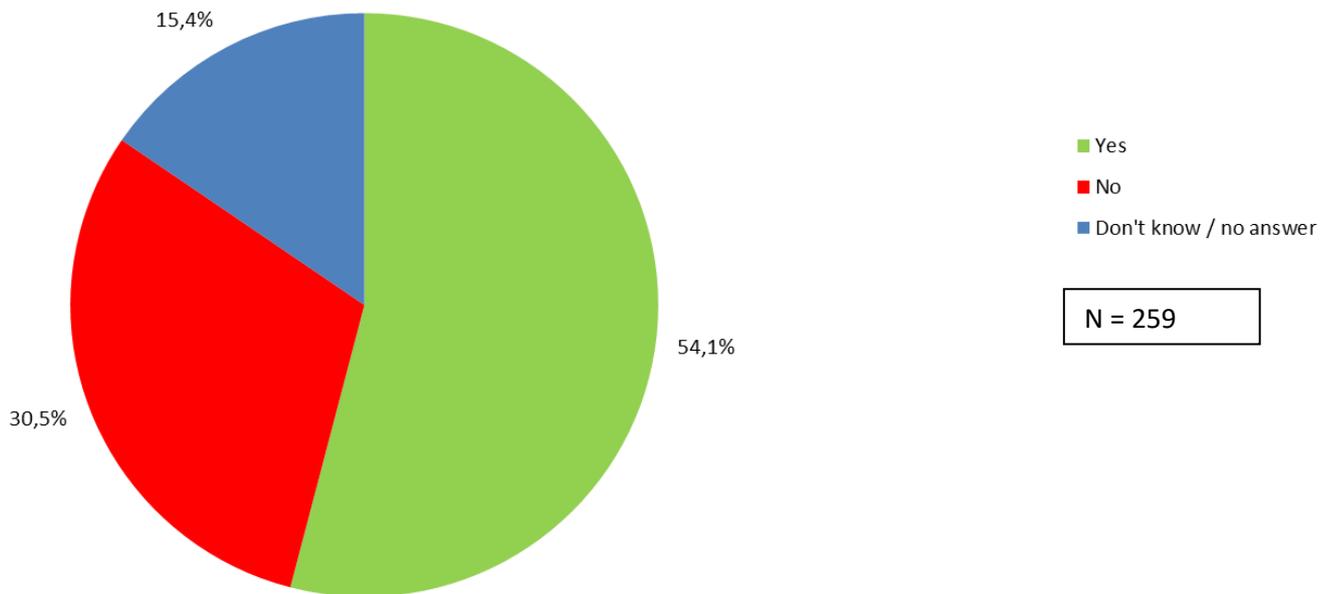
**SP10 - Do you think that the quality of your work would take advantage from a correct radiation protection culture spreading among the population?**



**Figure 40.** Opinion on taking advantages from a correct radiation protection culture spreading among the population on work of duty holders and decision makers.

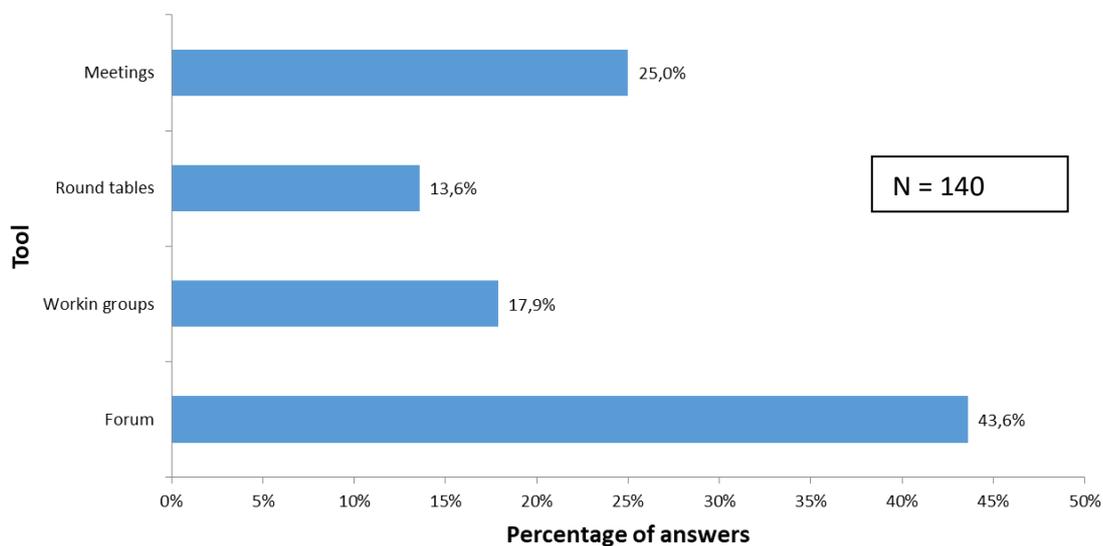
Among those who answered yes to question SP11 (140 respondents) the 46.3% considered forum the most useful tool to actively involve the population compared to meetings, working group and round table (lowest percentage, 14.2%).

**SP11 - In your experience a more direct involvement of the population, already in the early stage, could make a radiation protection decision process easier and more efficient?**



**Figure 41.** Opinion about the link of a more direct involvement of the population and the facilitation of the work of duty holders and decision makers.

