IBSEN Fourth Quarterly Newsletter

April 2025

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Executive summary

This fourth Quarterly Newsletter addresses the activities of the International Biological Security Education Network (IBSEN) following its first year and LMU BSRC's future projects on strengthening global biosecurity education.

The feature column within this Newsletter analyses the work of the International Federation of Biosafety Associations (IFBA). This Special Topic examines the achievements and challenges of IFBA and draws implications for the work of the IBSEN.

This Newsletter also details some exciting new developments and activities undertaken by LMU BSRC staff as well as highlighting some of the latest initiatives in biosecurity education from other regional and international actors. The section News in Global Biosecurity Education is designed for this purpose.

As part of the IBSEN, the LMU BSRC encourages any people who are interested in biosecurity education to contact the IBSEN team and discuss potential collaborations.

1. Note from Professor Lijun Shang, Director of the Biological Research Centre at the London Metropolitan University

It has been a really busy time since our newsletter number 3 was published. The BTWC has celebrated its 50 years since entering into force, and lots of reflection, discussion and vision for the next 50 years have been passionately expressed worldwide, including the new series of webinars on artificial intelligence organised by UNIDIR. We certainly enjoyed these events, now as we set out upon the second stage of the IBSEN work plan, we are moving at speed in implementation. With the new member of staff joining the team, we have quickly carried out an analysis of the work of International Federation of Biosafety Associations (IFBA) as the special topic of this newsletter number 4.

As a large not-for-profit nongovernmental organization, IFBA plays a very important role in addressing concerns about biosafety globally, and specifically its certification programmes have and are continuously warranting the competency of biosafety professionals in the safe and secure handling of infectious disease agents. Its new initiatives developed in recent years focused on specific regional areas, dedicated to various stakeholders, and employed some new methodologies that were supported by generous feasible government and partners'

funds. All these initiatives further complement the broad range of IFBA's work and provide new opportunities for implementing its strategies. We think it is important to analyse IBFA's work, especially its coordination of a global partnership and to learn useful practical tips for IBSEN. These have been summarised in the conclusion part of this specific topic.

We are concerned that there is still a great need for training and education on biorisk management in many countries as evidenced by a recent survey paper on assessing the training needs on biorisk management for medical and veterinary laboratory staff in Vietnam. We also feel concerned by another survey study with 127 researchers at a prestigious U.S. university who directly manipulate DNA or RNA in living organisms, cells, and/or viruses. The study found that U.S. life scientists have significant room for improvement in their capacity for proactive biorisk management, particularly regarding biosecurity and dual-use information risks. This is a country where there has been significant extended discussion of the problem of dual use and biorisk management. Therefore, we are going to hold a special webinar by our research assistant Kathryn Millett re-addressing the dual-use research of concern in May 2025. Further details will be reported in our next newsletter.

Another important piece of work that we initiated is a novel project in the UK (the Biosecurity School Project) in which we aim to introduce biosecurity concepts in high schools. Research Assistant Olivia Ibbotson is in charge of project delivery and conducted the launching event at the beginning of this month. We will report further in our next newsletter.

We have continuously expanded our network and recently further enhanced our contacts by exploring further partnership with the Observatorio de Riesgos Catastróficos Globales in Mexico. We are planning to hold another workshop following the policy workshop last March to discuss further the integrated approach to biosecurity education which is evidenced in our recent publication in the journal *Applied Biosafety* (detailed below).

As always, please feel free to contact us if you have any questions and ideas to collaborating.

2. Special Topic: Creating biosecurity educational initiatives and forging sustainable career paths

2.1 Introduction

Life scientists and practitioners work at the frontlines of the life sciences, driving discovery and innovation. Educating life scientists and practitioners and fostering responsible research practices and scientific integrity are among the most effective strategies for managing the biosafety and biosecurity risks that can accompany discovery and innovation. Traditionally, biosafety (designed to prevent the accidental release of a pathogen from a laboratory) has gained more attention than both biosecurity (designed to prevent the malicious misuse of pathogens and biotechnology) and dual-use research. However, educational efforts should equally be implemented across the entire biorisk management spectrum[1] to best nurture a global culture of biosafety, biosecurity, ethical, and responsible conduct in the life sciences, and help recognise and understand dual use and ethical issues.

Initially specifically focused on promoting and building competencies and skills in laboratory biosafety - a critical component of biorisk management as whole – the International Federation of Biosafety Associations (IFBA) strives to create opportunities for individuals to build technical skills and competences in a range of biorisk management specialties and works towards professionalizing biosafety and biosecurity as distinct career pathways. As managing biorisks has moved beyond biosafety to encompass and connect laboratory biosecurity and dual-use governance under one overarching framework, so has the IFBA expanded their efforts in these areas.

This article examines the work of the IFBA in building technical skills and competencies under the rubric of biorisk management, analyses its achievements and challenges, and draws lessons for IBSEN.

[1] Biorisk management is defined here as “An integrated, overarching approach to address the risks associated with the life sciences research enterprise, from accidents and inadvertent actions to deliberate misuse. Biorisk management relies on three core pillars: biosafety, laboratory biosecurity and the oversight of dual-use research. Biorisk management involves the quantitative or qualitative forecasting and evaluation of the probability of harm occurring and subsequent consequences (risk assessment), together with the identification and implementation of technologies, measures, or practices to avoid or minimize their likelihood or impact (risk mitigation). World Health Organization. *Global Guidance Framework for the Responsible Use of the Life Sciences: Mitigating Biorisks and Governing Dual-Use Research*. (World Health Organization, 2022).

2.2 Short history of the work of the IFBA

The International Federation of Biosafety Associations (IFBA) is not-for-profit nongovernmental organization that brings together regional and national biosafety associations from across the world under one umbrella. The IFBA membership currently encompasses 54 biosafety association members that spans scientists and other laboratory personnel, engineers, academics, policymakers, architects and biorisk management professionals, and works together towards the three common goals of:

- Developing biosafety and biosecurity strategies and guidelines;
- Advancing biorisk management practices and procedures; and
- Certifying the competency of biosafety professionals in the safe and secure handling of infectious disease agents.[2]

Established in late 2001 following the US anthrax letter attacks, the IFBA was originally conceived as the International Biosafety Working Group (IBWG) by members of the American Biological Safety Association (ABSA) and the European Biosafety Association (EBSA) in response to a perceived need to create a federation of associations that could look at, and act on, the priorities of the community as a whole more globally.

At its inception, the IBWG identified five key strategic objectives:[3]

1. Creation, coordination, and empowerment of an international biosafety advisory body;
2. Establishment, documentation, maintenance, and communication of standardized biosafety protocols and procedures;
3. Establishment of linkages with key partners;
4. Development of an inventory of biosafety laboratory and field best practices and sharing expertise among national biosafety organizations;
5. Supporting applied biosafety science and research.

In 2010, the IBWG evolved into the International Federation of Biosafety Associations (IFBA), based in Canada, with a primary focus on its capstone programme of the development of professional technical certifications in key aspects of biorisk management. Since its establishment, the IFBA has expanded its efforts beyond its growing portfolio of professional certifications to include more initiatives in support of building and mentoring a sustainable

[2] IFBA, What We Do, https://internationalbiosafety.org/who-we-are/what-we-do/#:~:text=The%20IFBA%20works%20in%20partnership,handling%20of%20infectious%20disease%20agents.
[3] IFBA, International Biosafety Working Group. https://internationalbiosafety.org/wp-content/uploads/2022/03/History-of-IFBA.pdf. See also: ABSA News, International Biosafety Working Group, https://internationalbiosafety.org/wp-content/uploads/2022/03/History-of-IFBA.pdf.

and competent community of biorisk management professionals and establishing biosafety and biosecurity as a distinct and accessible career path.

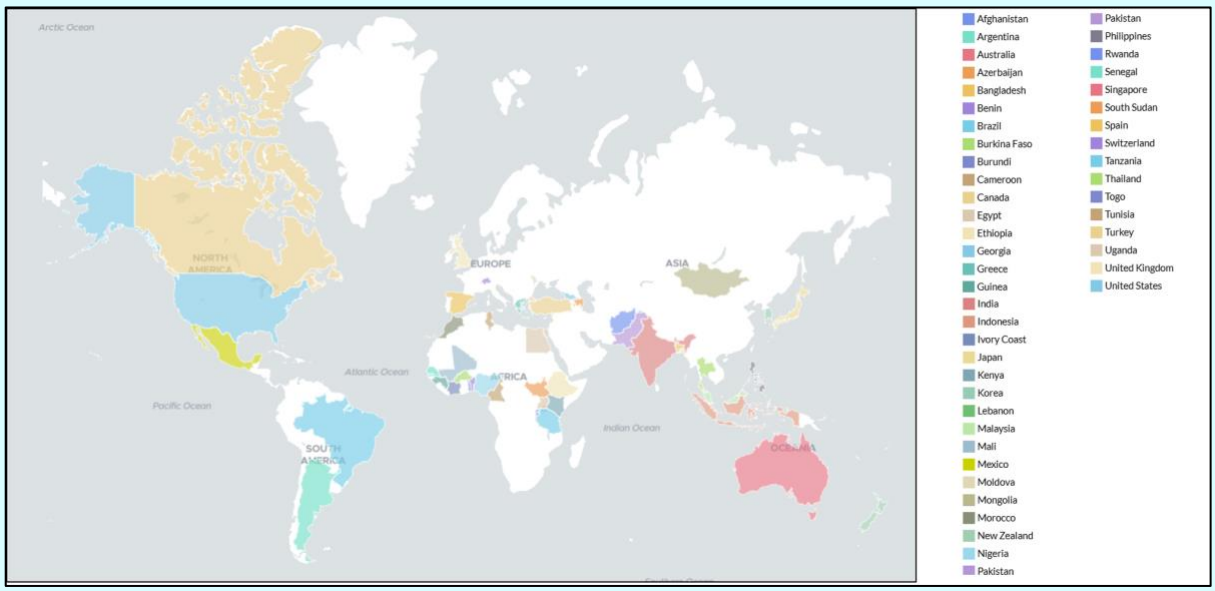

Figure 1. Map of IFBA national biosafety association members worldwide (adapted from IFBA information provided by email)

The IFBA now counts 54 national member associations, in addition to regional associations and other regional professional biosafety networks such as ABSA International, the Asia-Pacific Biosafety Association and the European Biosafety Association.[4] It has a lean central staff of 8-9 people and is governed by a three-year rotating Board of Directors drawn from its member associations to ensure an equitable spread both geographically and in terms of technical expertise.

2.3 **Overview and evolution of IFBA biosecurity and biosafety initiatives**

The IFBA's capstone initiative is its professional certification programme that currently provides a suite of certifications for seven key technical disciplines related to managing biological risks. In response to stated needs for its member community, the IFBA has recently further diversified its efforts to move beyond certification and biosafety and biosecurity awareness-raising to the design and implementation of an undergraduate degree course in

[4] IFBA, Member Associations, https://internationalbiosafety.org/member-associations/.

biosafety and biosecurity, as well as leadership in championing youth voices and other marginalised voices in international biosafety and biosecurity dialogues.

