



**United Nations**

# **Report of the United Nations Scientific Committee on the Effects of Atomic Radiation**

**Sixty-ninth session  
(9–13 May 2022)**

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# **Report of the United Nations Scientific Committee on the Effects of Atomic Radiation**

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*Note*

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## Contents

<i>Chapter</i>	<i>Page</i>
I. Introduction . . . . .	1
II. Deliberations of the United Nations Scientific Committee on the Effects of Atomic Radiation at its sixty-ninth session . . . . .	2
A. Present programme of work . . . . .	2
B. Update on the Committee's long-term strategic directions . . . . .	5
C. Future programme of work . . . . .	7
D. Administrative issues . . . . .	7



# Chapter I

## Introduction

1. Since the establishment of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) by the General Assembly in its resolution 913 (X) of 3 December 1955, the mandate of the Committee has been to undertake broad assessments of the sources of ionizing radiation and its effects on human health and the environment.<sup>1</sup> In pursuit of its mandate, the Committee thoroughly reviews and evaluates global and regional exposures to radiation. The Committee also evaluates evidence of radiation-induced health effects in exposed groups and advances in the understanding of the biological mechanisms by which radiation-induced effects on human health or on non-human biota can occur. Those assessments provide the scientific foundation used, inter alia, by the relevant agencies of the United Nations system in formulating international standards for the protection of the general public, workers, and patients against ionizing radiation;<sup>2</sup> those standards, in turn, are linked to important legal and regulatory instruments.

2. Exposure to ionizing radiation arises from naturally occurring sources (such as radiation from outer space and radon gas emanating from rocks on the Earth) and from sources with an artificial origin (such as medical diagnostic and therapeutic procedures; radioactive material resulting from nuclear weapons testing; energy generation, including by means of nuclear power; unplanned events such as the Chernobyl nuclear power station accident in April 1986 and the accident at the Fukushima Daiichi nuclear power station in March 2011; and workplaces where there may be increased exposure to artificial or naturally occurring sources of radiation).

<sup>1</sup> The United Nations Scientific Committee on the Effects of Atomic Radiation was established by the General Assembly at its tenth session, in 1955. The terms of reference of the Committee are set out in resolution 913 (X). The Scientific Committee was originally composed of the following Members States: Argentina, Australia, Belgium, Brazil, Canada, Czechoslovakia (later succeeded by Slovakia), Egypt, France, India, Japan, Mexico, Sweden, Union of Soviet Socialist Republics (later succeeded by the Russian Federation), United Kingdom of Great Britain and Northern Ireland and United States of America. The membership of the Scientific Committee was subsequently enlarged by the Assembly in its resolution 3154 C (XXVIII) of 14 December 1973 to include the Federal Republic of Germany (later succeeded by Germany), Indonesia, Peru, Poland and the Sudan. By its resolution 41/62 B of 3 December 1986, the General Assembly increased the membership of the Committee to 21 members and invited China to become a member. In its resolution 66/70, the Assembly further enlarged the membership of the Committee to 27 and invited Belarus, Finland, Pakistan, the Republic of Korea, Spain and Ukraine to become members. In its resolution 76/75, the Assembly further enlarged the membership of the Committee to 31 and invited Algeria, Iran (Islamic Republic of), Norway and the United Arab Emirates to become members.

<sup>2</sup> For example, relevant international safety standards that take into account the findings of the Committee include: (a) the Fundamental Safety Principles, which are jointly sponsored by the European Atomic Energy Community, the Food and Agriculture Organization of the United Nations (FAO), the International Atomic Energy Agency (IAEA), the International Labour Organization (ILO), the International Maritime Organization (IMO), the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA), the Pan American Health Organization (PAHO), the United Nations Environment Programme (UNEP) and the World Health Organization (WHO); and (b) *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards – General Safety Requirements Part 3*, which are co-sponsored by the European Commission, FAO, IAEA, ILO, OECD/NEA, PAHO, UNEP and WHO. Both international standards are established under the aegis of IAEA.

