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Research Article

Calibration of LR-115 Type II SSNTDs and Indoor Radon-222 Assessment in Man, Côte d'Ivoire

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Abstract

This study focused on the calibration of LR-115 type II solid-state nuclear track detectors (SSNTDs) and the assessment of indoor radon-222 concentrations in dwellings in Man, Côte d'Ivoire. Detector calibration was performed in a certified radon chamber by exposing the LR-115 to a radon concentration of 2.29 kBq m^{-3} for 64.33 h. After chemical etching and microscopic analysis, a calibration factor of 198.35 ± 21.43 tr/cm^2/kBq m^{-3} h was obtained. Twenty-six detectors were then deployed in dwellings for three months. Radon concentrations ranged from 52.13 to 219.4 Bq/m^3, with an average of 119.69 ± 13.36 Bq/m^3 (120 Bq.m^{-3}). Most measured values were below internationally recommended reference levels; however, several sites (M1, M6, M9, M14 and M18) exceeded 150 Bq m^{-3}. Apart from geological factors, elevated concentrations were mainly associated with poor ventilation and low foundation height. Excess cancer risk (ECR), estimated using EPA and UNSCEAR coefficients, showed significant spatial variability. According to the EPA model, ECR values ranged from 32 to 98 for site M19 and from 134 to 410 for site M14, while UNSCEAR-based estimates ranged from 41 to 111 at M19 and from 174 to 469 at M14. Corresponding annual effective doses varied between 2.09 and 8.81 mSv y^{-1}. These findings highlight the spatial variability of indoor radon concentrations linked to local geology and building characteristics, and provide essential baseline data for radon mapping and risk mitigation strategies in Côte d'Ivoire. The results support targeted ventilation improvements and foundation design considerations within existing housing stock without altering measured.

Keywords

Radon-222, WHO, SSNTD LR-115, Effective Dose, Man City, Lung Cancer

1. Introduction

Radon is a naturally occurring radioactive gas, colourless and odourless, produced by the decay of uranium and thorium contained in the Earth's crust. It represents the leading source of ionising radiation exposure for the general population [1, 2]. Since 1987, the International Agency for Research on Can-

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cer (IARC) classified radon as a human lung carcinogen, following several epidemiological studies conducted among uranium and coal miners [3]. Its health impact depends mainly on the geological characteristics of the soil and on the presence of its most significant isotope, radon-222.

In Côte d'Ivoire, several studies reported noteworthy concentrations in specific localities [4, 5]. The city of Man (Côte d'Ivoire), underlain by a basement composed of slightly uraniferous granites and gneisses [6], is therefore considered as an area with a high radon exhalation potential. The aim of the present study was to assess radon concentrations in this city using Solid State Nuclear Track Detectors (SSNTDs), and to estimate the resulting effective dose. Prior calibration of the SSNTDs was a crucial step, as it enables the conversion of track-density measurements into radon volumetric activities [4].

These data will contribute to the establishment of an essential baseline for the development of a national radon map for Côte d'Ivoire.

2. Materials and Methods

2.1. Determination of the Calibration Factor

The calibration of solid-state nuclear track detectors (SSNTDs) represents a fundamental step in establishing the quantitative correlation between the number of recorded interactions and the effective radon activity, particularly with respect to its volumetric concentration [7]. This process enables the conversion of observed track densities into precise activity values, thereby ensuring the accuracy, reliability, and reproducibility of the measurements.

The calibration procedure consisted of two stages: LR-115 SSNTDs were first irradiated at the Radiation Dosimetry Laboratory of the Nuclear Research Center of Algiers (CRNA), then chemically etched at Felix Houphouet-Boigny University in Côte d'Ivoire. This dual approach, combining controlled irradiation with chemical development, provides a robust calibration of the detectors, allowing the acquisition of quantitative data of high relevance for assessing radon volumetric activity in diverse environments.

The experimental calibration setup developed at the Nuclear Research Center of Algiers (Algeria) consists of a standard radon source (Figure 1), a hermetically sealed cylindrical stainless-steel vessel with a volume of 101.1 liters, an electronic pump, and an active AlphaGUARD detector. The AlphaGUARD detector, coupled to a radium source enclosed within the sealed vessel, enables reliable, continuous, and precise measurement of radon concentration through alpha-particle detection, facilitated by controlled air sampling and electronic data processing. The standard source (SRM 4973), certified by NIST, contains Ra-226 with an activity of 449 ± 6 Bq and a radon-222 emanation fraction of 0.88 ±0.01 at 21 ℃. Five non-strippable LR-115 film of 3 cm × 2 cm size were exposed inside the calibration chamber to an average radon concentration of 2.29 kBq/m^3 for 64.33 hours.

