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ENHANCING PUBLIC EDUCATION AND ADDRESSING POLICY GAPS FOR RADON EXPOSURE AND LUNG CANCER RISK MITIGATION IN SRI LANKA

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ABSTRACT

Radon, a naturally occurring radioactive gas, is a significant health risk attributable to its strong association with lung cancer. In Sri Lanka, public awareness of radon exposure and its health implications remains low, and there are minimal policies addressing this risk. This systematic review aimed to analyse public awareness, policy gaps, and mitigation strategies related to radon exposure and cancer risk, particularly in Sri Lanka. Following the PRISMA 2020 guidelines, we searched three electronic databases PubMed, Google Scholar, and ScienceDirect for studies published since 2001, yielding 1,025 records. After screening, we included 51 articles, focussing on public awareness and policy frameworks in both developed and South Asian countries. The findings disclose significant gaps in both public knowledge and policy measures, highlighting the urgent necessity for targeted public education campaigns and development of comprehensive regulations for radon testing and mitigation. By addressing these issues, Sri Lanka can reduce the health risks associated with radon exposure and enhance its cancer prevention strategies.

KEYWORDS: *Radon exposure, Lung cancer prevention, Public awareness, Sri Lanka, Environmental health policy, Radon mitigation*

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1. INTRODUCTION

Background Information

A naturally occurring radioactive gas called Radon (^{86}Rn) is formed from the decay of uranium in soil and rock. It is colourless, odourless, and tasteless, which makes it strenuous to detect without specialised equipment (Degu Belete and Alemu Anteneh, 2021). Long-term exposure to radon decay products poses significant health risks, particularly lung cancer. The World Health Organisation identifies radon exposure as the second leading cause of lung cancer after smoking (*Radon*, no date). The risk is especially high in environments with elevated radon levels, such as imperfectly ventilated buildings or homes in radon-prone areas.

Context in Sri Lanka

In Sri Lanka, the public awareness of radon exposure and its correlated health risks is comparatively low. Radon levels fluctuate greatly depending on geographical location, construction implementations, and building ventilation. With proliferating urbanisation and changes in construction materials, there is a growing need to acknowledge the quantity of radon exposure and public awareness in Sri Lanka. Despite its significance, radon is not broadly discussed in public health forums, and limited studies focus on radon exposure in the Sri Lankan context.

Objectives of the Review

The primary objective of this review is to explore the existing public education efforts and identify policy gaps related to radon exposure in Sri Lanka, emphasising the need for enhanced education and understanding of the associated health risks. Additionally, the review aims to provide an overview of the research on radon risk perception, evaluating existing policy measures related to radon mitigation and cancer prevention within the selected developed countries (United States, Canada, United Kingdom, Australia, European Union) with South Asian countries (India, Pakistan, Bangladesh, Nepal, Bhutan, Sri Lanka, Maldives, Afghanistan). By comparing these policies to international best practices, the review seeks to identify gaps and areas for improvement. Ultimately, the review aspires to offer actionable recommendations for improving public education and policy development on radon exposure, ensuring that the population is better informed and protected from the potential health hazards associated with this radioactive gas.

2. METHODOLOGY

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline.

Search Strategy

This review systematically searched three electronic databases PubMed, Google Scholar, and ScienceDirect for studies on radon exposure, public awareness, policy gaps, and cancer prevention. The search used the query: “radon exposure” AND “public awareness” OR “policy gaps” OR “cancer prevention” OR “cancer risk” OR “Sri Lanka.” Only English-language studies were included, with no time restrictions, ensuring comprehensive topic coverage as of December 3, 2023.

Study selection

Two researchers (W.V.A.S.L and S.N.H) independently evaluated titles and abstracts based on eligibility criteria, covering publications from 2001 onward. A total of 1025 records were identified from three databases, as shown in Figure 3 following PRISMA guidelines.

A total of 842 records were identified under the category of public awareness of radon exposure in developed countries (Figure 1). The selection process prioritised studies from nations with robust public health systems and radon mitigation strategies, offering valuable insights for Sri Lanka. United States: From 429 records, 10 were selected for their in-depth analysis of public awareness campaigns, policy frameworks, and successful mitigation efforts. Canada: Out of 211 records, 3 were chosen for their focus on public health initiatives, educational outreach, and radon awareness programmes relevant to Sri Lanka's context.