## Chapter II

### Deliberations of the United Nations Scientific Committee on the Effects of Atomic Radiation at its sixty-ninth session

3. The Scientific Committee held its sixty-ninth session in Vienna from 9 to 13 May 2022.<sup>3</sup> The following were elected to serve as officers of the Committee for its sixty-ninth and seventieth sessions: Jing Chen (Canada) as Chair; Lidia Vasconcellos de Sá (Brazil), Anssi Auvinen (Finland) and Anna Friedl (Germany) as Vice-Chairs; and Sarah Baatout (Belgium) as Rapporteur.

4. The Scientific Committee took note of and discussed General Assembly resolution [76/75](#) of 9 December 2021 on the effects of atomic radiation. The Committee welcomed its new States members, Algeria, Iran (Islamic Republic of), Norway and the United Arab Emirates, which the General Assembly, in that resolution, had invited to become members. The new members expressed their appreciation to the Committee for its important role in improving the understanding of the effects of radiation on humans and the environment and their willingness to contribute to the work of the Committee, and noted that it was an honour to become members of the Committee. The Committee heard statements from the States members of Algeria, Australia, Iran (Islamic Republic of), Japan, Poland, the Republic of Korea, Ukraine, the United Kingdom of Great Britain and Northern Ireland and the United States of America, as well as from observers: the European Union, the International Atomic Energy Agency (IAEA), the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA) and the World Health Organization (WHO). Japan, the Republic of Korea, Poland, the Russian Federation and the European Union used their right of reply. The recorded statements and recorded rights of reply are available from the Committee's secretariat.

5. The Scientific Committee also noted and discussed other issues in the resolution. These discussions are reported in chapter II, section D ("Administrative issues"), of the present report.

#### A. Present programme of work<sup>4</sup>

##### 1. Second primary cancer after radiotherapy

6. At its sixty-sixth session, the Scientific Committee endorsed the plan for initiating in 2019 an evaluation of second primary cancer after radiotherapy, and at its sixty-seventh session, it took note of the updated table of contents and the progress reported on the literature research strategy. At its sixty-eighth session, the Committee discussed and further clarified the structure and content of the evaluation and clarified that the meta-analysis of second primary cancer risks after radiotherapy should be based on absorbed organ doses after quality control of dosimetric data in the evaluated publications.

7. At its sixty-ninth session, the Scientific Committee discussed the progress and the first draft of its evaluation of second primary cancer after radiotherapy. The Committee emphasized the importance of that evaluation, which was intended to raise awareness in scientific and medical communities and national authorities with respect

<sup>3</sup> The sixty-ninth session of the Scientific Committee was attended by 187 participants (114 in person and 73 online) from 31 States members of the Committee (26 in Vienna and 5 online), and 13 observers from the European Union, FAO, the International Agency for Research on Cancer, IAEA, the International Civil Aviation Organization, the International Commission on Radiation Units and Measurements, the International Commission on Radiological Protection, ILO, IMO, OECD/NEA, the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization, UNEP and WHO.

<sup>4</sup> Updates to the working titles of all evaluations in the present programme of work will be considered by the Committee at its seventieth session.



to the fact that successful cancer treatment by radiation may, in some patients, result in a second primary cancer several years later. Quantification of the risk of second primary cancer induction by radiotherapy and assessments of the factors affecting that risk required data, such as data on dose distributions, which were often difficult to obtain and review retrospectively. The evaluation would therefore, in addition to a thorough literature review, also address the challenges associated with this type of evaluation and would describe potential paths forward.

8. To enable in-depth discussion of the complete report of this evaluation by the Scientific Committee before its approval, it was decided to postpone for one year the expected date for submission of the final draft, with the approval now envisaged to take place at the seventy-first session of the Committee, in 2024.