2.3.1 **Professional certifications in managing biological risks**

In line with its original vision, the development of professional certifications in technical disciplines associated with biorisk management remains IFBA's flagship enterprise. With a predominant focus on aspects of laboratory biosafety, the programme was developed to help ensure individuals working with biological materials have demonstrated competencies in their safe and secure handling as part of overall efforts to reduce biosafety and biosecurity risks.[5] The IFBA's certification programme remains the sole internationally recognised programme certifying individuals in technical disciplines related to managing biological risks.

Starting with the Biorisk Management professional certification launched in 2011, the IFBA has since developed a portfolio of six further professional certifications ranging from biosecurity and biological risk assessment to biocontainment facility design and biological waste management (See *Figure 2.*)

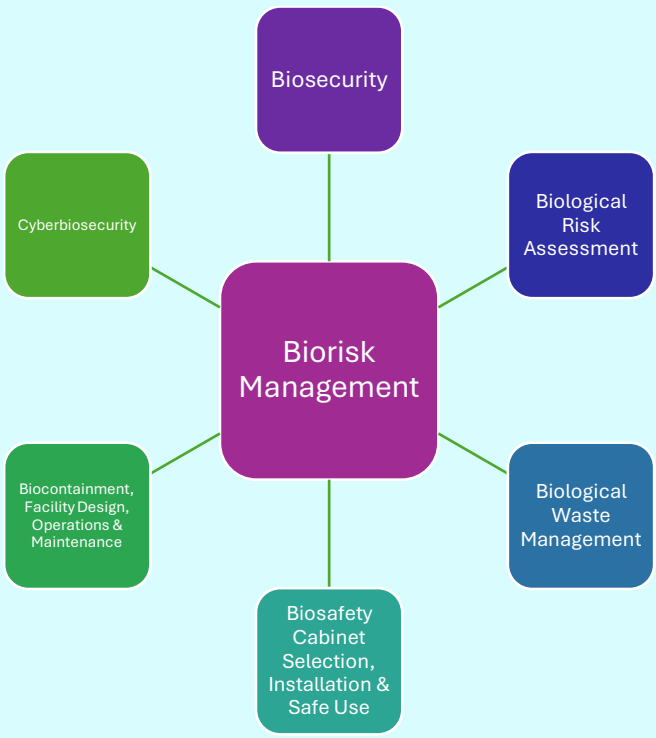

Figure 2. IFBA list of available professional certifications, as of March 2025.[6]

[5] IFBA, Certification https://internationalbiosafety.org/certification/certification/.
[6] IFBA, https://internationalbiosafety.org/certification/prepare-for-an-exam/.

Successfully completing the core Biorisk Management certification is the starting point for all candidates and a pre-requisite for undertaking further certifications. Each certification provides independent assessment of an individual's competency, and a standardised measurement of the knowledge and skills expected of professional in specific disciplines. Although some IFBA members independently conduct certification training, the IFBA programme does not directly provide any training or coaching for the exams to protect the integrity of the certifications. Recertification – which is required after five years – requires candidates to demonstrate a mix of ongoing work experience and professional development such as maintaining and expanding knowledge through participation in meetings, undertaking further training and article authorship, as well as actively contributing to the biorisk community as a whole through activities such as mentorship roles, creation of training tools and delivering training.[7]

Each certification is developed through a rigorous process taking approximately 10 months whereby a dedicated Certification Body is supported by geographically diverse Technical Committees to create certification content (called the 'Body of Knowledge' (BOK)) which determines the exam blueprint.[8] Psychometric specialists help design and guide the process to ensure validity, reliability and fairness of each certification and train technical committee members. The technical certification exams are divided into relevant 'Domains' of knowledge that form the overall blueprint of the exam that applicants must master. Applicants then demonstrate their learning via correctly answering at least 70% of the multiple-choice questions that test their situational knowledge and judgement based on the BOK, with each question linked to one of the statements as laid out in each Domain. For example, the BOK for the Biosecurity certification contains six domains covering international conventions, guidelines and standards, biorisk assessment, physical biosecurity measures inside the laboratory, as well as dual-use and bioethics.

[7] IFBA, Maintain your Certification, https://internationalbiosafety.org/certification/maintain-your-certification/.
[8] IFBA, IFBA Professional Certification Program Process 2025, presentation provided by IFBA via email.

Professional Certification in Biosecurity exam blueprint (passing score – 73%)	
Domain	**Number of questions**
A) Biosecurity Conventions, Guidelines and Standards	28
B) Biosecurity Risk Assessment & Program Management	20
C) Physical Biosecurity Measures	13
D) Pathogen Accountability	8
E) Personnel Reliability	12
F) Dual-Use, Bioethics & Evolving Biosecurity Threats	19

Figure 3. Body of Knowledge for the Professional Certification in Biosecurity[9]

As part of its Phase 5 'Expansion in the Post-Covid Era', the IFBA is actively working to continue to develop the certification program in consultation with the international stakeholder community.[10] The global Covid-19 pandemic has catalysed the demand for certification programmes among biorisk management practitioners leading to consideration of new potential future certifications, as identified by the community, including, for example, animal and veterinary biosafety and on ISO 31001 which provides principles and guidelines for risk management.[11]

While certification costs $200 USD per certification to meet IFBA administration costs (re-certification costs $150 USD), the IFBA strives to make the certifications more globally accessible, particularly in lower resource areas, through a variable fee structure that grants

[9] IFBA, Prepare for an Exam, https://internationalbiosafety.org/certification/prepare-for-an-exam/.
[10] IFBA, IFBA Professional Certification Program Short-term Youth Fellowship, https://internationalbiosafety.org/wp-content/uploads/2023/05/IFBA-Certification-Youth-Fellowship-Announcement.pdf.
[11] Interview with IFBA, 24 March 2025.

discounts for applicants from eligible countries.[12] Exams can be undertaken in person or online and are independently invigilated by approved exam proctors.

The demand, and high regard, for the professional certifications since the launch is clearly evidenced by the level of global participation. As of March 2025, over 2360 distinct certifications have been awarded across 110 countries. Unsurprisingly, as the baseline certification, Biorisk Management has by far enjoyed the most participants (1175), making up 67% of certifications awarded, followed by the certifications in Biosecurity (239 – 14%), Biowaste Management (140 – 8%), and Biological Risk Assessment (95 – 5%), with Biosafety Cabinet Selection, Installation and Safe Use (44), Biocontainment Facility Design, Operations and Maintenance (29) and Cyberbiosecurity (40) all attracting 2% each (see **Annex 1** for a full breakdown of certifications awarded in each category). The relative low level of participation for the latter certifications can be explained by the highly specialised nature of each one and that Cyberbiosecurity, launched in 2023, is the newest addition to the certification portfolio and remains a very new, not well-known and evolving subject.

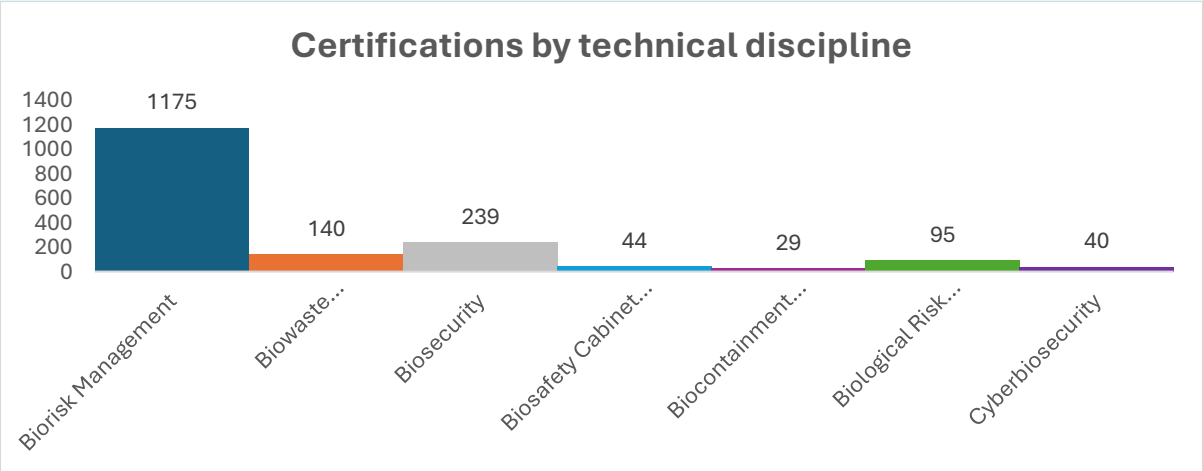

Figure 4. Number of professional technical certifications awarded according to topic.

There is a clear disparity between the interest and value placed upon professional certifications in different global regions, with participation in Asia and the Pacific (51%) totalling more than all the other regions combined. Africa also displays a high level of interest in professional certifications with 34% of all certifications across all technical disciplines worldwide, followed by Europe (6%), Latin America and the Caribbean (5%) and North America (4%). See *Figure 5* below.

[12] https://internationalbiosafety.org/certification/apply-and-take-an-exam/.

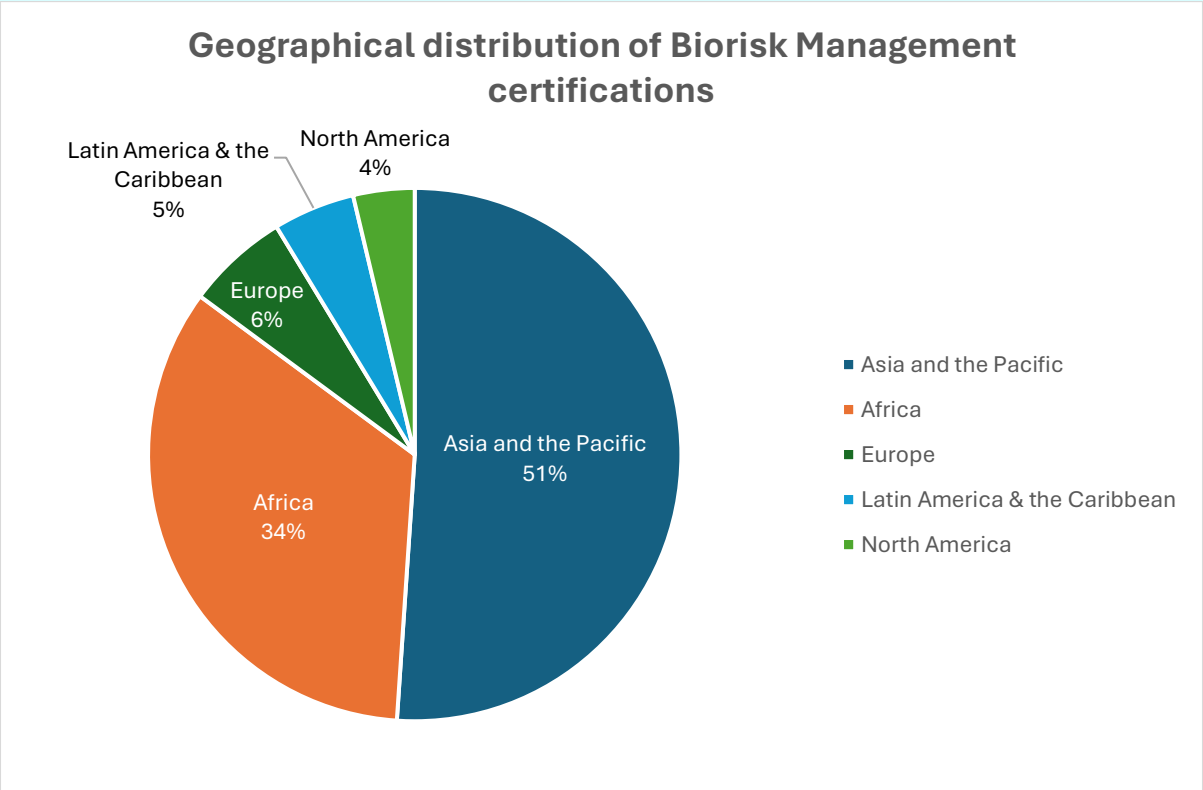

Figure 5. Geographical distribution of total certifications worldwide as a percentage