United Kingdom: Of 122 records, 2 were selected for their emphasis on government-led efforts and policy adaptations, offering practical insights for bridging awareness gaps. Australia: From 34 records, 1 study was chosen for its discussion on risk communication and public engagement strategies, adaptable to countries with low radon awareness. European Union: Of 46 records, 16 were selected due to the diverse policy measures across member states and the region's comprehensive approach to radon exposure management.

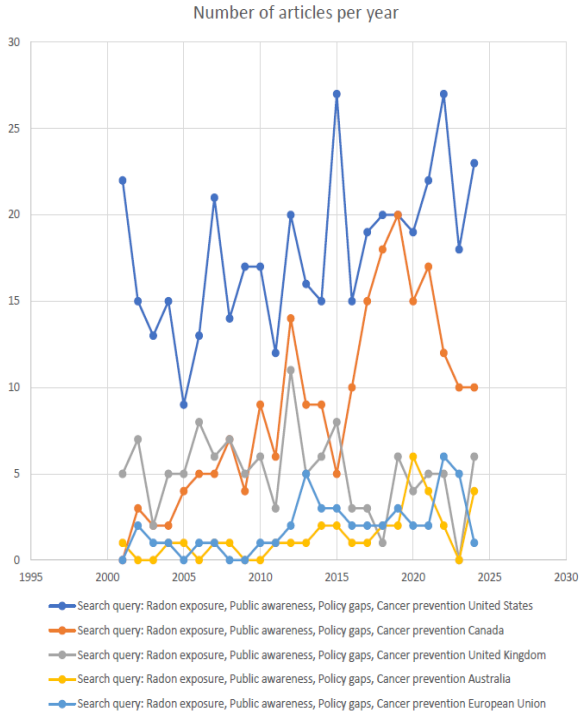

Figure 1. Timeline distribution of the articles included in the systematic review in developed countries

Under the category of public awareness of radon exposure in South Asian countries resulted in 184 records (Figure 2), which provided context for comparing radon awareness and policy frameworks in countries with similar socio-economic and public health challenges faced by Sri Lanka.

India: Out of 137 identified records, only 4 were selected for their analysis of radon risk, all of which centred on measurement rather than awareness campaigns or public education efforts. Pakistan: Among 37 reviewed records, 6 studies were chosen for their focus on radon concentration levels, but, again, none addressed public knowledge or mitigation strategies.

Bangladesh: All 4 available records were included due to the limited literature on radon exposure, but none explored public awareness initiatives. Nepal: Both available records were included, although there is a lack of focus on public health education and policy challenges related to radon exposure. Bhutan: The only record on radon and helium monitoring, with no emphasis on public awareness. Sri Lanka: Just 1 record was found, which was included due to its direct relevance to the study's focus on radon exposure in the country. Like in the other countries, this record did not delve into public awareness or policy issues. Maldives: No records were available, indicating a significant research gap in both radon measurement and awareness. Afghanistan: The single record identified was selected for its relevance to radon exposure in Aisa-pacific areas, offering insights for awareness strategies in similarly high-risk regions.

In summary, while radon measurement studies are available in several South Asian countries, there is a notable deficiency in research focused on public awareness and education.

Criteria for Eligibility and Inclusion

The eligibility criteria for study selection were as follows: Inclusion criteria included original research articles or government reports focussing on radon risk knowledge, public awareness, or policy gaps related to cancer prevention. Only research published after 2001, covering both empirical data and policy analysis, was considered. Additionally, articles had to provide an analysis of risk perception, public knowledge, and policy frameworks. Exclusion criteria included letters to editors, conference abstracts, as well as studies that did not address radon exposure in the context of public health or policy.

The data analysis focused on two main areas: public awareness and policy measures. For public awareness, academic journals, policy documents, and government reports were analysed to evaluate the level of knowledge about radon exposure and its health risks.