## **2. Epidemiological studies of radiation and cancer**

9. At its sixty-sixth session, the Scientific Committee initiated the evaluation of epidemiological studies of radiation and cancer, in order to update annex A of the UNSCEAR 2006 report.<sup>5</sup> The expert group on cancer epidemiology commenced its work in 2019 with the selection of literature on epidemiological studies on radiation and cancer. At its sixty-seventh session, the Committee took note of the updated timetable and an elaborated table of contents of the evaluation. At its sixty-eighth session, the Committee discussed the progress report on the evaluation and took note of the updated workplan, which had to be revised due to the coronavirus disease (COVID-19) pandemic, and noted that the final report had been postponed and would be submitted to the Committee for approval in 2025. The Committee also highlighted the fact that the evaluations needed to be based on the Committee's principles and criteria for ensuring the quality of the Committee's reviews of epidemiological studies of radiation exposure<sup>6</sup> and clearly distinguish between attribution of effects and inference of risks, as outlined in the UNSCEAR 2012 report.<sup>7</sup>

10. At its sixty-ninth session, the Scientific Committee welcomed the progress on the evaluation, including the completion of the literature search, as well as evidence summaries for most of the 25 selected primary cancer sites presented in the draft report. The Committee advised avoiding unnecessary overlap with annex B of the UNSCEAR 2019 report, on lung cancer risk from exposure to radon,<sup>8</sup> and the ongoing evaluation on second primary cancer after radiotherapy.

## **3. Evaluation of public exposure due to ionizing radiation from natural and other sources**

11. At its sixty-sixth session, the Scientific Committee decided to commence its evaluation of public exposure to ionizing radiation, including quality criteria for evaluating sources and exposure. Following the project commencement in 2020, the Committee at its sixty-seventh session agreed on an updated project plan, noting that the UNSCEAR Global Survey of Public Exposure would commence in 2021. At its sixty-eighth session, the Committee suggested revisions to the structure and content of the draft scientific annex and agreed to the proposed schedule for completion of the appendix on quality criteria for evaluating public exposure to ionizing radiation by 2022 and the annex by 2024. The Committee noted that the UNSCEAR Global

<sup>5</sup> *Effects of Ionizing Radiation: United Nations Scientific Committee on the Effects of Atomic Radiation 2006 Report to the General Assembly*, vol. I (United Nations publication, 2008), annex A.

<sup>6</sup> *Sources, Effects and Risks of Ionizing Radiation: United Nations Scientific Committee on the Effects of Atomic Radiation 2017 Report to the General Assembly* (United Nations publication, 2018), annex A.

<sup>7</sup> *Sources, Effects and Risks of Ionizing Radiation: United Nations Scientific Committee on the Effects of Atomic Radiation 2012 Report to the General Assembly* (United Nations publication, 2015), annex A.

<sup>8</sup> *Sources, Effects and Risks of Ionizing Radiation: United Nations Scientific Committee on the Effects of Atomic Radiation 2019 Report to the General Assembly* (United Nations publication, 2020), annex B.

Survey of Public Exposure had been initiated in March 2021 and that all States Members of the United Nations had been invited to participate. Ninety-seven Member States nominated national contact persons.

12. At its sixty-ninth session, the Scientific Committee acknowledged the considerable work carried out by the expert group on public exposure in collecting information, and noted that as at 31 March 2022, 46 countries had submitted data through the UNSCEAR Global Survey of Public Exposure. The expert group has already identified and reviewed about 2,000 articles from the literature. This review was continuing and was planned for completion by the end of 2022. The Committee provided feedback to the expert group on a draft appendix on quality criteria for evaluating public exposure to ionizing radiation. That draft appendix established the basis for a comprehensive and transparent evaluation of data on public exposure to ionizing radiation. The Committee also noted that the UNSCEAR dose assessment methodologies had been updated to cover a wider range of sources of public exposure. The Committee agreed with the proposed timeline for completion of the annex by 2024. The Committee also requested the expert group to provide a first draft of the annex and an updated draft of the supporting appendix on quality criteria at its seventieth session, in 2023.