The detectors were then etched in 2.5 N NaOH solution for 120 minutes at a constant temperature of 60 ℃ [4].

At the end of this period, each detector was removed and rinsed with tap water for 2 minutes, followed by a 2 minutes' rinse with distilled water. The detectors were then air-dried. Two control detectors, which had not been exposed, underwent the same steps in order to evaluate the background.

The counting of alpha tracks recorded by LR-115 detectors were carried out using an optical microscope.

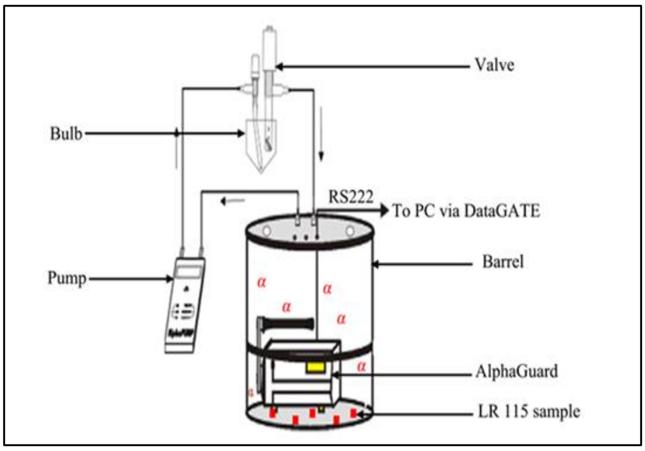

Figure 1. *Experimental Setup.*

The calibration factor is calculated using the following formula [4-8] by comparing the track density observed on the detector with the known radon concentration in the chamber.

$$k = \frac{\rho - \rho_0}{C.t} \quad (1)$$

where

k is the calibration factor (tr/cm^2/kBq/m^{3}h);

ρ is the trace density read (tr/cm^2);

ρ_0 is the background (tr/cm^2);

C is the radon concentration (kBq.m^{-3});

and t is the exposure duration of the SSNTDs (Solid State Nuclear Track Detectors) (h).

2.2. Presentation of the City of Man

Man is a city located in the western part of Côte d'Ivoire, approximately 600 km from Abidjan, and serves as the capital of the Tonkpi region. According to the December 2021 census, the city of Man has a population of 241,969 inhabitants, comprising 127,234 men and 114,735 women [9]. Most dwellings in the surveyed areas were bricks houses with partial ventilation. These houses were constructed using cement and sand bricks as building materials. In the majority of cases, roofs were made of corrugated iron sheets, while some are built of brick, positioned at a height of approximately 2.5 to 4 meters above ground level. Each house consists of rooms with adjoining walls, and some older dwellings were built of clay. The city lies on Archean formations characterized by intense metamorphism. These formations contain granitoids and uraniferous gneisses of low grade [6], yet sufficient to generate radon, particularly in fracture zones.

2.3. Location of Measurement Sites and Setup Preparation

The measurement points were selected in the most densely populated parts of the city. Their positioning was determined using a Global Positioning System (GPS). The experimental device was prepared in the Nuclear Physics and Radioprotection laboratory at Felix Houphouet-Boigny University. It consisted of a non-strippable LR-115 II pre-cut films of 3 cm × 2 cm size inserted into a hermetically sealed cup equipped with a selective membrane. The sealed cup was specifically designed to allow radon gas to diffuse through the selective membrane while effectively retaining solid progeny. These detectors were purchased with ALGADE, in France.

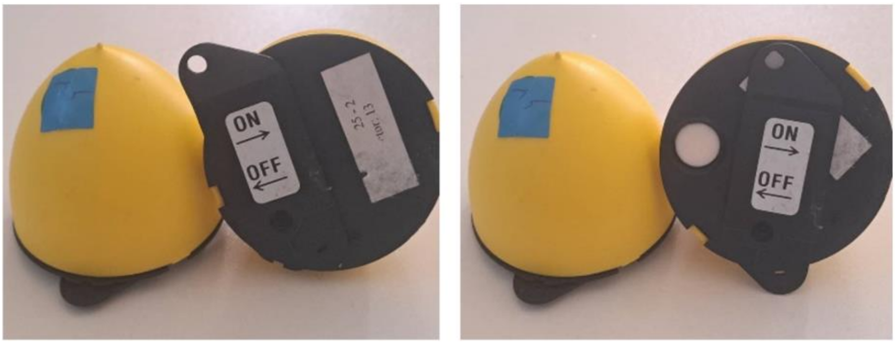

Figure 2. Photo of the Detector in its closed cup mode, in "off" and "on" states.