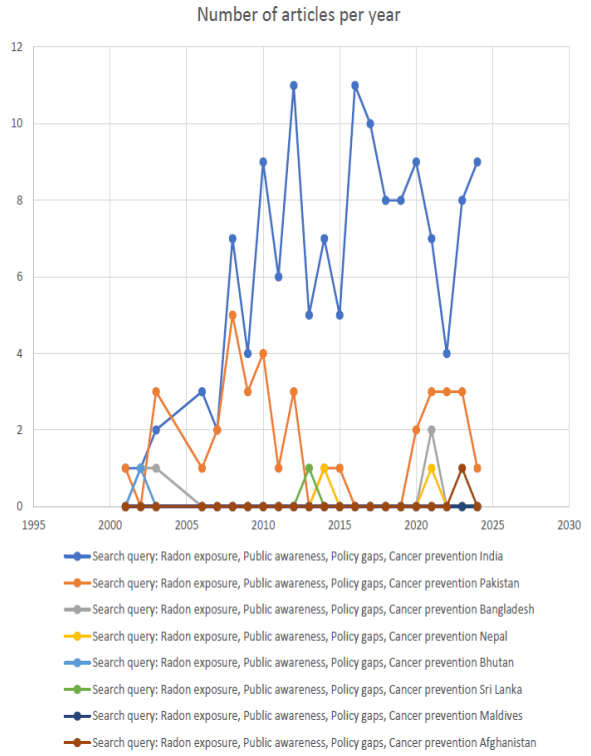

Figure 2. Timeline distribution of the articles included in the systematic review in South Asian Countries

Data Extraction

This analysis included comparing awareness levels with international standards. For policy analysis, existing policies in Sri Lanka were reviewed and evaluated against global best practices. Gaps and areas needing improvement were identified based on this comparison.

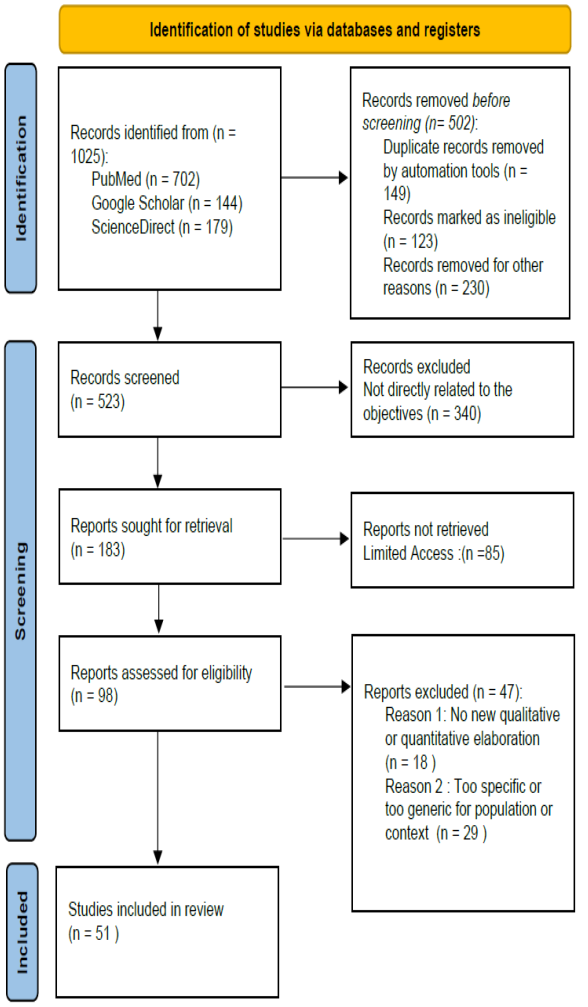

Figure 3. PRISMA 2020 flow diagram

3. RESULTS

Search Results and Study Characteristics

Figure 3 shows the article selection process for this review. Initially, 1025 articles (702 + 144 + 179) were identified from the databases. After removing 502 records due to duplication, ineligibility, or other reasons such as language barriers, geographical irrelevance, 523 articles were screened. Of these, 340 were not directly related to the objectives, and 85 could not be retrieved. During the full-text evaluation, 47 more articles were excluded for lack of new data or being too specific or generic. Ultimately, 51 articles were included to compare radon awareness in developed countries and South Asian regions, including Sri Lanka.

Overview of Radon Exposure and Health Risks

A radioactive gas called Radon emanates from the ground and can accumulate in constructions, especially in regions with high levels of uranium content in the soil. Academic journals provided insights into global and regional research on radon exposure and public awareness (IAEA, 2013; 'NOTICE : this is the author 's version of a work that was accepted for publication in Journal of Environmental Radioactivity. Changes resulting from the publishing process, such as peer review, editing, corrections, structural formatting, and