#### **4. Evaluation of diseases of the circulatory system from radiation exposure**

13. At its sixty-seventh session, the Scientific Committee agreed to commence an evaluation of diseases of the circulatory system resulting from radiation exposure, and at its sixty-eighth session, the Committee endorsed the project plan for commencement in 2021. At its sixty-ninth session, the Committee considered the progress report on the evaluation of diseases of the circulatory system from radiation exposure and acknowledged the work performed by the expert group to commence the literature review. The Committee provided feedback on the scope of topics to be included in the review, endorsed the proposed structure of the evaluation and the updated timeline for the evaluation, which was planned to result in a final draft annex, to be submitted to the Committee for consideration for publication in 2025. The Committee requested that the expert group on circulatory diseases submit at the seventieth session of the Committee, in 2023, a progress report and first draft of the annex, including the results of the evaluation of literature on diseases of the circulatory system from radiation exposure.

#### **5. Strategy to improve collection, analysis and dissemination of data on radiation exposure, including consideration of the Committee's ad hoc working group on sources and exposure**

14. At its sixty-sixth session, the Scientific Committee had established the ad hoc working group on sources and exposure to support the Committee's work on improving data collection, analysis and dissemination of data on radiation exposure. Two sets of recommendations to further improve the overall exposure assessment process had been presented at the Committee's sixty-seventh and sixty-eighth sessions. At its sixty-eighth session, the Committee extended the mandate of the ad hoc working group until its sixty-ninth session to support the implementation of those recommendations and consolidate the recommendations in one strategy document.

15. At the sixty-ninth session, the ad hoc working group presented a combined strategy to improve collection, analysis and dissemination of data on radiation exposure. That strategy was aimed at seeking widespread participation in the Scientific Committee's surveys, improving regional representation in future reports on medical, occupational and public exposures to ionizing radiation, and ensuring that future surveys of the Committee were relevant and useful and were adapted to changing data sources and uses of radiation across the world. The Committee acknowledged the valuable work carried out by the ad hoc working group, endorsed the data collection strategy, and agreed to initiate implementation of the recommendations by establishing a new ad hoc working group on sources and exposure to improve the Committee's work on data collection for medical,

occupational and public exposures and to advise the Committee on future data collection and exposure assessments. The new ad hoc working group was expected to be formed immediately after the sixty-ninth session of the Committee and to report on its work at the Committee's seventieth session.

## **6. Implementation of the public information and outreach strategy for 2020–2024**

16. At its sixty-sixth session, the Scientific Committee adopted a public information and outreach strategy for the period 2020–2024 to guide the work of the secretariat and the Committee in outreach and communication activities with different stakeholders. The strategy complemented the outreach activities planned for the UNSCEAR 2020/2021 report, annex B (Levels and effects of radiation exposure due to the accident at the Fukushima Daiichi Nuclear Power Station: implications of information published since the UNSCEAR 2013 Report).<sup>9</sup> At its sixty-seventh session, the Committee noted the progress report and acknowledged the postponement of outreach activities on the update of the UNSCEAR 2013 report due to the COVID-19 pandemic situation and encouraged close collaboration with international organizations to further promote the Committee's findings.

17. At its sixty-ninth session, the Scientific Committee took note of the progress report prepared by the secretariat and provided feedback on the ongoing and planned future outreach activities. The Committee proposed a new approach for outreach activities, including additional social media content to promote awareness of radiation effects. The Committee acknowledged that the newly developed website provided easy access to its reports and relevant General Assembly resolutions in the six official languages of the United Nations. The Committee re-emphasized the importance of broader dissemination and future updates to the United Nations Environment Programme (UNEP) booklet entitled *Radiation: Effects and Sources*. The Committee welcomed the intended update of the UNEP booklet, encouraged and appreciated its translation into other languages, and welcomed the development of an informative video about the UNEP booklet. The Committee recognized the importance of sharing knowledge and experiences with young professionals in order to foster the development of the next generation of radiation scientists, and expressed support to the secretariat to continue dissemination of the Committee's work.

## **B. Update on the Committee's long-term strategic directions**

18. At its sixty-sixth session, the Scientific Committee approved its long-term strategic directions and plan for the period 2020–2024. That plan was as follows:

- (a) Establishing working groups focused on sources and exposure, and effects and mechanisms;
- (b) Inviting, on an ad hoc basis, scientists from other States Members of the United Nations to participate in the Committee's evaluations;
- (c) Increasing the Committee's efforts to present its evaluations and summaries thereof in a manner that attracts readers without compromising scientific rigour and integrity;
- (d) While maintaining the lead in providing authoritative scientific evaluations to the General Assembly, liaising closely with other relevant international bodies to avoid duplication of efforts.