In total, 26 dwellings in the city were examined for the study between February 12, 2021, and May 14, 2021, corresponding to an exposure period of three months. In parallel, two (02) unexposed detectors were used to evaluate the background. Each device was affixed to a wall at approximately 1.5 meters above the ground using an adhesive strip, with care taken to avoid openings (doors, windows) as well as sources of heat. The installation was carried out with recording of the date and time. At the end of the exposure period, the detectors were removed and the retrieval date and time was documented.

3. Results

3.1. Results of the Calibration Factor

The trace densities measured, along with the associated calibration factors, obtained from the five exposed films, are presented in the Table 1 below. The arithmetic mean is 198.35 ± 21.43 $tr/cm^2/kBq.m^{-3}.h$. This value was used for evaluation radon concentration measure in the dwelling.

Table 1. Average tracks densities read by the microscope and Average Calibration Factors.

Track density (tr/cm^2)	Calibration factor ($tr/cm^2/kBq.m^{-3}.h$)
29,100.00 ±492.00	197.53 ±21.00
30,391.66 ±503.25	206.30 ±22.26
28,033.00 ±483.00	190.29 ±21.00
29,225.00 ±493.49	198.38 ±21.39
29,350.24 ±494.55	199.23 ±21.49
k_{moyen}	198.35 ±21.43

Our value is consistent with that determined by AGBA in the same laboratory [4] in 2015.

3.2. Measurement of Radon Concentration

The radon concentration, expressed as volumetric activity, was determined according to the following equation:

$$C = \frac{\rho - \rho_0}{k.t} \quad (2)$$

Where C represents the radon concentration (kBq.m-3),
k represents the calibration factor (tr/cm^2/kBq/m^{3}h),
t is the exposure duration (h),
and ρ_0 corresponds to the background.

The radon measurements in the various studied sites reveal concentrations ranging from 52.13 ± 6.31 Bq/m^3 to 219.4 ± 24.59 Bq/m^3. Site M14 exhibited the highest concentration, while M19 recorded the lowest concentration. The average radon concentration in the dwellings was 119.69 ±13.36 Bq/m^3.

These results take into account factors such as the exposure period, foundation height, condition of the dwellings, and duration of exposure.

Table 2. *Radon concentrations and corresponding effective doses received in the homes of the Man sites.*

	Foundation height (cm)	Ventilation condition	Radon Concentration (Bq/m^3)	Dose Effective (mSv/y)
M1	40	N.V	171.51 ±18.92	6.89 ±0.76
M2	40	N.V	93.23 ±10.46	3.74 ±0.42
M3	20	N.V	73.12 ±8.11	2.94 ±0.33
M4	80	V	129.34 ±12.15	5.19 ±0.49
M5	30	V	146.47 ±16.06	5.88 ±0.65
M6	30	N.V	189.34 ±20.78	7.60 ±0.83
M7	20	V	101.77 ±11.25	4.09 ±0.45
M8	30	N.V	161.97 ±17.89	6.51 ±0.72
M9	35	N.V	168.83 ±18.63	6.78 ±0.75
M10	50	V	102.18 ±11.74	4.10 ±0.47
M11	20	V	96.11 ±10.68	3.86 ±0.43
M12	40	V	131.81 ±14.83	5.29 ±0.60
M13	40	N.V	92.58 ±10.36	3.72 ±0.42
M14	20	N.V	219.4 ±24.59	8.81 ±0.99
M15	30	N.V	69.24 ±8.37	2.78 ±0.34
M16	10	N.V	121.8 ±13.43	4.89 ±0.54
M17	10	V	91.5 ±10.58	3.68 ±0.42
M18	50	N.V	194.99 ±21.95	7.83 ±0.88
M19	80	V	52.13 ±6.31	2.09 ±0.25
M20	40	N.V	73.47 ±8.12	2.95 ±0.33
M21	50	N.V	68.03 ±7.67	2.73 ±0.31
M22	60	N.V	147.72 ±16.26	5.93 ±0.65
M23	30	V	85.56 ±9.52	3.44 ±0.38
M24	40	N.V	181.64 ±19.92	7.30 ±0.80
M25	60	V	58.39 ±6.56	2.35 ±0.26
M26	50	N.1V	87.98 ±9.93	3.53 ±0.40
	Average		119.69 ±13.36	4.81 ±0.54