ot', 2018; Martin, Ryan, Delaney, David A Kaminsky, *et al.*, 2020; Martin, Ryan, Delaney, David A. Kaminsky, *et al.*, 2020; Khan, Gomes and Chreim, 2021; Celen *et al.*, 2023; Dessemon *et al.*, 2024; Khan *et al.*, 2024). It can drain into buildings through cracks in walls, floors, and foundations, pre-eminent to its inflation in indoor air (Abed *et al.*, 2024). The primary health risk correlated with radon exposure is lung cancer, which occurs due to the inhalation of radon decay particles that irradiate lung tissues. and significantly increase the risk of developing lung cancer. These particles persevere to emit radiation, which can lead to mutations in lung cells and ultimately result in cancer. Driver molecular alterations have been recently identified in non-small lung cancer (NSCLC), such as somatic mutations (*BRAF*, *HER2*, *EGFR*, *MET*) or chromosomal rearrangements (*ALK*, *NTRK*, *ROS1*, *RET*), mainly in the non-smoking population, where no risk factor has been identified yet (Riudavets *et al.*, 2022). The latency period for radon-instigated lung cancer is typically long, often taking many years or even decades to manifest (Draft, no date). Nevertheless, the severity of the health risk is contingent on the concentration of radon, the continuation of exposure, and individual factors such as smoking habits (Lantz, Mendez and Philbert, 2013).

Epidemiological studies have consistently illustrated a clear correlation between radon exposure and lung cancer risk. According to the World Health Organisation (WHO), approximately 3% to 14% of lung cancers are allocated to radon exposure, depending on the average radon concentration in a given geographical area and the prevalence of smoking (WHO, 2007). Even at low levels of radon exposure, there is no safe threshold, and any proportion of radon inhalation conveys a risk of lung cancer.

While lung cancer is the most well-documented health risk of radon exposure, emerging research suggests that radon may also be associated with other respiratory conditions. Some studies have designated a potential association between radon exposure and chronic obstructive pulmonary disease (COPD), though the evidence is less robust compared to lung cancer (Figure 4) (Turner *et al.*, 2012). The inhalation of radon progeny may contribute to the development or exacerbation of respiratory illnesses by causing oxidative stress and inflammation in lung tissues (Chen *et al.*, 2020). However, further research is needed to fully understand these syndicates and the mechanisms behind them.

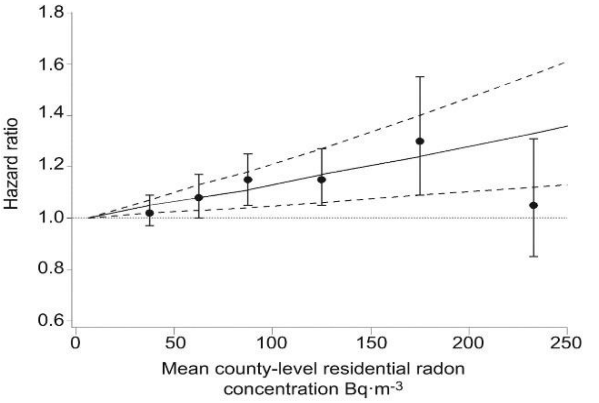

Figure 4: Adjusted hazard ratios with 95% confidence intervals for COPD mortality were analysed in relation to categorical and continuous indicators of mean residential radon concentrations (Lawrence Berkeley National Laboratory, Berkeley, CA, USA) from 1982–2006 in the American Cancer Society Cancer Prevention Study-II. Reference category: <25 Bq·m^{-3} (Turner *et al.*, 2012).

In addition to respiratory diseases, there is expanding concern about the potential for radon exposure to cause other types of cancers, such as leukaemia and other hematologic malignancies. While the evidence remains indeterminate, some studies have indicated a possible link between radon exposure and an increased risk of leukaemia, especially in children (Ngoc, Park and Lee, 2022). The hypothesised mechanism necessitates the damage to bone marrow cells by radon decay products, leading to mutations that could result in leukaemia (Bräuner *et al.*, 2010). However, these findings are still under investigation, and more conscientious studies are needed to authenticate any causal relationships.

Public Awareness of Radon Exposure

Globally, public awareness of radon exposure fluctuates significantly. In countries such as the United States and Canada, radon awareness programmes and mitigation strategies have been implemented extensively. These programmes often incorporate public education campaigns, radon testing

resourcefulness, and construction regulations to minimize radon levels. Furthermore, in many developing countries, including Sri Lanka, awareness is limited. Factors influencing public awareness include insufficiency of information, inadequate testing facilities, and limited media coverage. Studies have shown that strengthened public awareness about radon can guide to higher rates of testing and mitigation, thus lowering health risks (Neri *et al.*, 2018).