This difference can often be attributed in large part to the focus of funding partners, such as the US Biosecurity Engagement Program grants to hold training courses in the Philippines and funding from Global Affairs Canada focusing on East Africa.[13] Of equal importance, however, are the positive attitudes in low- and middle-income areas where professional certifications are viewed as an essential component of proving one's technical competence. In African countries, for example, professional certifications are seen as increasingly valuable due to a confluence of factors, including the growing demand for specialised skills and the need for continuous professional development, and the recognition of certifications by employers.[14]

[13] While there is no specific data currently available correlating sponsorship with the uptake of certifications in specific countries and regions, projects linking sponsors with country and regional initiatives to support certification are evident. For example, in 2020, certification opportunities were provided to members of the Mali Association for Biosafety and Biosecurity with financial support from Global Affairs Canada (see: https://internationalbiosafety.org/who-we-are/sponsors-donors/connecting-sponsors-with-candidates/anthony-abraham-copy/). Further similar events are described here: https://internationalbiosafety.org/who-we-are/sponsors-donors/connecting-sponsors-with-candidates/.

[14] R. Al-Maghraby. Professional Certificates versus Academic Education in light of Market Needs. Pan-African Conference Project Management Conference (2022). https://www.pan-african-pmc.africa/wp-

Future initiatives to promote uptake of technical certifications and build overall competences in regions with lower certification levels are already planned for Latin America and the Caribbean as part of a new scheme to provide a mentorship programme in the region.[15]

2.3.2 **IFBA initiatives in biorisk management education**

In recent years, IFBA has initiated several initiatives in specific regional areas, for dedicated stakeholders, and by new methodologies supported with feasible government and partners' funds. All these initiatives complement and broaden the range of IFBA's work and provide new opportunities for implementing its strategies.

2.3.2.1 BSc. in Biosafety and Biosecurity (MMUST, Kenya)

As part of the IFBA's mission to formalise biosafety and biosecurity career paths to help create a sustainable workforce in biorisk management, it has also invested significant effort in developing an undergraduate degree course within the higher education system to address the global shortage of biorisk management professionals that became apparent following the Covid-19 pandemic.[16]

With funding and technical assistance from a range of partners crossing government, venture capitalist firms and private companies, the IFBA partnered with the Masinde Muliro University of Science and Technology (MMUST) in Kenya to develop and pilot a new undergraduate BSc. degree programme in Biosafety and Biosecurity.[17]

Launched in 2024, this four-year degree programme spent three years in development before admitting its first cohort of 21 students in January 2024. The programme builds upon some

content/uploads/2022/11/Rania-Paper-Professional-Certificates-versus-Academic-Education-in-light-of-Market-Needs.pdf#:~:text=Professional%20certificates%20can%20be%20complementary%20to%20academic,when%20the%20academic%20study%20is%20not%20affordable.

[15] IFBA, IFBA Latin America and Caribbean (LAC) Mentorship Program (2024-2025), https://internationalbiosafety.org/ifba-latin-america-and-caribbean-lac-mentorship-program-2024-2025/.

[16] IFBA, Addressing the Global Shortage of Biosafety and Biosecurity Professionals through Education, https://internationalbiosafety.org/wp-content/uploads/2022/10/IFBA-Biosafety-Education-White-Paper.pdf, p. 1.

[17] Funding for the project was obtained from the Weapons Threat Reduction Program of Global Affairs Canada. Other project partners Pandemic Tech, NuAire and Germfree provided support for student recruitment and technical guidance in the development of course materials, https://internationalbiosafety.org/wp-content/uploads/2022/10/IFBA-Biosafety-Education-White-Paper.pdf, p. 6.

of MMUST's existing curricula within its Department of Medical Laboratory Sciences - such as the safe and secure handling of biological materials - requiring all students to spend the first two years studying core courses in microbiology and related disciplines, and later specialising in biosafety and biosecurity modules, practical laboratory and field experience and ending with a capstone project, potentially including key government ministries including the Ministry of Health and Ministry of Labor.[18] Among key subjects students will cover are biological risk assessment and mitigation, laboratory design and biocontainment, biological non-proliferation, and cyberbiosecurity.[19]

Supplementing MMUST's own staff with expertise in biosafety, biosecurity, medical laboratory science, and laboratory quality assurance, the course will also draw upon outside technical expertise in the latter years from the Technical University of Kenya, the University of Health and Allied Sciences in Tanzania, the University of British Columbia's Safety and Risk Management Services and others.

It is hoped that the lessons learned from this pilot degree programme will provide the basis for further rollout to other universities across Africa and beyond. As of March 2025, no new plans were in place to admit a second consecutive year of students to better focus on the inaugural cohort and assess and adapt the course as necessary.[20] In the long term, it is expected that the course not only trains young scientists to be able to enter biosafety and biosecurity professional careers and raises awareness and interest in such careers, but also helps establish a 'sustainable and diverse network of biosafety/biosecurity professionals… established to meet the current and future needs of the African and global biosafety and biosecurity workforce.'[21]

2.3.2.2 Online and other non-traditional educational initiatives

The IFBA has also long been involved in other diverse and less traditional or formal educational initiatives to support biosafety and biosecurity awareness-raising and education. For example, IFBA regularly collaborates with partners such as private companies to create best practice

[18] IFBA, Addressing the Global Shortage of Biosafety and Biosecurity Professionals through Education, https://internationalbiosafety.org/wp-content/uploads/2022/10/IFBA-Biosafety-Education-White-Paper.pdf, p. 7.
[19] IFBA, Undergraduate BSc. Degree in Biosafety and Biosecurity, https://internationalbiosafety.org/wp-content/uploads/2023/05/MMUST-BSc.-Biosafety-Biosecurity_6-2023.pdf.
[20] Interview with IFBA, 24 March 2025.
[21] IFBA, Addressing the Global Shortage of Biosafety and Biosecurity Professionals through Education, https://internationalbiosafety.org/wp-content/uploads/2022/10/IFBA-Biosafety-Education-White-Paper.pdf, p. 8.

videos,[22] and hold train-the-trainer workshops to rapidly increase the cadre of certified biosafety professional across different regions.[23]

In 2019, IFBA contributed a paper-based laboratory escape game scenario to a small project that aimed to raise awareness about biosafety and biosecurity at the 2019 International Genetically Engineered Machine competition (iGEM) Giant Jamboree in Boston, USA.[24] Similarly, in February 2025, IFBA launched its own online adventure game, entitled *Biorisk Adventure*, as part of a pre-conference event in advance of the IFBA Global Voices Conference that took place in February 2025.[25] The game was designed as a game-based learning tool for players to understand more about the risk-based approach for managing biological risks developed in the *WHO 4th Edition Laboratory Biosafety Manual*. Using real-life scenarios, the game requires players to select risk mitigation measures they feel are appropriate in different scenarios depending on the nature of the pathogens involved and the laboratory activities, local geographic conditions and available resources.

2.3.3 **Support for educational, awareness-raising and capacity building initiatives**

In addition to the IFBA's flagship certification programme and leading role in the MMUST undergraduate course are its associated initiatives to support young professionals, build biosafety and biosecurity champions, and to promote 'a global professional culture of accountability and inclusivity' through the work of its Equity-Focused Coordinating Committee (ECC).

2.3.3.1 Youth and young professional community-building, mentoring and education

Recent years has seen a growing movement calling for increased opportunities for young professionals to more easily contribute to international biosecurity discussions and for the creation of sustainable biosecurity career pathways.

In 2021, in keeping with its drive to help develop distinct career on-ramps and pathways in the field of biorisk management, the IFBA sponsored the *Youth Declaration in Biosecurity* which provided policy recommendations from the next generation of biosecurity leaders to

[22] Https://internationalbiosafety.org/nuaire-grant-for-ifba-professional-certification-biosafety-cabinets/.
[23] IFBA, SB3 in collaboration with the IFBA conduct a sub-regional Laboratory Biosafety Workshop for 9 countries in Latin America, https://internationalbiosafety.org/sb3-in-collaboration-with-the-ifba-conduct-a-sub-regional-laboratory-biosafety-workshop-for-9-countries-in-latin-america/.
[24] Interview with Biosecure, 26 March 2025.
[25] Https://ifbabioriskadventure.org/.

create opportunities for youth participation in global biosecurity. [26] Evolving from the Youth for Biosecurity Initiative implemented by the United Nations Office for Disarmament Affairs (UNODA), a group of young scientists developed a set of policy recommendations designed to encourage and facilitate greater youth inclusion in international biosecurity negotiations, as well as create a clear pipeline for biosecurity career advancement.[27]

Among its recommendations with the Declaration, endorsed by the IFBA, was the need for the inclusion of Biorisk Management education as part of undergraduate and post-graduate curricula, in addition to the provision of workshops, training, free online courses and other educational resources citing the 'urgent need to provide training scholarships to low- and middle-income countries (LMICS) to advance and strengthen professional skills.' The Declaration further emphasised the need to increase biosafety and biosecurity awareness through diverse means, such as informational events, open-access publications and the use of social media. As follow-up to the Declaration, IFBA staff contributed to published articles calling for the creation of opportunities for life scientists and related experts to participate meaningfully in biosecurity diplomacy in recognition of the need to build and invest in the next generation of biosecurity leaders.[28]

As further investment in youth participation and empowerment, the IFBA inaugurated a new short-term fellowship in 2023 for a young, certified professional to work on developing its certification programme. With funding from the US Biological Threat Reduction Program and Sandia National Laboratories, the fellowship aimed to strengthen and help provide future direction for the certification program as it prepared to launch its *Phase 5 Expansion in the Post-Covid Era*.[29] Further annual fellowships are planned.