1 V:Ventilated, NV: Not Ventilated

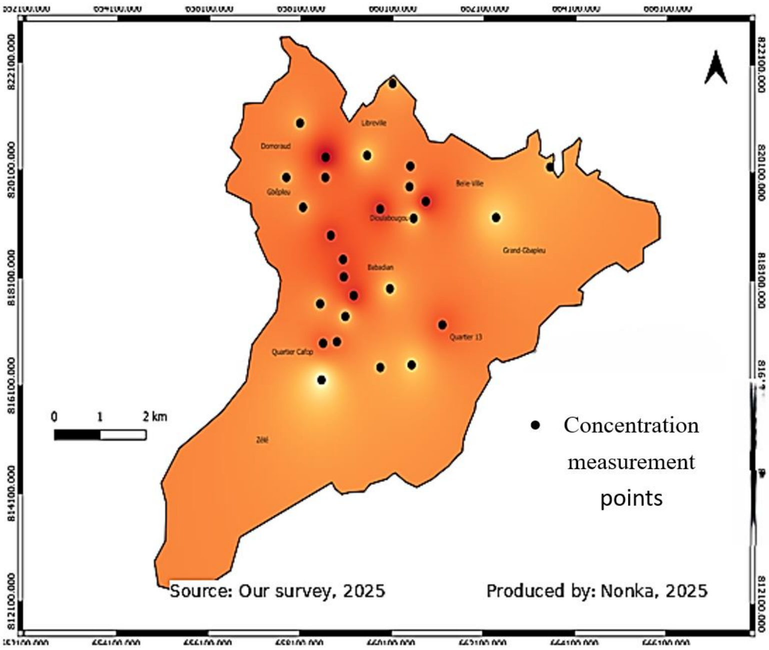

Figure 3. *Radon concentration in the city of Man.*

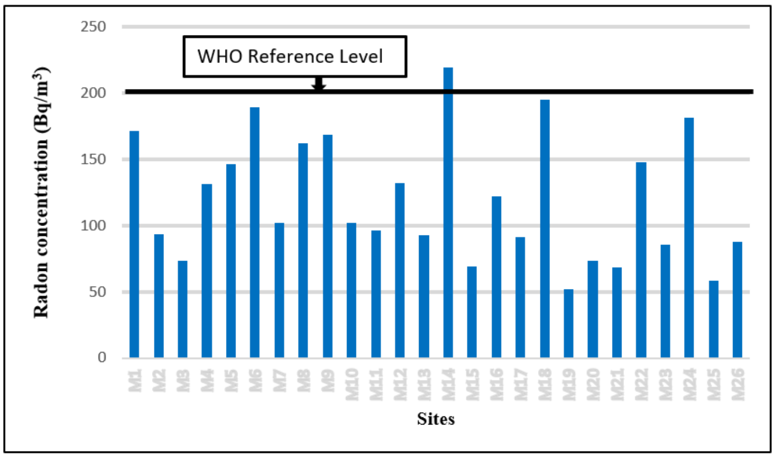

Figure 4. *Distribution of radon concentration (Bq/m^3) in dwellings of city of Man.*

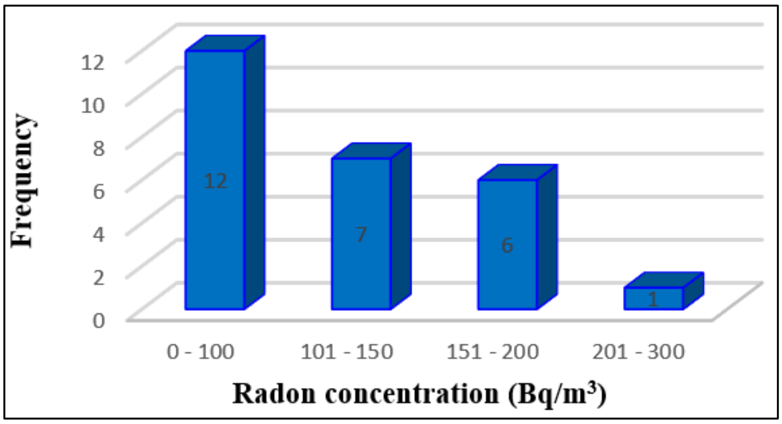

Figure 5. *Frequency of radon concentration in homes at Man sites.*

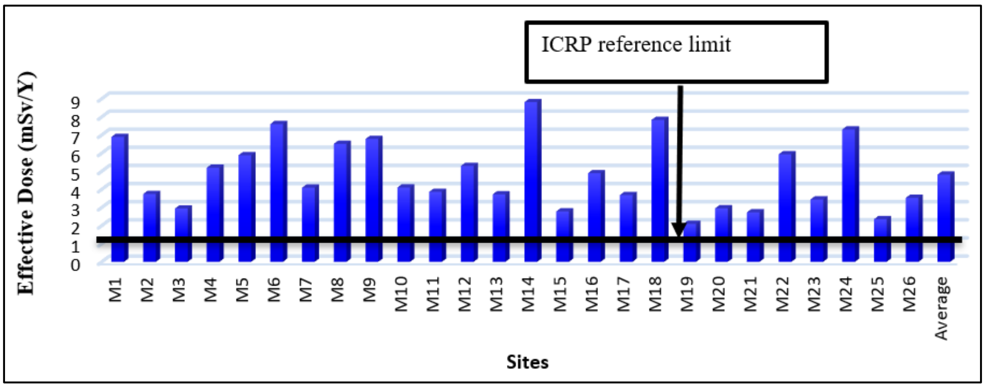

Figure 6. *Effective dose (mSv/y) according to measurement sites.*

The theoretical calculation of the excess risk of lung cancer (ECR) is determined by the following formula:

$$ECR = 0{,}4 \times 0{,}8 \times RiskFactor \times WLM \qquad (3)$$

In this formula, 0.4 represents the equilibrium factor and 0.8 the occupancy factor.