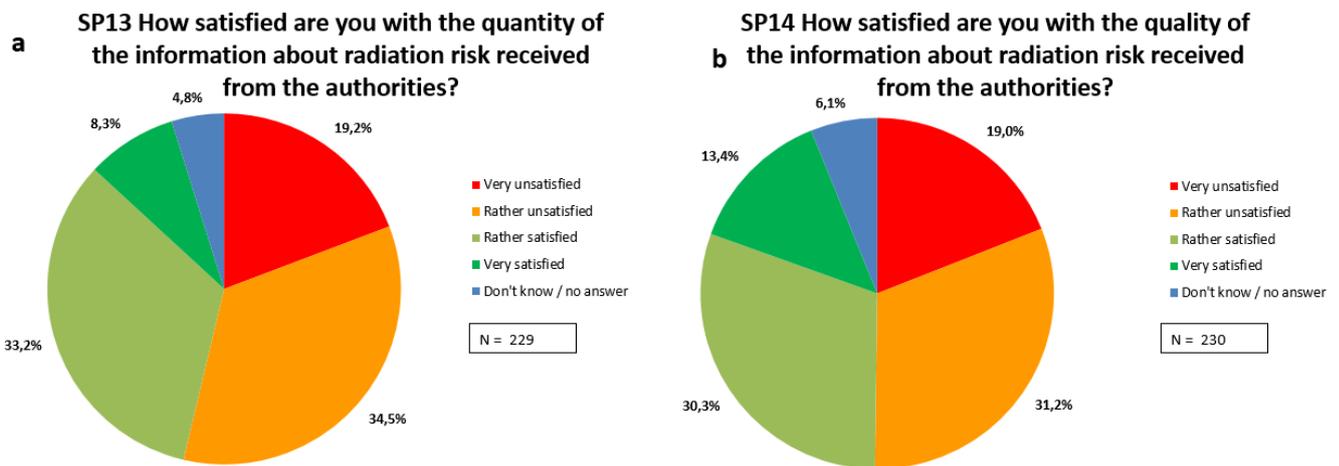
**SP12 If you answered yes to SP11 question, among the following which do you consider the most useful tool to actively involve the population? (multiple answers allowed)**



**Figure 42.** Opinion on the most useful tools to actively involve the population. Multiple answers were allowed.

### 6.3.4- S4 SPECIFIC CATEGORIES OF POTENTIALLY EXPOSED POPULATION

The S4 section of the questionnaire is aimed at specific categories of potentially exposed population. 254 people out of 1961 declared to belong to this category and consequently replied to this section.



**Figure 43.** Percentage of satisfaction with the quantity (a) and quality (b) of information about radiation risk received by the authorities.

Regarding the degree of satisfaction in relation to the quantity and quality of the information about radiation risk received from the authorities, the 34.5% and 31.2% of the respondents, respectively, consider themselves rather unsatisfied. An almost equal percentage (33.2% and 30.3%, respectively) of respondents considers itself rather satisfied. These responses raise significant concern in that close to 50% of respondents indicate some degree of dissatisfaction with the quantity and quality of information available from authorities. However, these rates seem to contradict the responses to question SP1, which was directed to a more professionally qualified sector of respondents. It seems clear that more engagement with the wider communities of those exposed to radiation to gain insight into their needs and how trust in the information made available can be improved.

### SP15 Do you feel adequately protected from ionising radiation exposure risks?

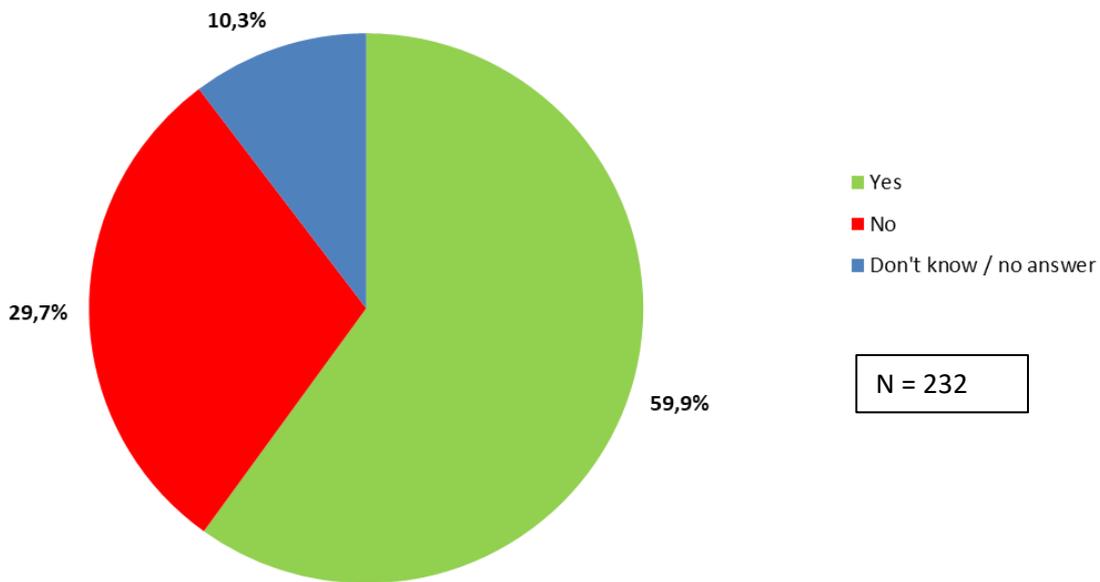
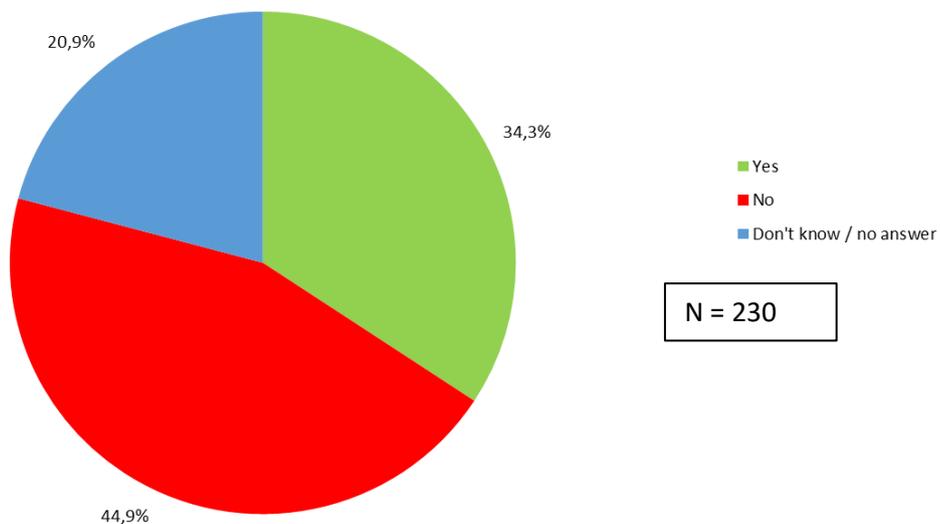