Another successful initiative supporting and building a community of young professionals in the international biosafety and biosecurity community worldwide since 2019 has been the annually renewing Global Mentorship Program. This programme aims brings together experts as mentors and champions with emerging professionals as mentees in monthly discussions and activities relating to biosafety, biosecurity, and biorisk management. Mentors—who possess at least two IFBA Professional Certification—help guide mentees in obtaining their own certifications, and work with them to write technical briefs on international biorisk management issues and on group projects and papers. The mentorship programme

[26] UNODA, Youth Declaration for Biosecurity, https://disarmament.unoda.org/bwc-youth-declaration-for-biosecurity/.
[27] *Ibid*.
[28] T. Alexanian *et al*. The Next Wave of Biosecurity Experts: Young Scientists Need a Better Path into Global Diplomacy. *Science and Diplomacy*, 22 February 2022. https://www.sciencediplomacy.org/article/2022/next-wave-biosecurity-experts-young-scientists-need-better-path-global-diplomacy.
[29] IFBA, IFBA Professional Certification Program Short-term Youth Fellowship, https://internationalbiosafety.org/wp-content/uploads/2023/05/IFBA-Certification-Youth-Fellowship-Announcement.pdf.

compliments other initiatives such as the UNODA Youth for Biosecurity programme and often receives funding from governmental partners and focuses on different geographic regions as part of an effort to better globalise and harmonize biosafety and biosecurity standards and raise-awareness worldwide.[30]

2.3.3.2 Biosafety Heroes initiative

The IFBA 'Biosafety Heroes' scheme launched in 2011 is an effort promote role models in biosafety and biosecurity by identifying and celebrating 'extraordinary individuals who make significant contributions to help others in the field of biorisk management.'[31] Chosen by an independent and international panel, each year an individual actively working in the field of biorisk management is awarded the accolade taking into account their accomplishments and impact, with preference to those working in low-resource environments and/or where biosafety and biosecurity has not yet received sustained attention.

2.3.3.3 Equity-Focused Coordinating Committee (IFBA ECC)

The IFBA's independent Equity-Focused Coordinating Committee (IFBA ECC) works in coordination with IFBA staff and the Board of Directors to identify and implement objectives aimed towards sustainable equitable practice within global biosafety and biosecurity.[32] The ECC is composed of a diverse set of professionals with demonstrated knowledge and experience in biosafety, biosecurity, and/or disciplines related to gender and intersectional equity. ECC members work to empower and amplify the voices of marginalised members and leaders within biosafety and biosecurity communities. This initiative has taken a step forward with the launch of the African Women's Network and, more recently, the ASEAN Women's Network for Biosafety and Biosecurity in June 2024 to 'empower local women as contributors to sustainable health in the region.' Future networks are planned for Latin America and the Caribbean.

[30] IFBA, IFBA Global Mentorship Program, https://internationalbiosafety.org/program-activities/mentoring/ifba-global-mentorship-program/.
[31] IFBA, Biosafety Heroes Program, https://internationalbiosafety.org/program-activities/biosafety-heroes/.
[32] IFBA, IFBA Equity-Focused Coordinating Committee, https://internationalbiosafety.org/program-activities/ifba-equity-focused-coordinating-committee/.

2.4 Lessons learned from the IFBA for biosecurity education and the IBSEN

IFBA's experience carries important lessons in some of the IBSEN's key areas of interest including the continued need for biosecurity education across stakeholder communities, network and community-building, diversification of teaching and engagement methodologies, impact evaluation and sustainability.

2.4.1 Continuing need for biosecurity education

The IFBA was born in response to the need identified by the laboratory biosafety community to establish itself as a distinct professional discipline in an era of rapid growth in the life sciences which necessitated a robust and competent workforce. The 2001 anthrax letter attacks in the US and later the COVID-19 pandemic further highlighted the growing importance and value of laboratory biosafety in preventing and responding to biological risks. Whilst still concentrating on biosafety, IFBA activities later expanded to some extent to incorporate laboratory biosecurity and dual-use governance into its area of work in recognition of the emergence of the concept of biorisk management that explicitly highlighted the interconnectivity and complementarity of laboratory biosafety, laboratory biosecurity and governance of dual-use research and technology.

The IFBA professional certification on Biosecurity - and to a lesser extent the certification on Biological Risk Assessment - provide a useful impetus for biosafety professionals to engage on these topics (see *Figure 6*). These certifications can, and surely have, helped raise awareness and encouraged self-education on best practices among the technical biosafety and biosecurity community. However, there remains a largely unmet global need across much the broader life sciences community for biosecurity education and awareness-raising, including understanding the concept of dual-use and promoting ethical and responsible conduct among life scientists that underpins a strong normative culture of responsibility. As pointed out by Greene *et al*, many scientists even at top-tier universities in highly-resourced countries like the United States 'remain unfamiliar with or disengaged from aspects of biorisk management' and in particular, unaware of dual-use issues in general or 'construe dual-use information concerns narrowly, resist viewing their own work as dual-use, and have conflicting opinions on the value of attempts to constrain potentially dual-use information.'[33]

[33] D. Greene, D. A. Relman, & M. J. Palmer, Unmet Expectations: life Scientists' Views on Biorisk and Responsibility. *Applied Biosafety*: 0, (2025). https://doi.org..10.1089/apb.2024.0052 (Pre-publication)

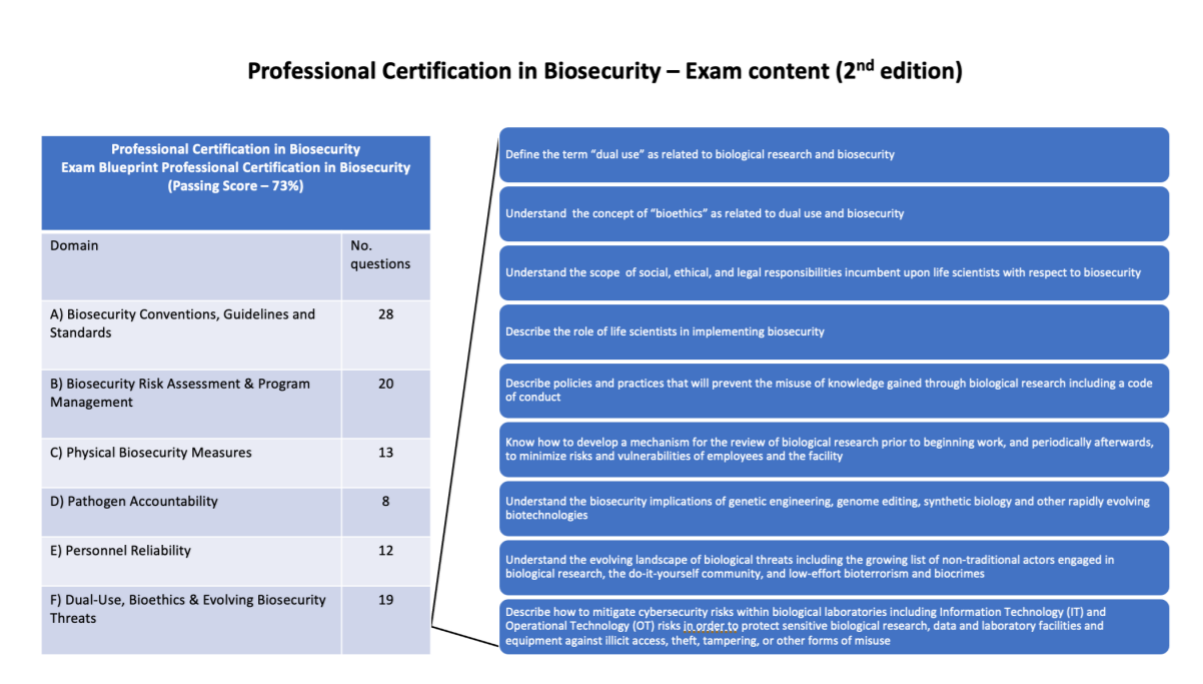

Figure 6. Body of knowledge topics for examination under Domain F of the IFBA Biosecurity professional certification

As emphasised by Australia in 2011, 'the frequent lack of awareness of aspects related to biosecurity and the obligation of the Convention among life scientists has to be addressed more urgently, strategically, and comprehensively.'[34] Laboratory biosafety and biosecurity communities are an important sector in which to communicate and build competency in these issues, but to cultivate and sustainably embed a culture of responsibility will require a broader scope, a more cohesive strategy and buy-in across all stakeholder communities if we are to effectively address the ongoing 'chronic and fundamental challenge' of a widespread lack of awareness and education, as it has been termed by the World Health Organization (WHO).[35]

While the IFBA has gradually expanded its efforts geographically, these initiatives are often taking place fractionally as funding allows and government priorities dictate. Focus on low- and middle-income countries (LMIC) where the lack of awareness is compounded by a lack of resources is much needed, but a consistent and global strategy should be the overriding priority to ensure an even global uptake as much as possible of awareness and skills necessary to ensure the life sciences are not misused. Such efforts will also necessarily include increased

[34] Australia *et al*, possible approaches to education and awareness-raising among life scientists, BWC/CONF.VII/WP.20/Rev.1, 1 December 2011. https://digitallibrary.un.org/record/717988.
[35] World Health Organization, Global Guidance Framework for the responsible use of the life sciences (2022), p. 28. https://www.who.int/publications/i/item/9789240056107.

integration of dual use and the responsible use of the life sciences discussions and teaching into education curricula such as inclusion for young scientists and on-the-job training across all relevant sectors of the life sciences and associated technologies across the One Health spectrum. Promoting the Tianjin Guidelines for Codes of Conduct, as long supported by the IBSEN, continues to provide a promising avenue for integrating these concepts into teaching.

2.4.2 Network development, community-building and multisectoral partnerships

The IFBA is especially notable for its globe-spanning and engaged network and dedicated community, as well as its successful multisectoral partnerships and engagement across policy, funding, scientific and technical arenas. From its inception, the IFBA has benefitted from a built-in network of biosafety associations through its spin-out from the American Biological Safety Association (ABSA) and the European Biosafety Association (EBSA).

This has been amplified by the IFBA's own sustained efforts to expand its network through highly visible annual meetings and workshops, as well as judicious partnership with governments, distinguished governmental laboratories such as the Sandia National Laboratories, academia and the private sector. These strategic partnerships have also ensured that the IFBA has secured the necessary funding to pursue its network-building efforts off the back of its national and regional workshops.

Further, the IFBA has shown ingenuity in its creation and use of biorisk management champions and leaders to help raise visibility and garner further interest among the current and future biosafety and biosecurity professional community. Its 'Biosafety Heroes' programme and mentorship programme, and support for youth networks and diversity and inclusion projects, has helped promote leadership development. Moreover, its work to create sustainable biosafety and biosecurity career pathways and focus on building technical competencies—meaning the specific skills and knowledge needed to perform a job or task—helped it develop its own community by providing tangible career-enhancing benefits. This has been bolstered by the global boom in biotechnology and the life sciences requiring skilled biosafety and biosecurity individuals coupled with the lessons learned globally from challenges to global security as exemplified by the COVID-19 pandemic, climate crisis and the emerging bioeconomy. These in combination are powerful drivers for students and professionals alike towards biosecurity-relevant careers.