In practice, the excess risk of lung cancer per million people per year, as a function of radon concentration in residential settings, is obtained using Figure 7. This calculation is based on risk estimates derived from studies of miners, which have been extrapolated to the general population [10]. According to ICRP 65, the radiological risk is 8×10^{-5}per mJ h m^{-3}, i.e., about 7×10^{-5}per mSv for home (domestic) exposure. ICRP 65 also recommends, for calculations, assuming an annual residence time of 7,000 hours at home and 2,000 hours in the workplace [11]. The results of our measurements are presented in Table 3.

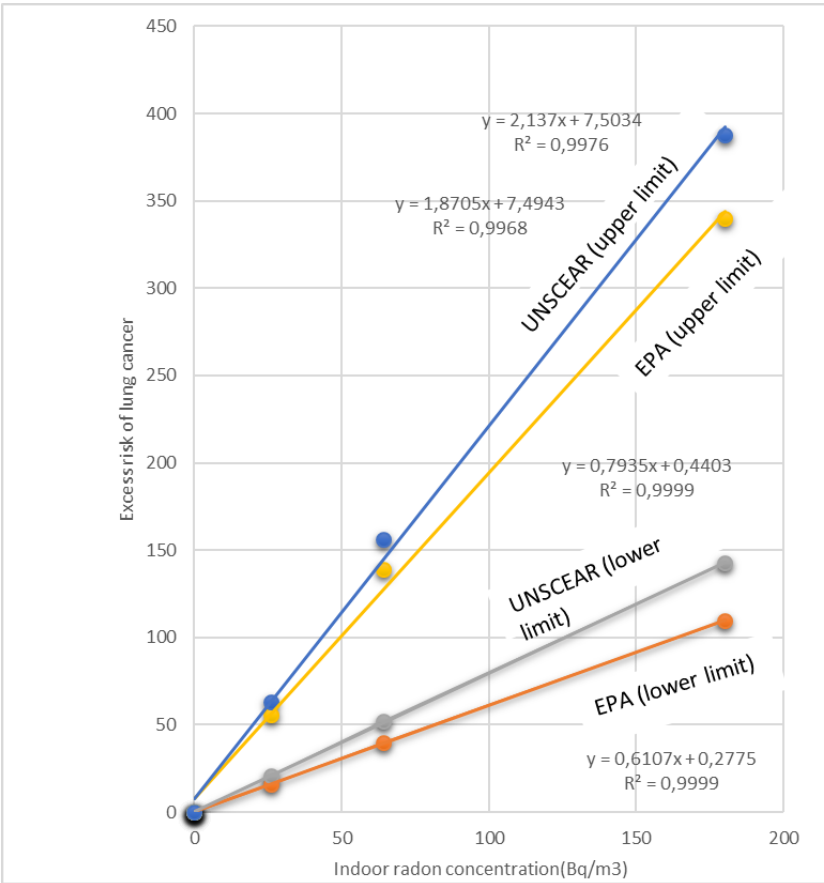

Figure 7. *Determination of the excess lung cancer risk (ECR) as a function of radon concentration [12].*

Table 3. Values of ECR and radiological risk at the measurement sites in the city of Man.