Figure 44. Percentage of satisfaction with the protection from IR exposure risks

Then, the 59.9% of respondents felt adequately protected from ionizing radiation exposure risks, with about a quarter considering themselves not adequately protected and about 1 in 5 not knowing.

### SP16 - Are you in contact/association with other people in the same situation of potential exposure?

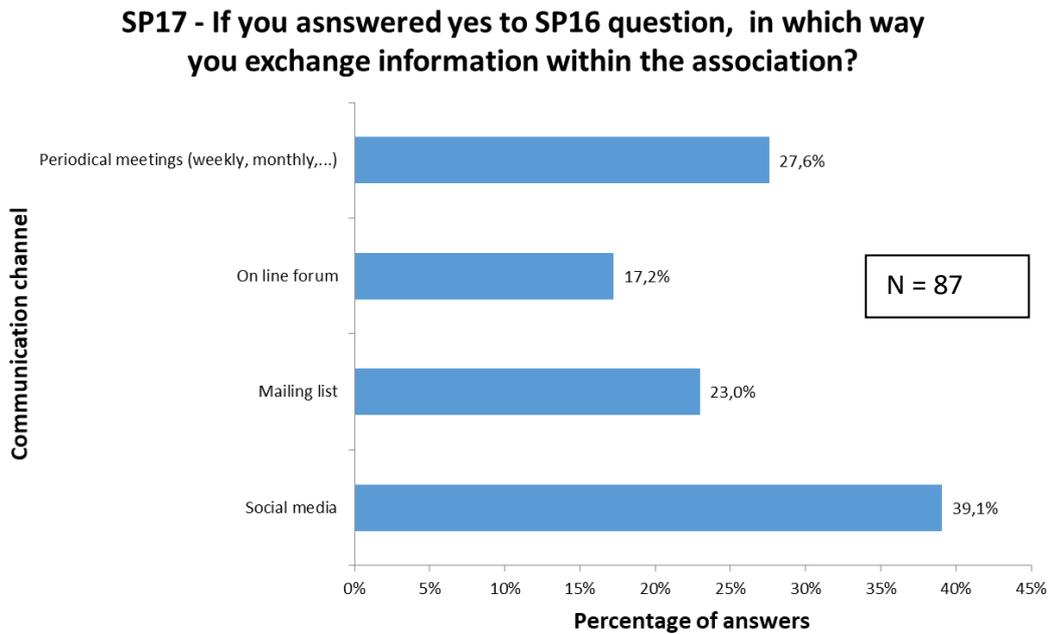


**Figure 45.** Percentage of respondents that claimed to be (or not) in contact/association with other people potentially exposed.

Among the 254 respondents, the 45% said they were not in contact with others who are in the same situation of potential exposure (SP16). 87 respondents (34%) claimed to be in contact with other people potentially exposed (see figure below).

Finally, the SP17 question allowed a multiple answer, 56% of those (87 respondents) who answered affirmatively to the SP16 question selected only one option and 22% did not respond (see figure and table below).

Most of the respondents declared to be in contact with others in the same situations of possible exposure to ionizing radiation through social media; secondly with periodical meetings and mailing lists.



**Figure 46.** Communication channels by which the respondents who claimed to be in contact with other people potentially exposed, have chosen to exchange information within the association.

Multiple answers were allowed.

	%
<b>Number of selected choices</b>	
<b>1</b>	<b>56.3%</b>

**Table 5.** Number of multiple

<b>2</b>	14.9%
<b>3</b>	6.9%
<b>Don't know / no answer</b>	21.8%

choices

### 6.3.5- S5 CULTUORAL INVOLVEMENT OR INTEREST IN RADIATION PROTECTION ISSUES

The S5 section of the questionnaire is aimed at cultural involvement or interest in radiation protection issues category. 551 people out of 1961 declared to belong to this category and consequently replied to this section.