However, it is important to recognise that the IFBA's core mission revolves around specifically improving laboratory biosafety and biosecurity goals and its professional community is predominantly highly technical and specific. As argued above, combined efforts must move beyond a narrow focus and should include initiatives that work together with all governments at the international level if global change is to be achieved. As demonstrated by the INSEN, a

dedicated international network on education that promotes excellence and works collaboratively to develop and share educational and professional development materials for all stakeholders such as students and faculty at High Schools and universities, would contribute significantly to the creation of a truly global culture of responsibility. This position was emphasised by CBRNe security education experts at our recent policy workshop in London as well as its reporting paper,[36] and IBSEN's joint side event with the Organisation for the Prohibition of Chemical Weapons (OPCW) Advisory Board on Education and Outreach (ABEO) in the Hague. The experiences from both the IBSEN and ABEO have demonstrated the impact of supporting efforts that focus on the creation and continued evolution of educational and awareness-raising materials, and especially the impact of international networks that collaborate and share materials in close collaboration with treaty regimes. The ISBEN's network of experts reflects these strategic goals and is already well-practised in engaging with a wide variety of target audiences including students, teaching faculty, States, media, research councils, relevant science and technology communities, industry, civil society, professional societies and associations and others. This is also reflected in its new initiatives such as the BSRC's Biosecurity School Project (see the news in this Newsletter). This flexibility and ability to liaise with stakeholders is critically important in the life sciences due to the breadth of disciplines within the life sciences and the dynamic pace of advances.

2.4.3 **Teaching and engagement methodologies**

The IFBA has pursued a highly diversified and multi-pronged approach to educate and raise awareness of biosafety and biosecurity challenges as well as provide the biorisk management community with the skills to recognise and mitigate them. This has spanned not only its flagship professional certification programme but also encompassed the more traditional route of higher education courses such as the new BSc. in Biosafety and Biosecurity at MMUST, Kenya and train-the-trainer schemes, as well as less-traditional methodologies such as online and paper-based games. This breadth of approaches is illustrative of the need for continued creativity in how we collectively approach biosecurity education.

While the MMUST university course is still in its infancy and its impact remains to be seen, the experience of the INSEN raises questions over the focus on formal university-level educational courses. The development of degree courses – especially longer-term undergraduate degrees – are highly resource intensive and require sustained buy-in from a wide range of actors. In the case of the MMUST Bachelor's degree, the degree course is the culmination of several

[36] LMU BRSC, 'Toward a collaborative, collective and integrative international CBRN security education: Coordination of International Policy Initiatives on Biosecurity Education' (March 2024), https://repository.londonmet.ac.uk/9312/.

years' work and preparation involving multiple workshops, and planning and liaison with various University departments, university leadership, funders and technical expert partners and the national Commission for University Education (CUE).[37]

The challenges associated with creating degree courses are echoed by the experience of the INSEN and the ABEO as discussed in previous IBSEN Newsletters. The IFBA does not experience the same bureaucratic challenges that have beset the efforts of the INSEN and the ABEO and is more nimble and manoeuvrable without the involvement of international organisational perspectives. This has likely made it easier to create a robust university-level course and to continue to adapt and develop it in response to needs and developments in the life sciences. However, the financial cost and efforts required to secure financial and local and governmental bureaucratic support remain very high. IBSEN has been fully aware of this and is exploring the feasible routes to facilitate this dealing with the broader challenge of lack of biosecurity awareness and education.

In addition, while university students and faculty will always remain an important audience, other initiatives and programmes are recognizing the importance of introducing critical concepts earlier in the education lifecycle at High School level. It is time to broaden biosecurity education efforts to the earliest effective level of education in view of the rapidly developing science and technology in the fourth industrial revolution. The International Genetically Engineered Machines (iGEM) competition has a dedicated High School track, and its Responsibility Program reaches over 4000 high school and university students worldwide per year.[38] The IBSEN has also recently launched a novel High School level initiative to introduce the concepts of dual-use and biosecurity concept earlier in science education.

Furthermore, many organizations such as the IFBA, INSEN, the WHO and other actors have successfully created impactful online courses with global reach, allowing learners to participate in high quality courses even where distance and schedule make present challenges.[39] Nevertheless, digital inclusivity and disparity can present a major issue for online and hybrid initiatives in terms of both available languages and internet connectivity, meaning local national support is crucial in helping enable build local capacity.[40] While the IFBA has made a robust start in providing resources and exams in multiple languages for a number of its exams, translation is expensive and highly technical subjects are much harder to translate correctly. IFBA is able to rely on its members to help assist in the translation, but this difficulty

[37] IFBA, Addressing the Global Shortage of Biosafety and Biosecurity Professionals through Education, https://internationalbiosafety.org/wp-content/uploads/2022/10/IFBA-Biosafety-Education-White-Paper.pdf, p. 6.
[38] Https://igem.org/.
[39] L. Shang *et al*. Essentials of Biological Security: A Global Perspective. Wiley. 2024. ISBN: 978-1-394-18901-4.
[40] IBSEN First Quarterly Newsletter, May 202, p. 19. https://ibsen.org.uk/wp-content/uploads/2024/05/First-IBSEN-Newsletter.pdf.

remains evident in the disparities across the available languages offered for examinations which range from eight languages for its core Biorisk Management certification to just one for the Biocontainment Facility Design, Operations and management certification. Funders should ensure that finances are provided for translation of educational materials as a core necessity to better ensure global availability and update of resources in a timely manner.

Another further lesson is the need to diversify teaching and awareness-raising methodologies. These can take many forms from in-person and online educational courses, stand-alone modules and seminars to cartoons, comics, podcasts, games, meetings, workshops and more. Graphic novels and cartoons, for example, can have a significant impact as a teaching tool designed to convey complex concepts in a concise and appealing manner. One such example is *Germ Warfare: A Very Graphic History* written by Max Brooks (author of popular comic and movie *World War Z*) produced in conjunction with the US Blue Ribbon Study on Biodefense.[41] In 2021, the IBSEN created a series of cartoons explaining the issue of dual-use and the role of the Biological and Toxin Weapons Convention (BTWC) and Chemical Weapons Convention (CWC).[42] A useful future project for the IBSEN would be to further develop these cartoons (see *Figure 7*) as part of its work to cultivate further interest and understanding on biosecurity issues, especially on its new High School project.

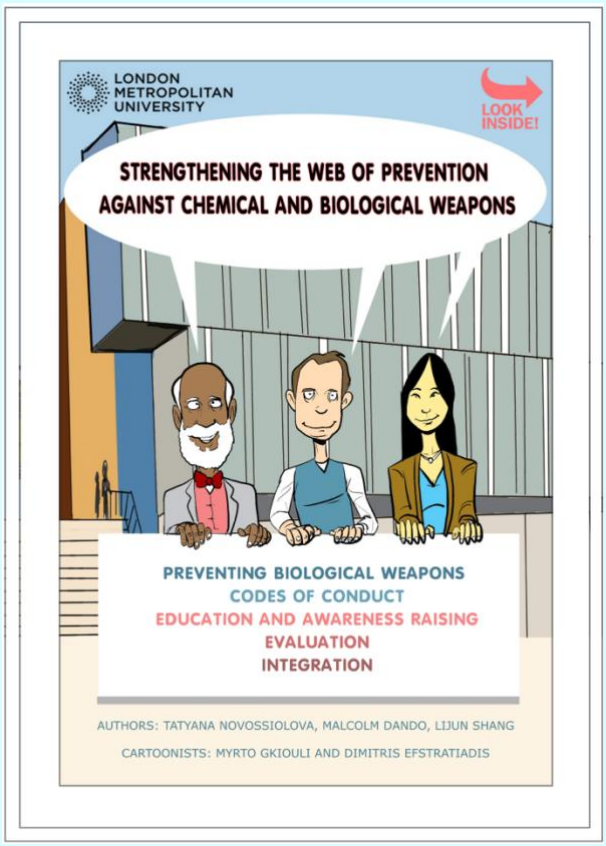

Figure 7. Strengthening the web of prevention against chemical and biological weapons comic

[41] M. Brookes, Germ Warfare: A Very Graphic Novel. Bipartisan Commission on Biodefense (April 2019). https://biodefensecommission.org/germ-warfare/.

[42] London Metropolitan University Biological Security Research Centre. Strengthening the web of prevention against biological and chemical weapons (2021). https://ibsen.org.uk/sample-page/.

2.4.4 **Impact evaluation**

Despite a wide range of biorisk management educational and awareness-raising efforts worldwide by a wide range of actors such as governments, international organisations, and non-governmental organisations, biorisk teaching overall may be having less effect than previously supposed and approaches to biorisk identification and management still vary widely across regions and countries.[43] In terms of the IFBA professional certifications, that they are not a career requirement, nor consistently valued in different geographical regions and technical specialities is a hindrance to their more widespread uptake. In addition, certification costs can be prohibitive for some, and it appears still a long way from embedding sustainable pathways or on-ramps to biosecurity careers.

The long-term impact of the certification programme is also somewhat uncertain. Despite very positive responses to a 2020 survey of 194 certified professionals that demonstrated that the certifications were held in high regard and viewed as useful (notably, almost 100% of respondents reported they would recommend the certifications to their colleagues with 98.5% indicating interest in pursuing further certifications in other disciplines) – the relatively low level of re-certification gives cause for concern.[44]

Analysis of the re-certification levels show overall low levels of recertifications being undertaken, even in countries that have the highest levels of certification (see ***Annex 2***). For example, the average level of re-certification within the 20 countries with the highest level of overall certifications averages just nine percent (9%) (see *Figure 8* below). Perhaps more surprisingly, the top five countries with the highest certification levels (Pakistan, Philippines, Malaysia, Nigeria and Kenya) have the lowest levels of re-certification, suggesting that certification projects targeting individual countries do not necessarily lead to the longevity and ground support needed to build a sustainable national community. This is particularly concerning given recertification is based on the candidate's proven continued track record in actively engaging and promoting the issues under examination. With new initiatives being undertaken in Latin America and the Caribbean it is likely that there will be sharp uptake of certifications in the near future. How that will look when the five-year period ends and recertification is required should help inform IFBA's long-term strategy to ensure enduring value and interest in certification. The need for the pace and scope of biosecurity education to be implemented equally in all regional areas is an issue argued by IBSEN from the outset.

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[43] L. Shang *et al*, Dual-Use Oversight: Is the Scientific Community Fit for Purpose? What Should Be Done if it is Not?, Journal of Biosafety and Biosecurity (2023). https://repository.londonmet.ac.uk/8890/1/1-s2.0-S258893382300050X-main.pdf.

[44] IFBA, IFBA Professional certification: measuring impact globally (2020), https://internationalbiosafety.org/wp-content/uploads/2020/10/IFBA-Certification-Program-Measuring-Impact-Globally_2020.pdf.