Policy Measures for Radon and Cancer Prevention

Effective policies for radon and cancer prevention often necessitate a coalescence of public awareness initiatives, and regulatory measures, and contribute to research. Countries with strong radon policies consistently have guidelines for radon testing in homes and workplaces, standards for radon levels, and requirements for radon mitigation in new and existing buildings (World Health Organisation, no date). In addition, policies may include reinforcement for radon research and funding for public health campaigns. Identifying and communicating policy gaps is decisive for developing comprehensive strategies to anticipate radon-induced lung cancer.

Public Awareness of Radon Exposure in Developed Countries

In developed countries, public awareness of radon exposure differs, but there has been a significant prominence on education and prevention due to the acknowledged health risks corresponding with radon. This section provides a recapitulation of how different developed countries address radon awareness and its influence:

1. United States

In the United States, social awareness of radon is proportionately high due to considerable public education campaigns and safety legislation. The American Lung Association (ALA) and the Environmental Protection Agency (EPA) have led initiatives to educate the public about radon risks (Howlader N, Noone AM, Krapcho M, Miller D, Brest A, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, 2010; Program, Ground and Unlimited, 2012).The EPA provides guidelines for radon testing and mitigation and has advanced educational materials that are broadly distributed (United States Enviomental Protection Agency, no date). Additionally, many states have radon programmes that offer free or low-cost radon testing kits, conduct public transcend, and provide information on how to mitigate radon levels in homes (Department of Health, no date; Health, no date; Montana.gov, no date; Official Pennsylvania Government Website, no date; State and Health, no date; United States Enviomental Protection Agency, no date; EPA, 2016). The National Radon Action Plan aims to decrease radon-related lung cancer by expanding testing, mitigation, and public education (The Authors Team, 2022).

2. Canada

Canada has also made considerable intentions to elevate awareness about radon. Health Canada and provincial agencies encourage radon testing and mitigation through public education campaigns, which include informational brochures, websites, and media outreach. The Canadian government has established radon guidelines and encourages homeowners to test for radon, particularly in areas known to have elevated radon levels. The Canadian Home Builders' Association and other organisations collaborate to integrate radon-resistant construction practices in new homes. Public awareness is further reinforced by research on radon levels and health risks, which aids inform and updating safety recommendations (Control, no date; Government of Canada, no date; Manitoba Health, no date).

3. United Kingdom

In the United Kingdom, the awareness of radon exposure has been accompanied by initiatives from Public Health England (PHE) and the Health Protection Agency (HPA). PHE anticipates information on radon risks, testing, and mitigation through its website and public health campaigns. The UK Radon Association and other organisations provide resources and guidance for homeowners and builders. The government has established radon action levels and dispenses support for testing and remediation in homes and workplaces. Awareness is elevated by localised radon maps that help recognise areas with higher radon potential,

promoting targeted testing and preventive measures (Authors Team, 2018; UK Data Service, 2021).

4. Australia

In Australia, radon awareness is less conspicuous compared to some other developed countries, but attempts are increasing. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) furnishes information on radon and its health risks, though public education is not as extensive as in the U.S. or Canada. The focus has been on research and monitoring radon levels in areas where geological conditions are known to produce higher radon concentrations (Figure 5) (Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), no date). Public awareness is primarily raised through specified studies and occasional outreach campaigns, with a slighter emphasis on widespread testing and mitigation programmes.

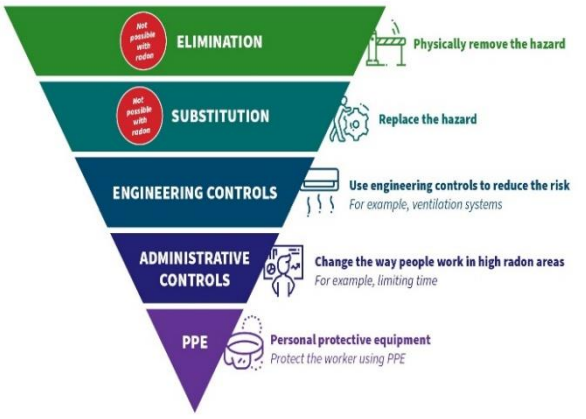

Figure 5: Hierarchy of Controls Pyramid in Response to Natural Radon Exposure (Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), no date).