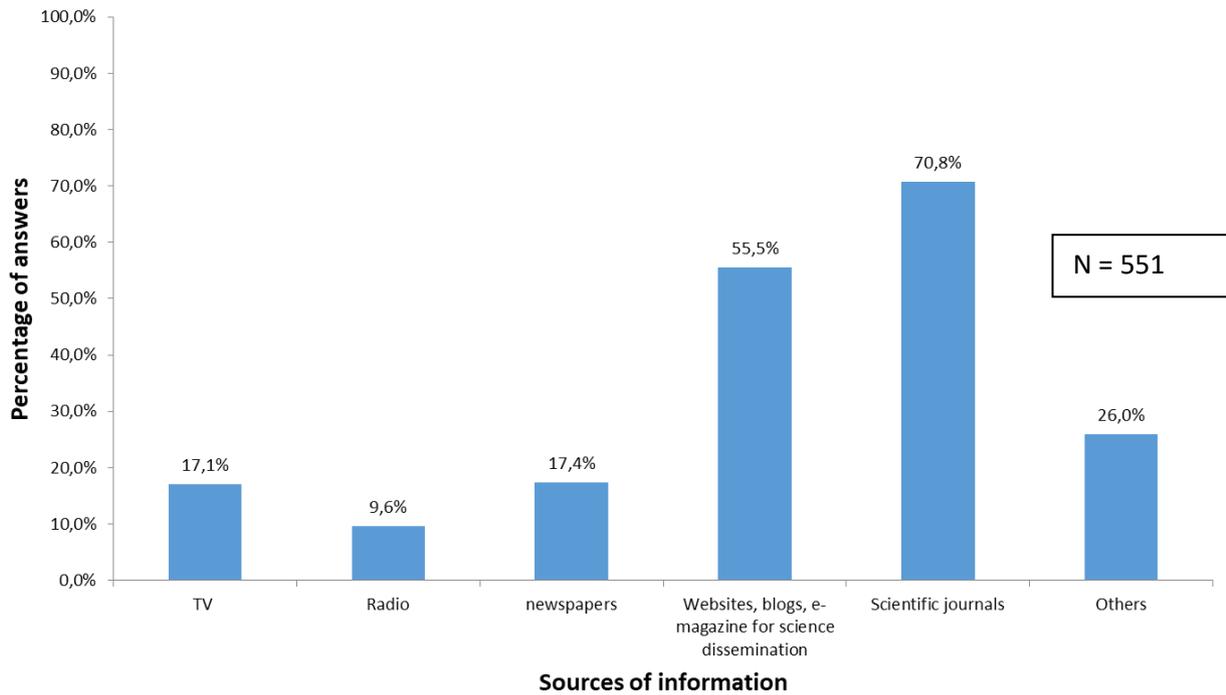
The 71% of these respondents uses scientific journals as the main sources of information, perhaps suggesting that respondents area largely drawn from a professional/scientific background; 56% use websites, blogs, and e-magazines for science dissemination (SP18, see figure XY below). 36.3% of the respondents selected two of the multiple choices, 29.8% of these only one (see table below).

**Table 6.** Number of multiple choices

<b>Number of selected choices</b>	<b>%</b>
<b>1</b>	29.8%
<b>2</b>	36.3%
<b>3</b>	17.2%
<b>4</b>	6.5%
<b>5</b>	2.4%
<b>6</b>	0.7%
<b>Don't know / no answer</b>	7.1%

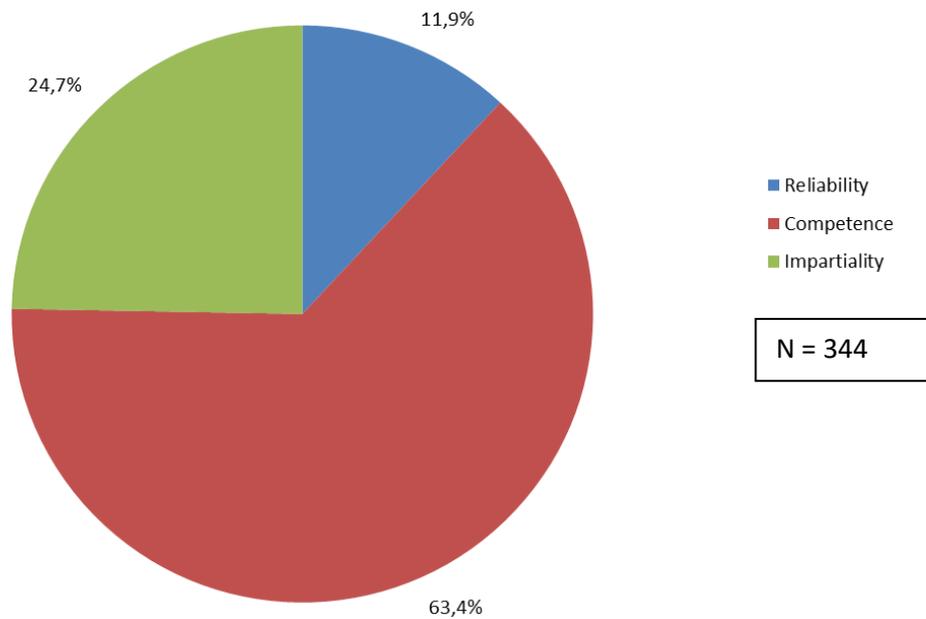
Only 344 respondents (62.4%) answered to SP19 question. For these respondents the main criterion for choice to decide whether a source is trustworthy is “competence” (63.4% as shown by the pie graph below).