Sites	Radon Concentration (Bq/m^3)	Radiological risk	ECR	
			EPA	UNSCEAR
M1	171.51 ±18.92	(5.32 ±0.53)10^{-4}	105 - 328	137 - 374
M2	93.23 ±10.46	(2.62 ±0.29)10^{-4}	57 - 182	74 - 207
M3	73.12 ±8.11	(2.06 ±0.23)10^{-4}	45 - 137	58 - 156
M4	129.34 ±12.15	(3.64 ±0.34)10^{-4}	80 - 245	104 - 280
M5	146.47 ±16.06	(4.12 ±0.45)10^{-4}	89 - 274	116 - 313
M6	189.34 ±20.78	(5.32 ±0.53)10^{-4}	116 - 354	150 - 405
M7	101.77 ±11.25	(2.86 ±0.31)10^{-4}	62 - 190	81 - 217
M8	161.97 ±17.89	(4.55 ±0.50)10^{-4}	99 - 303	128 - 346
M9	168.83 ±18.63	(4.75 ±0.52)10^{-4}	103 - 316	134 - 361
M10	102.18 ±11.74	(2.87 ±0.33)10^{-4}	62 - 191	81 - 218
M11	96.11 ±10.68	(2.70 ±0.30)10^{-4}	59 - 180	76 - 205
M12	131.81 ±14.83	(3.71 ±0.41)10^{-4}	81 - 247	105 - 282
M13	92.58 ±10.36	(2.60 ±0.29)10^{-4}	57 - 173	73 - 198
M14	219.4 ±24.59	(6.17 ±0.69)10^{-4}	134 - 410	174 - 469
M15	69.24 ±8.37	(1.95 ±0.35)10^{-4}	42 - 130	55 - 148
M16	121.8 ±13.43	(3.42 ±0.38)10^{-4}	74 - 228	97 - 260
M17	91.5 ±10.58	(2.57 ±0.30)10^{-4}	56 - 171	73 - 196
M18	194.99 ±21.95	(5.48 ±0.61)10^{-4}	119 - 365	155 - 417
M19	52.13 ±6.31	(1.47 ±0.18)10^{-4}	32 - 98	41 - 111
M20	73.47 ±8.12	(2.07 ±0.23)10^{-4}	45 - 137	58 - 157
M21	68.03 ±7.67	(1.91 ±0.22)10^{-4}	42 - 127	54 - 145
M22	147.72 ±16.26	(4.15 ±0.46)10^{-4}	90 - 276	117 - 316
M23	85.56 ±9.52	(2.41 ±0.27)10^{-4}	52 - 160	68 - 183
M24	181.64 ±19.92	(5.11 ±0.56)10^{-4}	111 - 340	144 - 388
M25	58.39 ±6.56	(1.64 ±0.18)10^{-4}	36 - 109	46 - 125
M26	87.98 ±9.93	(2.47 ±0.28)10^{-4}	54 - 165	70 - 188
		Average	73-224	95-256

3.3. Evaluation of Effective Dose and Radiological Health Risk

The dose coefficients recommended by the ICRP have evolved with advances in dosimetry and epidemiological research. In 1993, the ICRP recommended 1.4 mSv/mJ h m^{-3} for workers and 1.1 mSv/mJ h m^{-3} for the public. However, Publication No. 115 in 2000 doubled the estimate for the risk of lung cancer, while Publication No. 137 in 2017 raised the dose coefficient to 3 mSv/mJ h m^{-3} for both workers and the public, with a coefficient of 6 mSv/mJ h m^{-3} for specific situations. The Potential Alpha Energy (PAE) and the equilibrium factor (F) are essential parameters for assessing the biological risks of radon and its progeny. The Effective Dose (nSv) can be calculated using the following formula:

$$PAE = 5{,}56\, C \times F.$$

$$D = 0{,}86x3xPAExt$$

$$D = 0{,}86x3x5{,}56xCxFxt \quad (4)$$

Where:

D is the effective dose (nSv)

PAE is the radon exposure level (nJ/m^3)

t is the time an adult spends on average in the building or workplace during exposure (h)

0.86 m^3/h is the standard inhalation rate for an adult

F is the radon equilibrium factor in buildings (0.4)

The radiological risk according to the ICRP 65 is 8×10^{-5} per $mJhm^{-3}$, or approximately 7×10^{-5} per mSv at home.

4. Discussions

The results obtained in the Table 2 show significant variations in radon concentrations from one site to another. The radon concentration level for dwellings varies from (52.13 ± 6.31) Bq/m^3 to (219.4 ± 24.59) with an average of (119.62 ± 13.27) Bq/m^3 (about 120 Bq/m^3). The variation in the values of indoor radon concentrations may be due to the local geology, different ventilation conditions and the use of such building materials.

These values are crucial for assessing radiological risk in each area, as radon is a radioactive gas known for its harmful effects on health, particularly as a major risk factor for lung cancer. Figure 5 represents the frequency distribution of the radon concentration levels among the 26 dwellings of the study area. The radon concentration activity values fall in the ranges 0 -100, 101 -150; 151 - 200 and 201 – 300 Bq/m^3 in 46.15 %, 26.92 %, 23.08 % and 3.85 % of the houses.

The effective dose, which quantifies the impact of radon in terms of radiation on health, also varies depending on the observed concentrations. For example, M14 shows the highest effective dose of (8.81 ± 0.99) mSv, correlated with its maximum radon concentration of (219.4 ± 24.59) Bq/m^3. Conversely, M19 displays the lowest effective dose at (2.09 ± 0.25) mSv/y, corresponding to its lower concentration of (52.13 ± 6.31) Bq/m^3. These results clearly illustrate the linear relationship between radon concentration and radiation exposure, highlighting the importance of continuous monitoring to reduce health risks for exposed populations. The annual inhalation dose due to radon was found to vary from 2.09 to 8.81 mSv/y with an average of 4,81 mSv/y. These differences clearly reveal that areas with high radon concentrations, such as M14, present a significantly higher risk of excess lung cancer.