Further, internet connectivity and costs vary widely worldwide. Africa, for example, is currently one of the most expensive regions for mobile internet globally although the cost of mobile data varies greatly across African countries. Reliability of internet connectivity and lack of adequate national digital infrastructures can also create further complications for those attempting online courses and attending online workshops etc.[45] Therefore any online or hybrid course should strive to overcome these potential difficulties by providing shorter modules and lighter materials that can be easily downloaded and shared to reduce the burden on learners from less well-resourced areas.

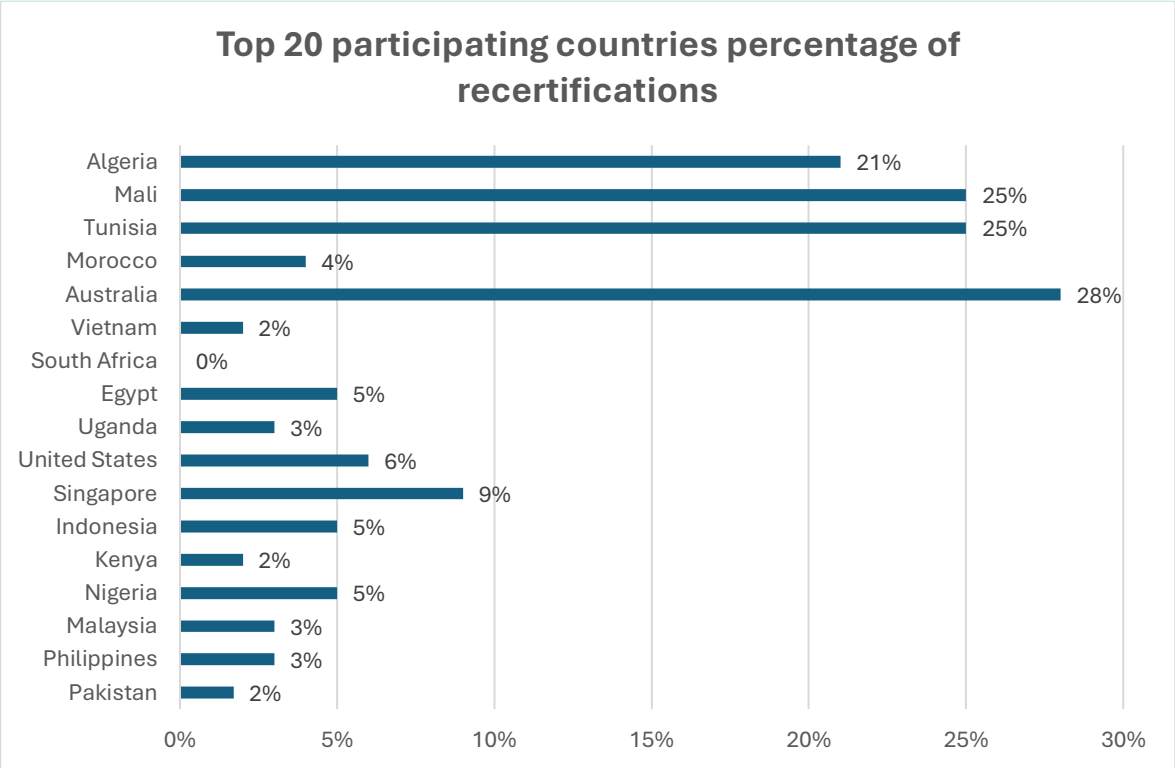

Figure 8. Top 20 participating countries percentage of recertifications

2.4.5 **Sustainability and funding**

IFBA's combined efforts with MMUST to launch its BSc. in Biosafety and Biosecurity demonstrates the difficulty many will face when trying to create traditional higher-education courses. Development of university courses are resource intensive in terms of time, personnel and finances, requiring sustained buy-in from a wide range of actors. The challenges

[45] https://tremhost.com/blog/cost-of-internet-in-africa-a-country-by-country-price-comparison-2025/.

associated with creating degree courses are echoed by the experience of the INSEN and the ABEO as discussed in previous IBSEN Newsletters. The IFBA does not experience the same bureaucratic challenges that have beset the efforts of the INSEN and the ABEO, and is far more nimble and manoeuvrable without the involvement of international organisational perspectives. This has likely made it easier to create a robust university-level course and to continue to adapt and develop it in response to needs and developments in the life sciences. However, the financial cost and efforts required to secure financial and local and governmental bureaucratic support remain very high.

IFBA's certification programme has achieved considerable success with over 2360 certifications awarded across 110 countries to date. However, the programme itself is not yet financially self-sustainable and therefore reliant on outside funding to maintain its level of engagement.[46] This, in turn, makes it vulnerable to the vagaries of the shifting funding environment whereby States are able to shape where certification efforts are focused according to their own internal security agendas and priorities. Additionally, this has the potential to impact programme consistency (should government priorities shift in light of national political and security imperatives) and affect implementation of longer-term strategic goals. To counter this, it is important for the IBSEN to ultimately be integrated into the formal architecture of the Biological Weapons Convention (BTWC) in a similar manner to the ABEO and INSEN to help ensure long-term funding and strategic priority.

Another clear lesson for the IBSEN is the importance of raising sustained funding and securing diverse and enduring partnerships across multiple sectors, including governments, academic, private and public laboratories, the scientific community, policymakers and others. The IFBA has forged deep and enduring partnerships with government programmes such as the US Biological Threat Reduction Program, US Biosecurity Engagement Program, and Foreign Affairs Canada which as part of their national efforts for assistance under Article X under the Biological Weapons Convention and the G7 Global Partnership against the spread of Weapons and Materials of Mass Destruction.[47] This echoes a key finding from lessons learned from the INSEN for the IBSEN of the necessity to include biosecurity within the framework of the BWC.[48] The IFBA has also successfully partnered with government laboratories such as Sandia National Laboratories, helping bring greater visibility and legitimacy to its own initiatives in a cost-effective manner, as well as private companies such as NuAire (a private biosafety cabinet manufacturing company)[49], Air Filter Maintenance Services International (AFMS) and Germfree – a laboratory facilities design and construction company. Emulating these kinds of partnerships could help bring the IBSEN greater visibility and broaden its reach into areas where there is currently little engagement.

[46] Interview with IFBA, 24 March 2025.
[47] G7 Global Partnership, https://www.gpwmd.com/.
[48] IBSEN First Quarterly Newsletter, May 202, p. 22. https://ibsen.org.uk/wp-content/uploads/2024/05/First-IBSEN-Newsletter.pdf.
[49] https://www.nuaire.com/about/ifba-collaboration.

2.5 **Conclusions and suggestions for overcoming challenges**

In its Global guidance framework, the WHO commented:

'The scale of the need for awareness raising and education should be understood. Globally, there are millions of life scientists, and it is likely that their numbers will increase in the future with the current biotechnology revolution. Only a small percentage of life scientists are aware of, and have the ability to manage, biosafety, biosecurity and dual-use issues. Improving biorisk management will require resources. Collaborative ambition among stakeholders combined with improvements in awareness raising, education, training, professional development and cultural shifts will be critical to help with meeting the challenge.'[50]

In 2017, States Parties at the Eighth Review Conference of the BWC recognised the need for life science stakeholder engagement with biological security and noted the value of, *inter alia*, measures to: promote awareness among relevant professionals in the private and public sectors and throughout relevant scientific and administrative activities including awareness of the States Parties BWC obligations; promote the development of training and education programmes for those granted access to biological agents and toxins relevant to the Convention; and, encourage the promotion of a culture of responsibility amongst relevant national professionals.[51]

IFBA's multi-pronged approach of building technical competencies in life sciences laboratories professional certifications and educational projects is helping respond to the gaps identified by the WHO and recognised by the BWC, in particular among the laboratory biosafety community. However, there remains much more to be done to engage relevant communities and stakeholders beyond laboratory biosafety and biosecurity professionals.[52] The IFBA's efforts are a crucial and timely contribution to global biosecurity education and awareness as part of the web of concurrent and complementary initiatives that can help build a strong culture of responsibility among life scientists.

IFBA's multisectoral, collaborative approach echoes the IBSEN's aim to build capacity and education resources that are focused on the long-term and support creating future generations of biosafety and biosecurity professionals and champions. Key amongst the lessons to be learned from the IFBA are its ability to build enduring communities and networks

[50] WHO, Global Guidance Framework. https://www.who.int/publications/i/item/9789240056107. p. 29.
[51] Eighth Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction. *Final Document*. Eighth Review Conference. BWC/CONF.VII/4. Geneva, Switzerland, 2017. https://docs.un.org/BWC/CONF.VIII/4.
[52] D. Greene, *et al*. Unmet Expectations: life Scientists' Views on Biorisk and Responsibility. *Applied Biosafety*: 0, (2025). https://www.liebertpub.com/doi/10.1089/apb.2024.0052 (Pre-publication).

as well as forge sustainable partnerships to ensure the necessary funding and support for initiatives in the realm of biosecurity education, particularly in low-resource settings.

However, it can be argued that perhaps the efforts of the IFBA and others do not go far enough and much more can be done. For example, IFBA or other professional certifications are not nationally recommended for laboratory professionals or those working in the wider biosafety and biosecurity fields.

One potential pathway to helping raise awareness is to consider making educational modules, ethics statements, or even professional certification, mandatory in life sciences disciplines. For example, each year the International Centre for Genetic Engineering and Biotechnology (ICGEB) awards several prestigious research fellowships as part of a Fellowship Training Programme for post-doctoral research.[53] Requiring successful candidates to undertake a mandatory module on dual-use biosecurity would help promote a culture of the responsible use of the life sciences and set a global standard of minimum awareness of dual-use issues. Similarly, regional scientific funding programmes such as the European Commission's Horizon Europe research and innovation funding programme could also implement such a scheme and broaden the reach of efforts to raise awareness of dual-use challenges in the life sciences.[54] While 'responsible research and innovation (RRI)—or 'responsible innovation' (RI)—became an essential part of the EU Horizon 2020 research agenda in 2011 (which has been succeeded by the Horizon Europe which covers the period 2021-2027 and aims to spend EUR 93.5 billion on scientific and engineering research tackling global challenges) alongside complementary methods such as 'value sensitive design' (VSD) and 'safe by design' (SbD), there is currently no requirement that those applying for grants demonstrate their ability to apply these practices and principles in the course of their work. Ensuring more attention to biosecurity education and awareness is part of IBSEN's further implementation strategy for working with different stakeholders.