**SP18 - Which are your main sources of information about radiological and nuclear risk?**



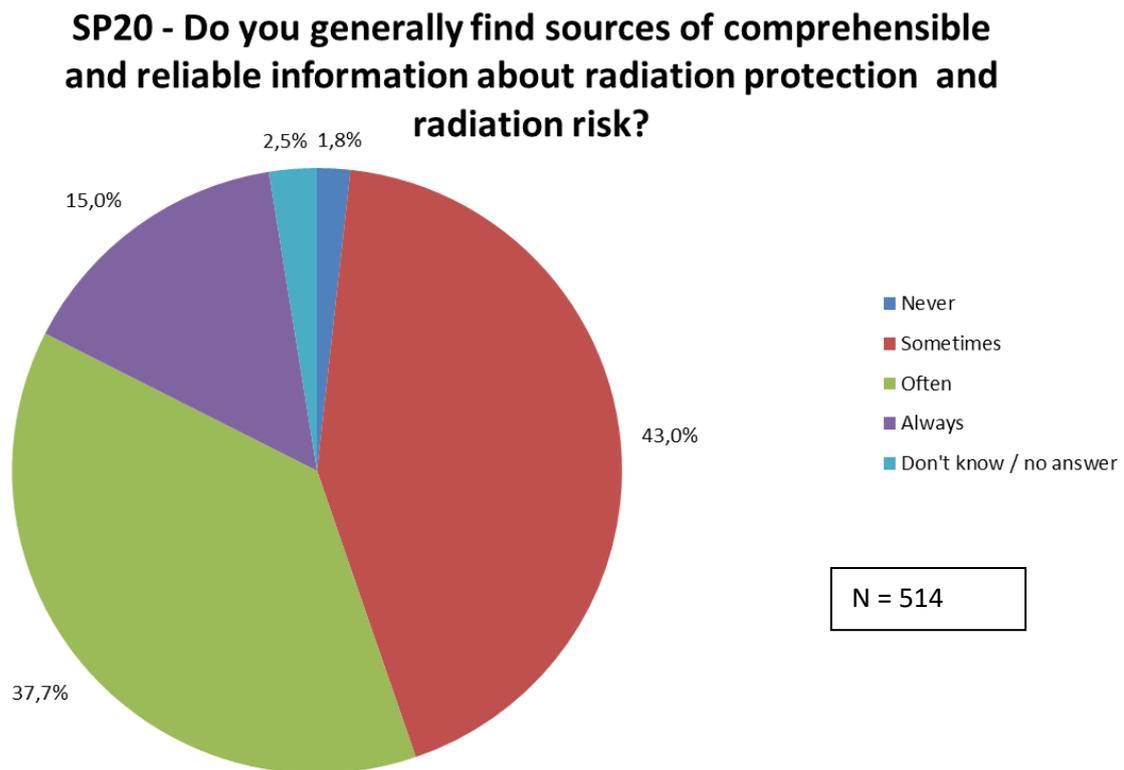
**Figure 47.** Main sources of information about radiological and nuclear risk.

**SP19 - What is the most important criterion do you use to decide whether a source is trustworthy or not?**



**Figure 48.** Most important criterion to decide whether a source is trustworthy.

Finally (SP20, see pie graph below) of the 514 out of 551 respondents to this question, 43% of these finds the sources of information only sometimes comprehensible and reliable, 37.7% of the respondents selected “often” to this question. Surprisingly, only 1.8% answered that the sources of information are never comprehensible and reliable. The large proportions reporting ‘never’ or ‘sometimes’ indicates a gap in the available provision that programmes such as CONCERT or the RP platforms should consider in the future.



**Figure 49.** Sources of comprehensible and reliable information about radiation protection and radiation risk.

## 7. Limitations

This work has achieved its goal as an initial undertaking to provide an overview of key trends in perceptions of the public, occupationally exposed individuals, and medical patients. This work has been carried out mainly by physical and life scientists active in the IR and RP fields, with some guidance from social scientists. An area of future research could include a more detailed study implementing rigorous sampling and advanced social analysis techniques.

During the analysis of the results, some limitations of the survey process were *a posteriori* observed. First, it is evident that respondents are unbalanced as many of them are involved in IR and RP activities; e.g. 33% of the respondents declared to have had some training in RP at university level, which is not very representative of the general public picture. Some possible reasons of this imbalance include: i) only people already working or dealing with IR are interested in answering questions about RP (especially in countries without nuclear energy production); ii) the dissemination of the survey through CONCERT EJP contacts may have tended to involve acquaintances, colleagues and friends working in the IR and RP scientific fields. In addition, the distribution of responses within Europe is not representative of the relative population sizes in each country, as some countries had significantly larger response rates than others, and this was not related to population size.

Another limitation relates to ambiguity in the interpretation of some questions; for example, the concept of “small village” may be different in Finland or in Italy, although this is not an easy point to solve.

*A posteriori*, it became clear that some questions were cumbersome, assuming too much prior knowledge and/or experience from survey participants.

## 8. Conclusions

From the survey responses, it was possible to observe:

- A general positive attitude towards science and technology and a relatively low perception of risk about ionizing radiation, with the exception of significant events such as accidents at nuclear installations and a terrorist attacks with radioactive sources. (This result could be linked to the polarization of the survey sample towards a high level of education in radiation protection field). Interestingly, a different perception of risk for nuclear accidents appears in countries where NPPs are present (like in Finland and Spain) and countries where they are not (like in Italy). In the former, the fear of a nuclear accident is much lower than in the Italian case.

- Concerning medical diagnostic examinations, they are generally considered as providing more benefits than detriment, even though ways to improve the provision of information on medical procedures might be considered by the EURAMED platform in the future, as the satisfaction of survey participants was not very high in that regard.
- Surprisingly, especially considering the high level of education of the survey sample, only 64% of survey participants considered high voltage power lines as providing more benefits than detriments.
- Nonetheless, as expected, a relatively good level of knowledge on ionizing radiation topics was observed.
- The survey participants indicated a general trust of most actors involved in the radiation protection field. However, survey results did not suggest a general trust of journalists or scientists from private companies when reporting on IR and RP issues.

## 9. ANNEX- Structure of the questionnaire

### BACKGROUND QUESTIONS

While the survey is anonymous, we would like to know more about your background.