<sup>9</sup> *Sources, Effects and Risks of Ionizing Radiation: United Nations Scientific Committee on the Effects of Atomic Radiation 2020/2021 Report to the General Assembly* (United Nations publication, 2022), annex B.

**1. Establishing working groups focused on sources and exposure, and effects and mechanisms**

19. At its sixty-ninth session, the Scientific Committee prolonged the mandate of the ad hoc working group on effects and mechanisms to continue their activities until the Committee's seventieth session, in 2023. The prolongation would allow the ad hoc working group on effects and mechanisms to continue supporting and monitoring progress in the implementation of the programme of work, to evaluate new scientific developments relevant to the Committee, and to work with the secretariat to continue the preparation of the Committee's future programme of work for the period 2025–2029, for discussion at its seventieth session.

20. At its sixty-ninth session, the Scientific Committee agreed to establish an ad hoc working group focusing on the implementation of an updated strategy for improving the collection of data on radiation exposure. The ad hoc working group would monitor the literature, provide advice to the Bureau and Committee for ongoing data collection, and evaluate available and new data sources relevant for the Committee's exposure assessment, in order to work with the secretariat in preparation for the Committee's future assessments on medical, occupational and public exposures to ionizing radiation.

**2. Inviting, on an ad hoc basis, scientists from other States Members of the United Nations to participate in evaluations regarding the Committee's evaluations**

21. The Scientific Committee noted that the secretariat and the Bureau had taken steps to involve scientists from other States Members<sup>10</sup> of the United Nations in supporting the Committee in conducting ongoing evaluations. This was particularly relevant for the ongoing evaluation of public exposure to ionizing radiation from natural and other sources.

**3. Increasing the Committee's efforts to present its evaluations, and summaries thereof, in a manner that attracts readers without compromising scientific rigour and integrity**

22. The Scientific Committee referred to the outreach activities reported in paragraphs 16 and 17 above.

**4. While maintaining its lead in providing authoritative scientific evaluations to the General Assembly, liaising closely with other relevant international bodies to avoid duplication of efforts**

23. The importance of the Scientific Committee's findings in providing the scientific evidence upon which decisions are made by the international community and the safety standards are developed was also demonstrated in the period since its sixty-eighth session. The Committee noted that its secretariat was a member of the Inter-Agency Committee on Radiation Safety. The Committee also noted that the secretariat also continued to collaborate with IAEA, participating as an observer of the IAEA Commission of Safety Standards, the Emergency Preparedness and Response Standards Committee and the Radiation Safety Standards Committee. The secretariat was also cooperating with several other organizations, including ICRP and the International Radiation Protection Association.

24. The Scientific Committee welcomed and supported the continued cooperation of the secretariat within the United Nations system and with other intergovernmental organizations with a view to promoting the Committee's work and exploring synergies and joint activities that would contribute to that work and support the collection and analysis of scientific data. The Committee specifically acknowledged the memorandum of understanding signed with IAEA on 10 May 2022, the ongoing development of framework agreements with the European Commission and WHO, and the engagement with the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization, the International Civil Aviation Organization, the International Maritime

<sup>10</sup> Austria, Italy and Switzerland.

Organization and OECD/NEA, and requested the secretariat to report on cooperation with other entities at its seventieth session.

## C. Future programme of work

25. In line with its planned programme of work for the period 2020–2024, the Scientific Committee decided to commence a new evaluation of nervous system effects of radiation exposure in 2022, depending on the availability of resources and experts. Furthermore, it began preparation of its future programme of work for the period 2025–2029 after having received proposals by Member States and observers. Preliminary evaluation of those proposals and additional gap analysis performed by the ad hoc working group on effects and mechanisms had resulted in a list of potential topics, which were discussed by the Committee. The Committee selected six topics<sup>11</sup> for detailed evaluation and prioritization by the ad hoc working group on effects and mechanisms, the result of which was to be presented at the Committee's seventieth session.