5. European Union

Across the European Union, awareness of radon fluctuates by country. The European Commission reinforces radon awareness through its Radiation Protection programme, which contributes guidelines and recommendations for member states. Countries such as Sweden, Switzerland, and Germany have strong radon awareness programmes, with comprehensive public education campaigns, testing initiatives, and regulatory frameworks (Rivki *et al.*, no date; Strahlenschutz, no date; Piller and Johner (INVITED), 1998; Akerblom *et al.*, 2000; Roserens, 2000; Wichmann *et al.*, 2006; Khan *et al.*, 2021; Petermann and Bossew, 2021; Vienneau *et al.*, 2021). In contrast, awareness is slighter developed in some Southern and Eastern European countries, where radon risks may be higher but public knowledge and testing rates are lower (Sarrou and Pashalidis, 2003; Vukotic *et al.*, 2008; Clouvas, Xanthos and Takoudis, 2011; Celebi *et al.*, 2014; Tushe *et al.*, 2019; Savković *et al.*, 2020; Coretchi, Ene and Ababii, 2021).

Overall Impact

In developed countries with high levels of public awareness, radon testing and mitigation efforts have led to a convalescent understanding of radon risks and refined public health outcomes. Education campaigns, government regulations, and community transcends play significant roles in amplifying awareness and decreasing radon-related health risks. Additionally, the extent of public awareness and the effectiveness of radon mitigation impacts can still differ, emphasising the requirements for continued education and policy reinforcement to address radon exposure effectively.

Public Awareness of Radon Exposure in South Asian Countries

Radon awareness across South Asian countries is generally low, with significant discrepancies in public education, government initiatives, and research efforts. This region, consisting of Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka, faces unique challenges related to radon awareness due to diverging levels of economic development, public health infrastructure, and environmental priorities. This section provides an overview of radon awareness in the selected countries:

1. India

In India, public awareness of radon exposure is deficient, although some progression has been made through research and localised studies. The Bhabha Atomic Research Centre and other scientific institutions have supervised studies to map radon levels in distinct regions of the country, especially in areas with high uranium content in the soil (Ramachandran *et al.*, 2003; Raghavendra *et al.*, 2014; Singh *et al.*, 2015a,

2015b). However, these studies are substantially constricted to academic circles and have not translated into general public awareness. Government efforts to educate the public about radon are minimal, and there are no national campaigns or policies specifically targeting radon testing or mitigation. Awareness is predominantly confined to professionals in the fields of radiation protection and environmental science.

2. Pakistan

In Pakistan, radon awareness is similarly low. Research on radon exposure has been conducted by institutions such as the Pakistan Atomic Energy Commission (PAEC), but public dissemination of information is limited. The general public is substantially unaware of the health risks related with radon exposure, and there are no significant government-led initiatives to encourage radon awareness (Matiullah *et al.*, 2003; Rahman, Anwar and Matiullah, 2008; Matiullah and Muhammad, 2016; Matiullh and Muhammad, 2016; Ahmad *et al.*, 2018; Shah *et al.*, 2024). Public health campaigns in Pakistan have traditionally focussed on more immediate health concerns, such as infectious diseases, rather than long-term environmental risks like radon exposure.

3. Bangladesh

In Bangladesh, the awareness of radon exposure is minimal, with insufficient public education or government intervention in this area. Research on radon levels has been accompanied by universities and research institutions, but these studies are not broadly known outside academic circles (Srivastava *et al.*, 2001; Srivastava, 2005b, 2005a; Hasan *et al.*, 2021, 2023). The deficiency of public awareness campaigns and governmental focus on radon mitigation contributes to the general unawareness of radon risks among the population. Comparable to other South Asian countries, Bangladesh's public health priorities have largely been concentrated on communicable diseases and disaster management, with radon exposure receiving little attention.

4. Nepal

Nepal faces indistinguishable challenges in terms of radon awareness.The country's mountainous territory and geological conditions make it susceptible to diverse radon levels, but public knowledge about radon risks remains low. Several studies have been conducted to assess radon concentrations in different regions, but there has been a miniature effort to translate these findings into public awareness or policy measures (Thapa and Shah, 2014; Rijal *et al.*, 2021). The government and public health agencies have not prioritised radon assessing or mitigation, leaving the population predominantly uninformed about the potential precariousness of radon exposure.