The measured values in different cities, such as Bingerville and Treichville, show notable similarities in terms of construction materials, as well as similar lifestyles within their populations. The highest radon concentrations are observed in poorly ventilated homes, particularly in rooms located on the ground floor or those with doors and windows that remain frequently closed. As for the measured radon levels, they generally remain below the limits recommended by internationally recognized institutions, such as Canada, WHO, ICRP, EPA, and the EU, except for the city of Boundiali, where the concentration reaches 333 Bq/m^3. However, it should be noted that the concentration measured in San-Pedro exceeds the limit set by the EPA, and that of Boundiali exceeds the thresholds of all the aforementioned organizations, which warrants special attention for this city [4].

The cities of Boundiali and Aboisso present geological factors that promote radon emission, such as the nature of the bedrock and proximity to faults. Dimbokro, on the other hand, is situated in a basin and is subdivided into two geological domains: volcano-sedimentary and granitogneissic.

Table 4. *Comparison of Radon Concentration Limit Values.*

Agencies/Countries	**Radon concentration limits in the dwellings (Bq/m^3)**
Canada	200
WHO	From 100 to 300, with an average value of 200
ICPR 103	300
EPA (USA)	150
Europ Union (EU)	200
Our results	120
Average value mesured in Yopougon [5]	93
Average value mesured in Abobo [13]	113
Average value mesured in Boundiali [4]	333
Average value mesured in Aboisso [4]	144
Average value mesured in Dimbokro [4]	87
Average value mesured in San-Pedro [14]	169

Agencies/Countries	Radon concentration limits in the dwellings (Bq /m^3)
Average value mesured in Treichville [15]	139

The histogram (Figure 8) of radon concentrations measured in selected Ivorian towns shows a right-skewed distribution. Most of the monitored locations display values ranging from 87 to 170 Bq/m^3, whereas Boundiali stands out with a markedly higher concentration (333 Bq/m^3). This extreme value inflates the mean and widens the overall dispersion, an effect consistent with the local geological substrate, characterised by bands of schists, migmatites, and plutonic rocks [4].

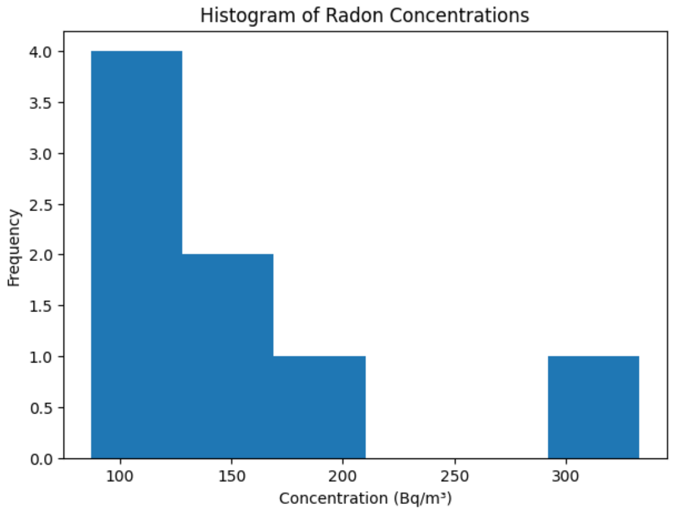

Figure 8. *Histogram of radon concentrations in selected cities in Côte d'Ivoire.*

Table5. *Characteristics of the studies included. [16].*

Author	Year	Country	Measurement period (days)	No. of dwellings	Average radon concentration (Bq/m^3)
Mosupya and al	2019	South Africa	90	5	105
			90	7	41
Kgabi and al	2009	South Africa	21	1	1115.92
			25	1	1704.22
Ndjana and al	2019	Cameroon	90	26	134
			90	20	131
Opoku-Ntim and al	2019	Ghana	180	40	101.35
Our results	2025	Côte d'Ivoire	90	26	120

Indoor radon concentrations measured in dwellings located near gold mine tailings in several African countries are comparable to those recorded in the city of Man (Côte d'Ivoire). However, the values reported in the locality of Botshabelo (South Africa) are markedly higher [16].

The excess cancer risks (ECR) calculated using the EPA and UNSCEAR coefficients highlight significant differences between the sites studied. For the EPA model, values range from 32 to 98 at M19 and from 134 to 410 at M14. According to UNSCEAR, they vary from 41 to 111 at M19 and from 174 to 469 at M14. These results confirm that higher radon concentrations are associated with increased radiological risk, in line with the findings reported in numerous studies on radon in residential environments. The use of EPA and UNSCEAR models therefore provides a reliable basis for guiding public policies on radon management and public health protection.