26. The Scientific Committee emphasized that the timely implementation of its mandate and the programme of work for the period 2020–2024 requires sufficient available resources in the secretariat and additional scientific expertise and administrative support. That was particularly relevant in view of the increased membership, increased number of experts and groups, increased outreach activities, proposed new activities related to the collection, analysis and dissemination of data on medical and occupational exposures, and the updating and modernization of the UNSCEAR global survey platform to facilitate its use by Member States.

## D. Administrative issues

27. The Scientific Committee took note of General Assembly resolution 76/75 on the effects of atomic radiation, in which the Assembly:

(a) Requested the United Nations Environment Programme to continue, within existing United Nations resources, to service the Scientific Committee and to disseminate its findings to Member States, the scientific community and the public and to ensure that the administrative measures in place were appropriate, including clear roles and responsibilities of the various actors, so that the secretariat is able to adequately and efficiently service the Committee in a predictable and sustainable manner and effectively facilitate the use of the invaluable expertise offered to the Committee by its members in order that the Committee might discharge the responsibilities and mandate entrusted to it by the General Assembly;

(b) Requested the Secretary-General to strengthen support for the Committee within existing United Nations resources, particularly with regards to the concerns raised by the Committee in relation to resourcing, and with regard to the increase of operational costs in the case of the increase in membership, and to report to the General Assembly at its seventy-seventh session on those issues.

28. The Scientific Committee also recalled the United Nations Sustainable Development Goal 3, on ensuring healthy lives and promoting well-being for all at all ages. The Committee highlighted that the effective, sustainable and timely completion of its planned programme of work to deliver its mandate directly related to that Goal.

29. In considering those requests of the General Assembly in its resolution 76/75, the Scientific Committee expressed its ongoing and increasing concern about the continued decline in regular budget funds allocated to the Committee to engage expert consultants

<sup>11</sup> Those topics were levels of exposure in animals and plants, dose-response relationship of radiation effects, radiation effects on lifespan, radiation signatures and biomarkers, uncertainties associated with radiation therapy, and biological effects of prenatal exposures as far as non-cancer effects are concerned.

for performing the Committee's scientific evaluations. In the past 10 years, the annual budget funds allocated for consultants had decreased from \$98,300 in the period 2012/13 to \$56,300 in 2022. Further, the starting position for 2023 reflected an additional reduction of 10 per cent in the budget line for consultants, which was yet to be confirmed. Over that same period of time, the complexity required in the Committee's evaluations and the volume of literature required to be reviewed had increased significantly, augmenting the demand for qualified and capable experts to undertake that work.

30. With respect to the request of the Assembly reflected in paragraph 27 (a) above, the Scientific Committee was of the view that, in order for it to be adequately and efficiently serviced in a predictable and sustainable manner and to effectively facilitate the use of the invaluable expertise offered to the Committee by its members, the Committee needed to be assured of a predictable and sustainable budget, enabling it to plan for supporting key experts engaged as consultants. Without that, and a reliable and sustainable level of support from the secretariat, the ability of the Committee to discharge the responsibilities and mandate entrusted to it by the General Assembly was severely compromised.

31. While the Scientific Committee acknowledged that contributions made to the general trust fund by Member States had allowed some work to progress, that method of funding was neither predictable nor sustainable. Present extrabudgetary support for the secretariat was expected to expire by 2023, and the timely implementation of the programme of work to deliver on the Committee's mandate would require the provision of additional professional and administrative secretariat services.

32. The Scientific Committee calls upon all Member States of the General Assembly to invest in scientific education and programmes at all levels and to support radiation research programmes to ensure the crucial work of the Committee can be sustainably maintained in the future.

33. The Scientific Committee also updated its governing principles for the Committee's work in order to reflect its extended membership and emphasized the importance of Member State support for future data collection.

34. The Scientific Committee agreed to hold its seventieth session in Vienna from 19 to 23 June 2023.

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