Greene *et al* also point out that, according a survey the conducted in late 2024, it remains the case that '[C]areer incentives and the logistical burdens of biorisk management were noted as reasons for disengagement.'[55] One possible avenue to help change these perceptions could include the creation of a global 'excellence in biosecurity' award scheme similar to the Biosecurity Award schemes implemented by the governments of Australia and New Zealand.[56] Creating prestigious awards could help shift the enduring view that conducting science safely and responsibly is a burden and a demanding while rewarding good practice and innovation to shine a spotlight on biosecurity and dual-use issues in a positive manner. Changing such

[53] ICGEB, https://www.icgeb.org/fellowship/.
[54] European Commission, Horizon Europe. https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en.
[55] D. Greene, *et al*. Unmet Expectations: life Scientists' Views on Biorisk and Responsibility. *Applied Biosafety*: 0, (2025).https://doi.org/10.10889/apb.2024.0052 (Pre-publication)
[56] See for example, the Australian Biosecurity Awards (https://www.agriculture.gov.au/biosecurity-trade/policy/australia/public-awareness/aba) and the New Zealand Biosecurity Awards (https://www.mpi.govt.nz/about-mpi/our-work-at-mpi/mpi-scholarships-and-awards/new-zealand-biosecurity-awards/).

perceptions through rewarding life sciences done well, would bring renewed interest and focus onto biosecurity issues.

The conclusions drawn by Greene *et al* highlighted that there remains a long way to go to bolster a culture of responsibility and change behaviour reflect prior research that 'life scientists are not educated about deliberate-misuse or dual-use issues, and that they face career incentives to disregard biorisk management', and making headway will require sustained funding and dedicated government and international buy-in. The ISBEN's objectives will continue to focus on helping overcome these issues through collaboration with its members to continue to raise awareness of dual-use and shape norms, create a robust and sustainable community and produce globally relevant educational tools adaptable to diverse audiences, including components to raise awareness within emerging generations of life scientists as early as Secondary School level.

Acknowledgement

We extend our grateful thanks to Maureen Ellis and Stephanie Norlock of the IFBA for their time and provision of supporting materials that helped inform this article.

3. News in Global Biosecurity Education

3.1 News from the LMU BSRC

London Metropolitan University Biological Security Research Centre staff published an article 'Toward a Collaborative, Collective, and Integrative International Chemical, Biological, Radiological, and Nuclear Security Education'

Ms Iris Magne, Ms Olivia Ibbotson, Professor Lijun Shang and Professor Malcolm Dando published an article in the journal *Applied Biosafety* highlighting the need for an International Biological Security Education Network (IBSEN) to provide a much-needed global framework for developing biosecurity education resources that can be used to help overcome the challenges facing efforts to strengthen the Biological and Chemical Weapons Conventions. The article analyses lessons learned for establishing global biosecurity education, concluding that international collaboration and coordination are imperative to raising awareness of the need for biosecurity education, and in the creation of new methodologies and ensuring their availability across multiple languages.

Access here the article.

Ms Olivia Ibbotson presented at the 8th Annual SYP Peace and Disarmament Conference

Ms Olivia Ibbotson represented the Biological Security Research Centre as a panellist speaker at the 8th Annual SYP Peace and Disarmament Conference. Olivia was on the panel discussing 'The impact of emerging and disruptive technology on peace and security'. Her presentation, entitled 'An integrated approach on Chemical, Biological, Radiological and Nuclear Security education: Exploring the challenges arising to CBRN security education from advanced science and technology', discussed the risks all CBRN security disciplines are facing in regards to advanced science and technology, such as synthetic biology and AI. The presentation advocated for an integrative approach to CBRN security education.

A big thank you to the Student/Young Pugwash team and Tim Street for such a successful conference.

Ms Kathryn Millett attended a workshop on cyberbiosecurity organised by the DSIT and King's College London (KCL)

Ms Kathryn Millett attended a workshop on horizon-scanning for cyberbiosecurity organised by the UK's Department of Science, Innovation and Technology (DSIT) and King's College London in April 2025. The workshop aimed to help shape the UK's cyber security policy by discussing cyber security protections, mitigations, and solutions that policymakers should consider when addressing emerging and future risks related to the exploitation of common engineering biology laboratory equipment over the next 5-10 year period.

Update on IBSEN Biosecurity School Project

After receiving confirmation of collaboration, Olivia Ibbotson and Gill Moore (Debden Park High School) kicked off the Biosecurity School Project with a launching event in early April. The event introduced students to the Biosecurity Security Research Centre, the International Biological Security Education Network and the project. Olivia explained the aims, details and structure of the project, while Gill introduced some biosecurity resources she has produced.

Thank you to Debden Park High School for collaborating with us of this exciting project.

A big thank you to Gill Moore for your relentless enthusiasm and passion for the project.

Presentation by Dr Matteo Gerlini at the London Metropolitan University: 'The Nuclear Security Short History, And its Meaning for the CBRN International Agreements'

LMU Biological Security Research Centre Visiting Fellow, Dr Matteo Gerlini, of the University of Siena gave a talk at the London Metropolitan University in April 2025 on nuclear security as a distinct and autonomous field, outlining major changes underway from historical and political perspectives, and lessons and overlaps for chemical and biological weapons. This is one of the LMU BSRC series talks and also take our vision of integrated, collective approach in biosecurity education.

3.2 Other news

We encourage and welcome all members from IBSEN to send us news relevant to this Quarterly Newsletter. Please note that it would be your responsibility to ensure the reliability of the information and therefore that the edited news section is from open accessed sources and does not represent the LMU BSCR's views.

50th Anniversary of the Biological and Toxin Weapons Convention (BTWC)

The BTWC marked its 50th anniversary of entry into force on 26 March 2025 with a commemorative event organised by the United Nations Office for Disarmament Affairs' (UNODA) Geneva Branch and the BWC Implementation Support Unit that brought together experts from the diplomatic field and civil society to reflect on the BTWC's part, present and future. UNODA produced a special publication to mark the occasion.

Learn more about the 50th anniversary of the BTWC commemorative event.

Access here the document The Biological Weapons Convention at Fifty.

Spirt of Asilomar Summit: Asilomar 2.0

A commemorative conference celebrating the 50th anniversary of the historic 1975 Asilomar Conference on Recombinant DNA was held in February 2025, bringing together scientists, ethicists, industry, policymakers and civil society to discuss key issues shaping the future of biotechnology. Youth participation was particularly encouraged through the Spirit of Asilomar's Next Generations Leaders programme. Participants addressed developments in

biosafety, biosecurity, AI-driven biotechnology, and the ethical considerations of synthetic biology. Particular focus was given discussion on the five thematic areas of pathogens research & biological weapons; artificial intelligence and biotechnology; synthetic cells; biotechnologies beyond conventional containment; and, framing biotechnology's futures.

Learn here more about the Asilomar 2.0 summit.

MMUST BSc Biosafety and Biosecurity Program published the children's book 'Germs Goodbye'

Student Aggrey Wekesa Baras enrolled in the BSc Biosafety and Biosecurity at Masinde Muliro University of Science and Technology (MMUST, Kenya) published a children's book entitled *Germs Goodbye* on the importance of biosafety and biosecurity aimed at primary school students.

Contact the IFBA to obtain a copy.

Global Affairs Canada launches its global Africa Strategy to strengthen CBRN threat mitigation

The Government of Canada launched its 'African Strategy: A partnership for shared prosperity and security' as part of its continued investment in strengthening engagement and cooperation in Africa. An important aspect of Canada's Africa Strategy is continued support for the G7 Global Partnership Signature Initiative to Mitigate Biological Threats in Africa through which G7 states, the Africa Centres for Disease Control and Prevention, and other African partners collaborate to strengthen pan-African health security capacities though, *inter alia*, integrated disease surveillance systems and implementation of a continental biosecurity and biosafety strategic plan.

Access here the document African Strategy: A partnership for shared prosperity and security.

Publication of Piloting of the global guidance framework for the responsible use of the life sciences: Mitigating biorisks and governing dual-use research in Uganda by the WHO

The WHO published a report on its pilot project on implementing its Global Guidance Framework (2022) in Uganda, documenting lessons learned, success factors and providing recommendations to help guide the adoption and implementation of the framework by WHO Member States in similar settings.

Read here the report.

Academic article summarising the current AI challenges and opportunities for non-proliferation and disarmament

Published by the EU Non-Proliferation and Disarmament Consortium, this compendium outlines the current state of the art in AI technologies and their military uses across four areas including chemical and biological weapons and explores key legal challenges and frameworks, ethical considerations and initiatives to address challenges.

Access here the article Artificial Intelligence, Non-proliferation and Disarmament: A Compendium on the State of the Art

4. Further reading

4.1 Biological security, the IFBA and educational initiatives

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2. IFBA, Addressing the Global Shortage of Biosafety and Biosecurity Professionals through Education, https://internationalbiosafety.org/wp-content/uploads/2022/10/IFBA-Biosafety-Education-White-Paper.pdf.
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4. T. Alexanian *et al*. The Next Wave of Biosecurity Experts: Young Scientists Need a Better Path into Global Diplomacy. *Science and Diplomacy*, 22 February 2022. https://www.sciencediplomacy.org/article/2022/next-wave-biosecurity-experts-young-scientists-need-better-path-global-diplomacy.
5. D. Greene, *et al*. Unmet Expectations: life Scientists' Views on Biorisk and Responsibility. *Applied Biosafety*: 0, (2025). http://doi.org/10.1089/apb.2024.0052. (Pre-publication)
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9. M. Brookes, Germ Warfare: A Very Graphic Novel. Bipartisan Commission on Biodefense (April 2019). https://biodefensecommission.org/germ-warfare/.
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11. IFBA, IFBA Professional certification: measuring impact globally (2020), https://internationalbiosafety.org/wp-content/uploads/2020/10/IFBA-Certification-Program-Measuring-Impact-Globally_2020.pdf.
12. Eighth Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction. Final Document. Eighth Review Conference. BWC/CONF.VII/4. Geneva, Switzerland, 2017. https://docs.un.org/BWC/CONF.VIII/4.
13. European Commission, Horizon Europe. https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en.
14. WHO, Health-Security Interface Technical Advisory Group: Report of the Annual In-Person Meeting (Geneva, Switzerland), https://cdn.who.int/media/docs/default-source/hsi-tag/hsi_tag_meeting_report_2024.pdf?sfvrsn=416e1f3c_1&download=true.
15. Phuc Pham Duc *et al*, Assessment of Training Needs on Biorisk Management for Medical and Veterinary Laboratory Staff in Vietnam: A Survey in 13 Provinces, Health Security, Vol. 3, no.2, https://doi.org/10.1089/hs.2024.0039.

4.2 **Biological security and IBSEN**

I. Magne *et al*, Toward a Collaborative, Collective, and Integrative International Chemical, Biological, Radiological, and Nuclear Security Education, Applied Biosafety, 2025, https://doi.org/10.1089./apb.2024.0048.