BG 1	Gender of the respondent	<ul style="list-style-type: none"> <li>- Male</li> <li>- Female</li> </ul>
BG 2	Country of residence	Country
BG 3	Place of residence	<ol style="list-style-type: none"> <li>1. Big city</li> <li>2. Medium town</li> <li>3. Small town</li> <li>4. Village</li> </ol>
BG 4	Year of birth	Year
BG 5	What is the highest Qualification you have obtained?	<ol style="list-style-type: none"> <li>1. Primary school or no education</li> <li>2. Lower secondary - general</li> <li>3. Higher secondary - general</li> <li>4. Higher non-university</li> <li>5. University – scientific/technical subject</li> <li>6. University – arts/humanities/social science subject</li> <li>7. Post University</li> </ol>
BG 6	What is your current occupation?	<ol style="list-style-type: none"> <li>1. Service industry (food, financial, IT, service provider)</li> <li>2. Manufacturing and processing trade</li> <li>3. Healthcare sector</li> <li>4. Education and training</li> <li>5. Unemployed/retired</li> <li>6. Others</li> </ol>

BG 7	Have you ever undergone one of the following medical examination/treatment involving the use of ionizing radiation?	<ol style="list-style-type: none"> <li>1. Medical X Ray (not dental)</li> <li>2. Dental imaging (X Ray, CONE Beam Computed Tomography,...)</li> <li>3. Computed Tomography (CT)</li> <li>4. Positron Emission Tomography (PET)</li> <li>5. Radiation Therapy</li> <li>6. Interventional Radiology</li> <li>7. Scintigraphy</li> <li>8. Others</li> </ol>
BG 8	Have you ever lived in an area close (within a 20 km radius) to a nuclear installation (power plant, nuclear research reactor)	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Don't know/ no answer</li> </ol>
BG 9	Have you ever had a job that involved the use or exposure to ionizing radiation?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Don't know/ no answer</li> </ol>
BG 10	Select from the list the roles you dealt with radiation protection field:	<ol style="list-style-type: none"> <li>1. Professional exposure</li> <li>2. Duty holders - decision makers</li> <li>3. Medical exposure</li> <li>4. Specific categories of potentially exposed population</li> <li>5. Cultural involvement or interest in radiation protection issues:</li> <li>6. Don't know/ no answer</li> </ol>

BG 11 a	If you answered "Professional exposure" to BG10 question, please specify (multiple answers are allowed)	<ol style="list-style-type: none"> <li>1. Medical specialist</li> <li>2. Industrial radiographer</li> <li>3. Hospital radiographer</li> <li>4. Worker at nuclear power plants</li> <li>5. Worker at water processing plants</li> <li>6. Miner</li> <li>7. Worker involved in site remediation</li> <li>8. Radiation worker in research</li> <li>9. Aircrew</li> <li>10. Others</li> </ol>
BG11 b	If you answered "Duty holders- Decision makers" to BG10 question, please specify (multiple answers are allowed)	<ol style="list-style-type: none"> <li>1. General practitioner/family physician</li> <li>2. Industrial manager</li> <li>3. Nuclear power regulator</li> <li>4. Involved in emergency planning</li> <li>5. Others</li> </ol>
BG11 c	If you answered "Medical exposure" to BG10 question, please specify (multiple answers are allowed)	<ol style="list-style-type: none"> <li>1. Patient exposed to radiotherapy</li> <li>2. Patient exposed to interventional radiology</li> <li>3. Patient exposed to nuclear medicine</li> <li>4. Patient exposed to radiology</li> <li>5. Others</li> </ol>
BG11	If you answered "	1. Living close to the Energy Plant/Nuclear

d	<p>Specific categories of potentially exposed population</p> <p>" to BG10 question, please specify (multiple answers are allowed)</p>	<p>waste disposal sites</p> <ol style="list-style-type: none"> <li>2. Living close to contaminated areas (currently or in the past)</li> <li>3. Living in a house or region with high radon levels</li> <li>4. Others</li> </ol>
BG11 e	<p>If you answered "Cultural involvement or interest in radiation protection issues" to BG10 question, please specify (multiple answers are allowed)</p>	<ol style="list-style-type: none"> <li>1. Student</li> <li>2. Teacher</li> <li>3. Journalist</li> <li>4. Scientific mediator</li> <li>5. Others</li> </ol>
BG 12	<p>What kind of training have you had in radiation protection field?</p>	<ul style="list-style-type: none"> <li>– High school</li> <li>– University</li> <li>– PhD</li> <li>– Master</li> <li>– Professional training (<i>una tantum</i>)</li> <li>– Professional training on a regular basis</li> <li>– Informed consent</li> <li>– Personal interest</li> <li>– Other</li> <li>– None</li> </ul>

## GENERAL SECTION

### AX - ATTITUDE TOWARDS SCIENCE AND TECHNOLOGY

Please indicate to what extent you agree or disagree with these statements:

Future generations will have a better quality of life as a result of science and technology	1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree 5. Don't know / no answer
Science and technology will make our lives easier	
Science and technology have made life more dangerous	
Science and technology development have unforeseen side effects that harm human health and the environment	

### RPP - RISK PERCEPTION

Please indicate to what extent you think each of the following affects your relatives' health.