Finally, it should be noted that while the average radon concentration remains generally below reference levels, the risk estimated using the EPA model exceeds the recommended limit, which warrants particular attention.

The results stress the need for increased vigilance and preventive actions to reduce radon exposure, particularly in high-risk areas such as M14. Dwellings with inadequate ventilation exhibit markedly higher radon concentrations.

5. Conclusion

The results of the present study provide a database on indoor radon level in the city of Man. In this study, we determined the calibration factor of LR-115 type Solid-State Nuclear Track Detectors (SSNTDs), a necessary preliminary step for obtaining a reliable estimate of indoor radon activity concentration. The method is based on the recording, by the SSNTDs, of tracks produced by alpha particles emitted during radon decay. Measurements conducted in the city of Man indicate an average concentration of 120 Bq/m^3. Although this value remains generally below internationally recommended reference levels, enhanced vigilance is required for certain dwellings where concentrations reach or exceed 150 Bq/m^3, particularly at sites M1, M6, M8, M9, M14, and M18. The effective dose values range from 2.09 to 8.81 mSv/y, with an average of 4.81 mSv/y. This study highlights the need for continuous monitoring of radon concentrations in certain households in the city of Man, due to the occasionally elevated levels observed. The recommended measures include improving ventilation, strengthening building airtightness, and using materials with low radon permeability. The use of active detectors is also considered relevant to ensure regular and reliable monitoring of concentration variations. Finally, raising awareness among local authorities and providing training for building professionals are essential levers to enhance the effectiveness of radon-risk reduction measures.

Abbreviations

ARSN	Radiation Protection, Nuclear Safety and Security
IARC	International Agency for Research on Cancer
ICRP	International Commission on Radiological Protection
IREN	Institute for New Energies Research
LASMES	Laboratory for Matter, Environmental and Solar Energy Sciences
LR-115	Lexan Resin 115
M	Man (city)
Max	Maximum
Min	Minimum
mSv	Millisevert
NaOH	Sodium Hydroxide
NIS	National Institute of Statistics
NV	Not Ventilated
PAE	Potential Alpha Energy
Rn-222	Radon-222
SSNTD	Solid-State Nuclear Track Detectors
UFHB	University Felix Houphouet Boigny
UNA	University Nangui Abrogoua
V	Ventilated
WHO	World Health Organization

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Author Contributions

Gnionnihindjoue Romaric Nonka: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Methodology, Supervision, Validation, Visualization, Writing – original draft, Writing – rewiew & editing

Aka Antonin Koua: Conceptualization, Methodology, Supervision, Validation, Visualization, Writing – rewiew & editing

N'guessan Guy Leopold Oka: Conceptualization, Methodology, Supervision, Visualization, Validation, Writing – rewiew & editing

Conflicts of Interest

The authors declare no conflicts of interest.

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Biography

Gnionnihindjoue Romaric Nonka is a Nuclear Physicist and Expert in the implementation of Nuclear Safety measures, responsible for Nuclear Protection, Safety, and Security at the Authority for Radiological Protection, Safety, and Security (ARSN). Currently, I am pursuing a PhD at the Laboratory for Matter, Environmental, and Solar Energy Sciences (LASMES) at Felix Houphouet-Boigny University (UFHB) in Abidjan, Côte d'Ivoire.

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N'guessan Guy Leopold Oka is a nuclear physicist and a Qualified Expert in Radiation Protection. He is currently the Deputy Director of Nuclear Safety and Security of the Radiation Protection, Nuclear Safety and Security Authority (ARSN, Regulatory Body for Nuclear Safety and Security of Côte d'Ivoire) and Sworn Inspector of ARSN. He is also a Research Associate at the Laboratory of Nuclear Energy and Radiation Protection of the Institute for Research on New Energies of the University of Nangui-Abrogoua. He was Head of Radiation Protection Services at the Sub-Directorate of Protection against Ionizing Radiation (SDPRI) of the National Public Health Laboratory (LNSP) from 2002 to 2008 and then Manager of the "Radiation Protection and Environment Consulting"

Research Field

Gnionnihindjoue Romaric Nonka: Study of radon concentrations in the air of dwellings, Radioecology, Optimization of nuclear security measures for Major Public Events.

Aka Antonin Koua: Evaluation of the Radiological quality of some foods consumed and NOMRs management in Côte d'Ivoire, Study of optimization of doses.

N'guessan Guy Leopold Oka: Evaluation of the Radiological quality of some foods and drinking waters consumed in Côte d'Ivoire, Study of optimization of doses, Optimization of nuclear security measures for Major Public Events.