5. Bhutan

In Bhutan, there is constrained awareness of radon exposure among the general population. The country has not conducted extensive research on radon levels, and there is an insufficiency of public education initiatives or government policies conveying radon risks. Bhutan's centralisation on environmental conservation and sustainable development does not currently include radom awareness, and the issue remains largely unexplored in public discourse (Virk, Sharma and Sharma, 2002).

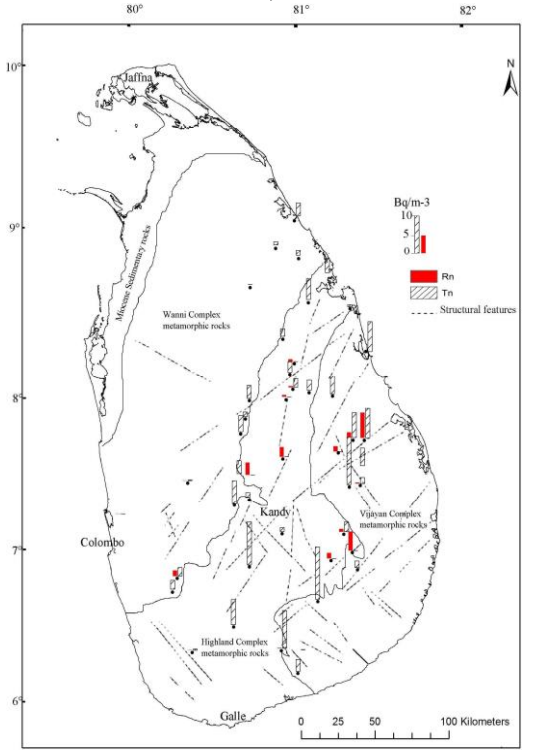

Figure 6: Radon (^{222}Rn) and thoron (^{220}Rn) distribution in the geographical locations in Sri Lanka (Nalaka *et al.*, 2013)

. **6. Sri Lanka**

In Sri Lanka, public awareness of radon exposure is also quite low, as highlighted by limited research and a lack of government-led awareness campaigns. While several academic studies have been conducted to measure radon levels in various divisions of the country, these findings have not been widely distributed to the public (Nalaka *et al.*, 2013). Most people in Sri Lanka are unaware of the health risks associated with radon, and there are no national policies or guidelines particularly addressing radon testing or mitigation (Figure 6).

7. Maldives

The Maldives has almost no public awareness of radon exposure. Given the country's unique geography, with shallow islands and minimal mineral content in the soil, radon is not seen as a significant public health concern. As a result, there is no research, public education, or policy efforts associated with radon in the Maldives.

8. Afghanistan

Afghanistan, like other South Asian countries, has low public awareness of radon exposure. The country's occurring political and economic challenges have led to a focus on more immediate health and security issues, abrogation of radon exposure and its associated risks largely unaddressed. There has been minimal research on radon levels, and public health campaigns do not include radon awareness as a priority (Janik *et al.*, 2023).

Overall Impact

In South Asian countries, public awareness of radon exposure is generally low, with limited research and minimal government intermediation. The insufficiency of widespread public education and the inadequacy of national guidelines or policies on radon testing and mitigation contribute to the region's vulnerability to radon-related health risks. Broadening public awareness, encouraging research, and advancement of regulatory frameworks are essential steps to mitigate these risks and protect public health in South Asian region.

4. DISCUSSION

Implications of Findings

The review reveals that public awareness of radon exposure in Sri Lanka is alarmingly low. There is a noticeable lack of enriched information sources available online and offline that cater to the Sri Lankan population. Most existing resources are either technical, aimed at professionals, or are not tailored to the local context, making them less accessible to the general public. While developed nations such as the United States, Canada, and the United Kingdom have established regulations mandating radon testing in homes, schools, and workplaces, Sri Lanka lags significantly in this area.

The absence of large-scale public health campaigns specifically aimed at raising awareness about radon exposure is another factor contributing to the knowledge gap in Sri Lanka. In developed countries, public health agencies actively promote educational campaigns through television, radio, and digital platforms, informing the public about the potential health risks of radon exposure. In Sri Lanka, however, there have been no substantial efforts to inform the general public through similar outreach initiatives. Additionally, outreach to rural and high-risk communities where radon exposure might be more prevalent due to geological factors is almost non-existent. In contrast, developed countries target these areas with tailored campaigns to ensure that even the most vulnerable populations are informed about testing options and mitigation strategies.