Air pollution	1. No risk at all 2. Very low 3. Low 4. Average 5. High 6. Very high 7. Don't know / no answer
Radioactive waste	
Chemical waste	
An accident in a chemical installation	
An accident in a nuclear installation	
Radiation from mobile phones (cell phones)	
High voltage power lines	
Natural radiation (e.g. radon or radiation from space)	
Medical X-rays	
CT scans or PET etc. for medical examinations	
MRI scans for medical examinations	
A terrorist attack with a radioactive source	
Residues of radioactivity in food	
Sterilization of food by irradiation	

## RBD – BENEFITS AND DETRIMENTS

Please select the items for which you think that the benefits (social, economic, health ...) are higher than detriments (multiple answers are allowed)

Chemical installation	
Nuclear installation	
Mobile phones (cell phones)	
High voltage power lines	
Naturally occurring radioactivity (e.g. in food or building)	
Medical X-rays	
CT scans or PET etc. for medical examinations	
MRI scans for medical examinations	
Sterilization of food by radiation	

## ARP1 - ACTORS IN THE RADIATION PROTECTION FIELD/AWARENESS

Please tell us if you think that the following actors are aware to public concerns about radiation (give an answer only for the actors that you know)

Actors in Radiation Protection	
National radiation protection authorities	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Don't know / no answer</li> </ol>
Environmentalist organisations	
Nuclear industry	
The journalists	
National Agencies/Institutes for nuclear safety or control	
General practitioners	
Medical personnel in hospital	
The national agency for radioactive waste and enriched fissile	

materials	
IAEA (International Atomic Energy Agency) in Vienna	
Scientists from Universities / Public Institutes	
ICRP (International Commission on Radiological Protection)	
Scientists from private companies	
The European Commission	

## ARP2 - ACTORS IN THE RADIATION PROTECTION FIELD/COMPETENCE

Please tell us if you think that the following actors are technically and scientifically competent to point out the risks and benefits of the use of ionising radiation (give an answer only for the actors that you know)

Actors in Radiation Protection	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Don't know / no answer</li> </ol>
National radiation protection authorities	
Environmentalist organisations	
Nuclear industry	
The journalists	
National Agencies/Institutes for nuclear safety or control	
General practitioners	
Medical personnel in hospital	
The national agency for radioactive waste and enriched fissile materials	
IAEA (International Atomic Energy Agency) in Vienna	

Scientists from Universities / Public Institutes	
ICRP (International Commission on Radiological Protection)	
Scientists from private companies	
The European Commission	

### ARP3 - ACTORS IN THE RADIATION PROTECTION FIELD/TRUTH

Please tell us if you think that the following actors are telling the truth about risks and benefits of the use of ionising radiation (give an answer only for the actors that you know)

Actors in Radiation Protection	1. Yes 2. No 3. Don't know / no answer
National radiation protection authorities	
Environmentalist organisations	
Nuclear industry	
The journalists	
National Agencies/Institutes for nuclear safety or control	
General practitioners	
Medical personnel in hospital	
The national agency for radioactive waste and enriched fissile materials	
IAEA (International Atomic Energy Agency) in Vienna	

Scientists from Universities / Public Institutes	
ICRP (International Commission on Radiological Protection)	
Scientists from private companies	
The European Commission	

### RC1 - SATISFACTION WITH ACTIONS OF THE AUTHORITIES

How satisfied are you with the actions the authorities undertake in the following contexts to protect the population against the risks below?

Radioactive waste	1. Very unsatisfied  2. Rather unsatisfied  3. Rather satisfied  4. Very satisfied  5. Don't know/no answer
Chemical waste	
An accident in a chemical installation	
An accident in a nuclear installation	
Radiation from mobile phones (cell phones)	
Natural radiation (e.g. radon or radiation from space)	
Medical X-rays	
CT scans for medical examinations	
A terrorist attack with a radioactive source	
A terrorist attack with chemical/biological agents (or sources)	
Residues of radioactivity in food	

The following questions concern the use of radiation in general. What do you think about the following issues?

Does exposure to radiation always lead to radioactive contamination?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Don't know/ no answer</li> </ol>
Is radioactive waste produced only by nuclear power plants?	
Is it true that vegetables grown near a nuclear power plant are not good for consumption because of radioactivity?	
Is it true that natural radioactivity is never dangerous because we are used and adapted to it?	
Is it true that the human body is naturally radioactive?	
Is it true that with time, every radioactive substance becomes more and more radioactive?	
Is it true that food sterilization by irradiation makes food radioactive?	

### C - COMMUNICATION ABOUT IONISING RADIATION IN GENERAL

In general, how satisfied are you with the public information related to ionising radiation provided by the following sources? (Skip the item if you have never received any information related to ionising radiation from the specific source).

National Agencies/Institutes for nuclear safety or control/radiation protection	<ol style="list-style-type: none"> <li>1. Very unsatisfied</li> <li>2. Rather unsatisfied</li> </ol>
Medical personnel in hospitals	
General practitioners or dentists	

Mass-media	3. Rather satisfied
Scientists from universities	4. Very satisfied
The Nuclear industry	5. Don't know/no answer
Others	

F1 - FINALLY

The European CONCERT Project is currently developing a "research roadmap" to help ensure that future scientific work is consistent with societal priorities with respect to issues related to the protection of the public and ecosystems from ionising radiation exposure.

	<p>Would you, as a stakeholder invited to respond to this questionnaire, be interested in further giving your opinion on future research needs in the course of the elaboration of the above mentioned European Roadmap?</p>	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Don't know/ no answer</li> </ol>
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F2- If you answered "yes" to F1 question, please give us your email  
 .....