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Annex 1: List of technical certifications awarded by topic and country

Country	Biorisk Management	Biowaste Management	Biosecurity	Biosafety Cabinet Selection, Installation & Safe Use	Biocontainment Facility Design, Operations & Maintenance	Biological Risk Assessment	Cyberbiosecurity
Albania	1	0	0	1	0	0	0
Algeria	24	1	3	0	0	0	0
Anguilla	1	0	0	0	0	0	0
Argentina	21	0	1	0	0	0	0
Armenia	1	0	0	0	0	0	0
Aruba	1	0	0	0	0	0	0
Australia	32	10	0	1	4	0	0
Austria	4	0	0	0	0	0	0
Azerbaijan	5	0	0	0	0	0	0
Barbados	4	0	0	0	0	0	0
Belgium	2	0	0	0	0	0	0

Belize	2	0	0	0	0	0	0
Benin	4	2	0	0	0	0	0
Bosnia and Herzegovina	1	0	0	0	0	0	0
Botswana	4	0	0	1	0	0	0
Brazil	26	0	0	0	0	0	0
Brunei	26	9	22	0	0	15	0
Burkina Faso	11	3	0	0	0	0	0
Burundi	3	0	1	0	0	0	0
Cambodia	2	0	0	0	0	0	0
Cameroon	16	0	0	0	1	1	0
Canada	7	1	6	1	1	1	1
Cape Verde	5	0	0	0	0	0	0
Cayman Islands	1	0	0	0	0	0	0
Central African Republic	1	0	0	0	0	0	0
Chad	1	0	0	0	0	0	0
Chile	1	0	0	0	0	0	0
China	1	0	0	0	0	0	0

Colombia	2	0	1	0	1	0	0
Congo	1	0	0	0	0	0	0
Czech Republic	1	0	0	0	0	0	0
Denmark	2	0	0	0	0	0	0
Dominica	1	0	0	0	0	0	0
Ecuador	1	0	0	0	0	0	0
Egypt	61	1	4	0	0	0	0
Eswatini	2	0	0	0	0	0	0
Ethiopia	9	2	0	0	0	0	0
Finland	1	0	0	0	0	0	0
France	2	0	0	1	0	0	0
Gabon	5	0	0	0	0	0	0
Gambia	5	1	0	0	0	0	0
Georgia	9	1	1	0	0	0	0
Germany	1	0	0	0	0	0	0
Ghana	9	4	0	0	0	0	0
Greece	9	1	1	1	1	1	1

Guinea	5	3	0	0	0	0	0
Hong Kong	4	0	0	0	0	0	0
India	61	5	1	7	0	0	0
Indonesia	86	0	7	1	0	1	0
Iraq	6	1	0	0	0	0	0
Italy	10	1	2	0	2	2	0
Ivory Coast	6	2	0	0	0	0	0
Jamaica	3	0	0	0	0	0	0
Japan	1	0	0	0	0	0	0
Jordan	19	1	4	0	0	0	0
Kazakhstan	9	0	0	0	0	1	0
Kenya	80	2	18	0	0	7	8
Kuwait	1	0	0	0	0	0	0
Kyrgyzstan	1	0	0	1	0	0	0
Lao PDR	2	0	0	0	0	0	0
Lebanon	5	1	0	0	0	0	0
Lesotho	1	0	0	0	0	0	0

Liberia	2	0	0	0	0	0	0
Libya	3	0	0	0	0	0	0
Malaysia	83	3	28	3	1	1	0
Mali	19	3	1	1	0	7	0
Mauritius	2	0	0	0	0	0	0
Mexico	9	0	0	2	1	1	0
Moldova	4	0	0	0	0	0	0
Morocco	28	0	8	0	0	6	0
Mozambique	1	0	0	0	0	0	0
Namibia	2	0	0	0	0	0	0
Netherlands	8	0	2	0	0	1	0
New Zealand	5	0	0	0	0	0	0
Niger	5	2	0	0	0	0	0
Nigeria	99	10	5	1	1	1	0
Pakistan	283	45	66	8	4	2	14
Panama	1	0	0	0	0	0	0
Papua New Guinea	1	0	0	0	0	0	0

Paraguay	2	0	0	0	0	0	0
Peru	3	0	0	0	0	0	0
Philippines	118	2	11	2	0	12	2
Romania	2	0	0	0	0	0	0
Rwanda	6	0	1	0	0	0	0
Saint Lucia	1	0	0	0	0	0	0
Saint Vincent and the Grenadines	1	0	0	0	0	0	0
Saudi Arabia	5	0	0	0	1	0	0
Senegal	20	4	0	0	0	2	0
Serbia	1	0	0	0	0	0	0
Sierra Leone	7	0	5	0	0	0	0
Singapore	56	3	1	4	1	21	1
South Africa	35	0	14	3	3	0	9
South Korea	2	0	0	0	0	0	0
South Sudan	9	1	0	0	0	1	0
Spain	16	1	1	1	2	0	0

Switzerland	1	0	1	0	0	0	0
Taiwan	1	0	0	0	0	0	0
Tanzania	20	1	0	0	0	3	0
Thailand	11	0	4	0	0	0	0
Togo	7	2	0	0	0	0	0
Trinidad and Tobago	7	0	0	0	0	0	0
Tunisia	28	1	8	0	0	2	0
Turkey	35	0	0	0	0	0	0
Ukraine	1	0	0	0	0	0	0
Uganda	61	5	3	1	2	5	0
United Arab Emirates	3	0	0	0	0	0	0
United Kingdom	8	2	1	1	1	0	0
United States	59	3	7	2	2	1	4
Vietnam	63	0	0	0	0	0	0
Zambia	2	0	0	0	0	0	0
	1775	**140**	**239**	**44**	**29**	**95**	**40**

Annex 2: Certification and recertification levels by country

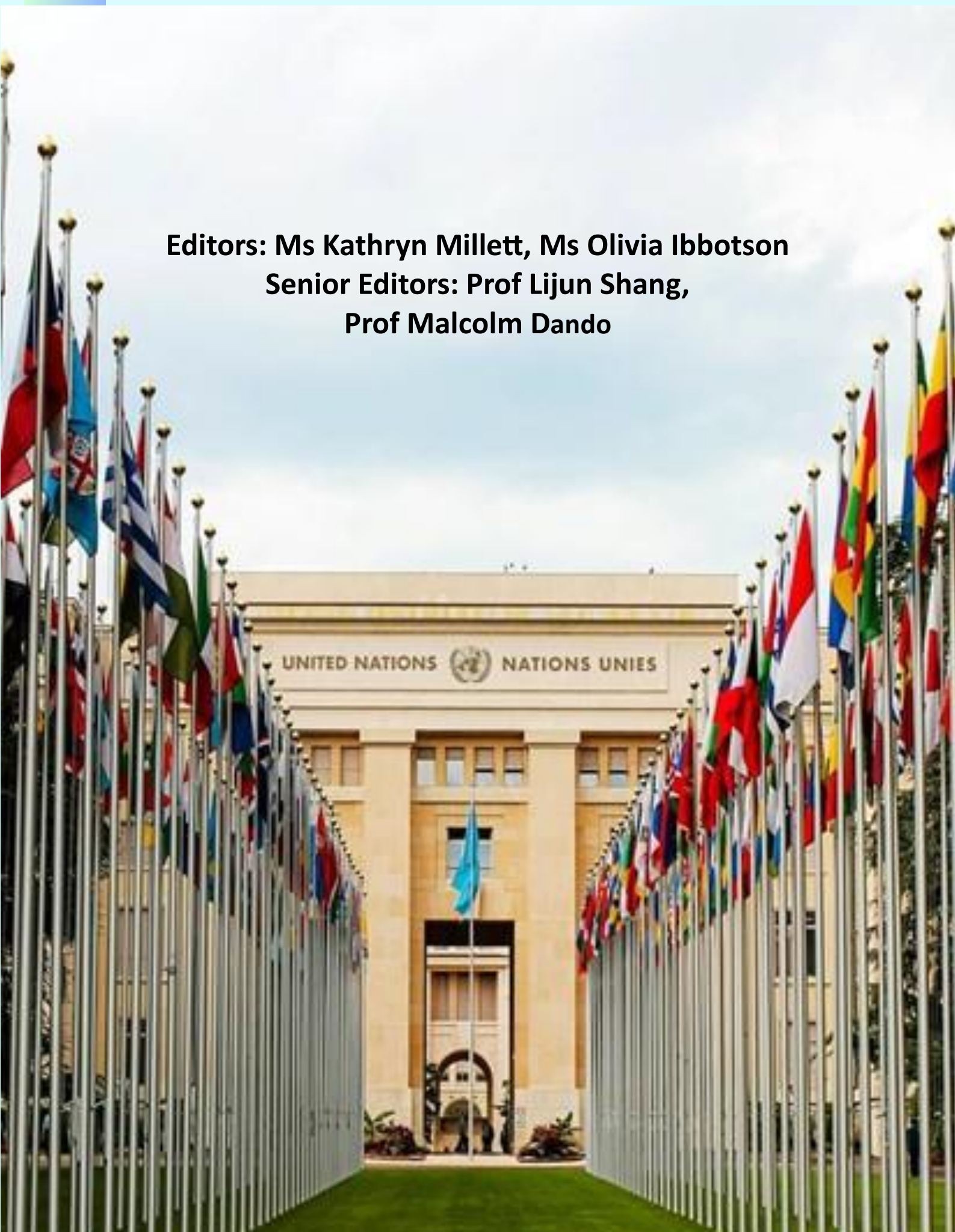
Country	BRM	BWM	BS	BSC	BFD	BRA	CBS	TOTAL	Currently active	Inactive	Recertified	% Recertified
Pakistan	283	45	66	8	4	2	14	422	385	30	7	2%
Philippines	118	2	11	2	0	12	2	147	119	23	5	3%
Malaysia	83	3	28	3	1	1	0	119	71	44	4	3%
Nigeria	99	10	5	1	1	1	0	117	100	11	6	5%
Kenya	80	2	18	0	0	7	8	115	82	31	2	2%
Indonesia	86	0	7	1	0	1	0	95	81	9	5	5%
Singapore	56	3	1	4	1	21	1	87	64	15	8	9%
United States	59	3	7	2	2	1	4	78	60	13	5	6%
Uganda	61	5	3	1	2	5	0	77	65	10	2	3%
India	61	5	1	7	0	0	0	74	74	0	0	n/a
Brunei	26	9	22	0	0	15	0	72	72	0	0	n/a

Egypt	61	1	4	0	0	0	0	66	34	29	3	5%
South Africa	35	0	14	3	3	0	9	64	62	2	0	0%
Vietnam	63	0	0	0	0	0	0	63	59	3	1	2%
Australia	32	10	0	1	4	0	0	47	21	17*	6	28%
Morocco	28	0	8	0	0	6	0	42	23	18	1	4%
Tunisia	28	1	8	0	0	2	0	39	24	9	6	25%
Turkey	35	0	0	0	0	0	0	35	35	0	0	n/a
Mali	19	3	1	1	0	7	0	31	17	6	8	25%
Algeria	24	1	3	0	0	0	0	28	9	13	6	21%
TOTAL										**283**	**75**	**9%**

*3 retired

KEY:

BRM – Biorisk Management
BWM – Biological Waste Management
BS - Biosecurity
BSC - Biosafety Cabinet Selection, Installation & Safe Use
BFD – Biocontainment Facility Design, Operations & Maintenance
BRA – Biological Risk Assessment
CBS - Cyberbiosecurity



Editors: Ms Kathryn Millett, Ms Olivia Ibbotson
Senior Editors: Prof Lijun Shang,
Prof Malcolm Dando