Another key factor hindering public understanding of radon exposure in Sri Lanka is the lack of substantial academic research and local data. In contrast to developed nations where universities and research institutions actively study radon exposure, Sri Lankan academic bodies have not contributed significantly to this area of public health. The scarcity of local research makes it difficult for policymakers to create evidence-based interventions, further widening the gap between academic insight and public policy.

Cultural perceptions and the focus on more immediate health threats such as dengue fever, tuberculosis, and chronic diseases have also contributed to the limited

awareness about radon exposure in Sri Lanka. Radon exposure may be seen as a distant or insignificant threat compared to more visible or pressing health concerns. This contrasts with the situation in many developed countries, where radon exposure is perceived as a serious public health issue due to extensive awareness campaigns and media coverage.

Mainstream media in Sri Lanka rarely covers the topic of radon exposure, further contributing to the lack of public knowledge. In contrast, many developed countries regularly highlight radon risks through news reports, public service announcements, and even social media campaigns. The digital presence of radon-related information is also lacking in Sri Lanka.

Finally, economic factors play a role in limiting public awareness and testing. While radon exposure may be seen as a serious health issue in developed countries, where economies can support extensive public health measures, Sri Lanka's economic priorities may differ. Addressing immediate public health concerns such as communicable diseases and poverty alleviation may take precedence over longer-term, less visible risks like radon exposure. Additionally, even if awareness were to increase, the costs associated with radon testing and mitigation could prove prohibitive for many families, especially in rural areas with lower economic means.

Policy Measures

In Sri Lanka, the Sri Lanka Atomic Energy Board offers a specialised Radiation Monitoring Service to institutions and individuals for measuring radioactivity, radiation levels, contamination, dose rates, or radon concentration. This service is available through both laboratory measurements and in-field/in-situ assessments. It is particularly beneficial for irregular objects such as mineral samples (including semi-precious gems), unspecified minerals, and other suspicious materials. The techniques engaged are non-destructive, acknowledging a precise approximation of radioactivity levels and radioisotope configuration without damaging the samples (SRI LANKA ATOMIC ENERGY BOARD, no date). Despite the availability of this advanced monitoring service, Sri Lanka still faces significant challenges in addressing radon exposure at a policy level.

Relationship between This Review and Previous Studies

Public awareness of radon exposure varies significantly worldwide. Developed countries like the United States and Canada have implemented extensive radon awareness programs, including educational campaigns and testing regulations, leading to reduced health risks associated with radon. For example, the American Lung Association and the Environmental Protection Agency (EPA) in the U.S. have successfully raised awareness, resulting in increased testing and mitigation efforts. In contrast, many developing countries, including Sri Lanka, face challenges that hinder awareness, such as insufficient information, limited testing facilities, and minimal media coverage. Consequently, the general population remains largely uninformed about radon risks and mitigation strategies.

Theory, Practice, and Policy Formulation

The absence of effective public health campaigns in Sri Lanka further exacerbates this issue. Unlike developed nations that utilise various platforms to disseminate information, Sri Lanka lacks substantial outreach efforts, especially in rural and high-risk communities. Cultural perceptions prioritise immediate health threats, such as infectious diseases, over long-term risks like radon exposure. Additionally, a scarcity of local research and data on radon limits policymakers' ability to create evidence-based interventions, widening the gap between academic findings and public policy.

Economic factors also play a role in limiting awareness and testing. Public health initiatives in Sri Lanka often focus on pressing health issues, leaving radon exposure as a low priority. Even if awareness were to improve, the costs associated with radon testing and mitigation could be prohibitive for many families, particularly in economically disadvantaged areas.

Overall, addressing these gaps in public awareness and policy is crucial for improving health outcomes in Sri Lanka. Initiatives must prioritise education, research, and resource allocation to effectively tackle the risks associated with radon exposure and enhance public health awareness.

5. CONCLUSION

This review highlights the critical gaps in public awareness and policy regarding radon exposure, particularly in Sri Lanka compared to developed countries. While extensive awareness initiatives in nations like the United States and Canada have successfully reduced radon-related health risks, similar efforts in Sri Lanka are virtually non-existent. The lack of public education campaigns, inadequate testing facilities, and minimal research contribute to a widespread unawareness of the dangers posed by radon. Increasing public awareness through targeted outreach, especially in high-risk communities, and establishing regulatory measures for radon testing and mitigation are vital steps toward enhancing public health. Addressing these issues will not only protect the population from radon-related health risks but also foster a more informed society capable of making safer choices regarding their environmental health.

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