**SPECIFIC SECTION**

Please answer to the section(s) of your competence (BG10 question)

S1 - PROFESSIONAL EXPOSURE

SP 1	How satisfied are you with the professional training in radiation protection received?	<ul style="list-style-type: none"> <li>1. Very unsatisfied</li> <li>2. Rather unsatisfied</li> <li>3. Rather satisfied</li> <li>4. Very satisfied</li> <li>5. Don't know/no answer</li> </ul>
SP 2	How satisfied are you with the implementation of radiation protection provisions by your employer?	<ul style="list-style-type: none"> <li>1. Very unsatisfied</li> <li>2. Rather unsatisfied</li> <li>3. Rather satisfied</li> <li>4. Very satisfied</li> <li>5. Don't know/no answer</li> </ul>
SP 3	How satisfied are you with the following learning material? (skip the item if you have never used it)	
	Slideshow	1. Very unsatisfied
	Video tutorials	2. Rather unsatisfied
	Books	3. Rather satisfied
	Lecture notes	4. Very satisfied
	Practical exercises on field	5. Don't know/no answer
	Official documents (ICRP, NCRP....)	
	Other (specify)	
SP 4	Are radiation protection guidelines a useful instrument for your daily work?	<ul style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Don't know/ no answer</li> </ul>

SP 5	What's the field you feel more necessary to be deepened in the professional training?	<ol style="list-style-type: none"> <li>1. Regulations</li> <li>2. Individual and collective devices</li> <li>3. Early and late radiation effects</li> <li>4. Others</li> </ol>
SP 6	Please provide in the box below brief reasons for your responses above.	

## S2- MEDICAL EXPOSURE

SP 7	How satisfied are you with the following Informed Consent steps?	
	Description of the clinical issue and suggested treatment	<ol style="list-style-type: none"> <li>1. Very unsatisfied</li> <li>2. Rather unsatisfied</li> <li>3. Rather satisfied</li> <li>4. Very satisfied</li> <li>5. Don't know/no answer</li> </ol>
	Discussion on alternatives to the suggested treatment (including the option of no treatment)	
	Discussion on risks and benefits of the suggested treatment (and comparing them to the risks and benefits of alternatives)	
	Assessment of the understanding of the information provided, and thereby consent	
SP 8	For which procedures would you like to receive more information?	<ol style="list-style-type: none"> <li>1. Medical X Ray</li> <li>2. CT</li> <li>3. PET</li> <li>4. Radiation Therapy</li> <li>5. Interventional Radiology</li> <li>6. Scintigraphy</li> </ol>

		7. Others
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S3 - DUTY HOLDERS - DECISION MAKERS

SP 9	How satisfied are you with the communication channels with scientific research field (Workshops, scientific projects/association websites, peer reviewed papers, blogs) ?	<ol style="list-style-type: none"> <li>1. Very unsatisfied</li> <li>2. Rather unsatisfied</li> <li>3. Rather satisfied</li> <li>4. Very satisfied</li> <li>5. Don't know/no answer</li> </ol>
SP 10	Do you think that the quality of your work would take advantage from a correct radiation protection culture spreading among the population?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Don't know/ no answer</li> </ol>
SP 11	In your experience a more direct involment of the population, already in the early stage, could make a radiation protection decision process easier and more efficient?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Don't know/ no answer</li> </ol>
SP 12	If you answered yes to SP11 question, among the following which do you consider the most useful tool to actively involve the population?	<ol style="list-style-type: none"> <li>1. Forum</li> <li>2. Working groups</li> <li>3. Round tables</li> <li>4. Meetings</li> </ol>

S4 - SPECIFIC CATEGORIES OF POTENTIALLY EXPOSED POPULATION

SP 13	How satisfied are you with the quantity of the information about radiation risk received from the authorities?	<ol style="list-style-type: none"> <li>1. Very unsatisfied</li> <li>2. Rather unsatisfied</li> <li>3. Rather satisfied</li> <li>4. Very satisfied</li> <li>5. Don't know/no answer</li> </ol>
SP 14	How satisfied are you with the quality of the information about radiation risk received from the authorities?	<ol style="list-style-type: none"> <li>1. Very unsatisfied</li> <li>2. Rather unsatisfied</li> <li>3. Rather satisfied</li> <li>4. Very satisfied</li> <li>5. Don't know/no answer</li> </ol>
SP 15	Do you feel adequately protected from ionising radiation exposure risks?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Don't know/ no answer</li> </ol>
SP 16	Are you in contact/association with other people in the same situation of potential exposure? E.g. other people living in the same village; consumers' association; Whatsapp groups...	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>3. Don't know/ no answer</li> </ol>
SP 17	If you answered yes to SP16 question, in which way you exchange information within the association?	<ol style="list-style-type: none"> <li>1. Periodical meetings (weekly, monthly,...)</li> <li>2. On line forum</li> <li>3. Mailing list</li> <li>4. Social media</li> </ol>

S5 - CULTURAL INVOLVEMENT OR INTEREST IN RADIATION PROTECTION ISSUES

SP 18	Which are your main sources of information about radiological and nuclear risk?	<ol style="list-style-type: none"> <li>1. TV</li> <li>2. Radio</li> <li>3. Newspapers</li> <li>4. Websites, blogs, e-magazine for science dissemination</li> <li>5. Scientific journals</li> <li>6. Others</li> </ol>
SP 19	What is the most important criterion do you use to decide whether a source is trustworthy or not?	<ol style="list-style-type: none"> <li>1. Reliability</li> <li>2. Competence</li> <li>3. Impartiality</li> </ol>
SP 20	Do you generally find sources of comprehensible and reliable information about radiation protection and radiation risk?	<ol style="list-style-type: none"> <li>1. Never</li> <li>2. Sometimes</li> <li>3. Often</li> <li>4. Always</li> <li>5. Don't know/ no answer</li> </ol>

