



*Report of IAP Project*  
**Survey and Awareness of Dual Use Education in Pakistan**

*Principal Investigator*

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The Global Network of Science Academies (IAP)



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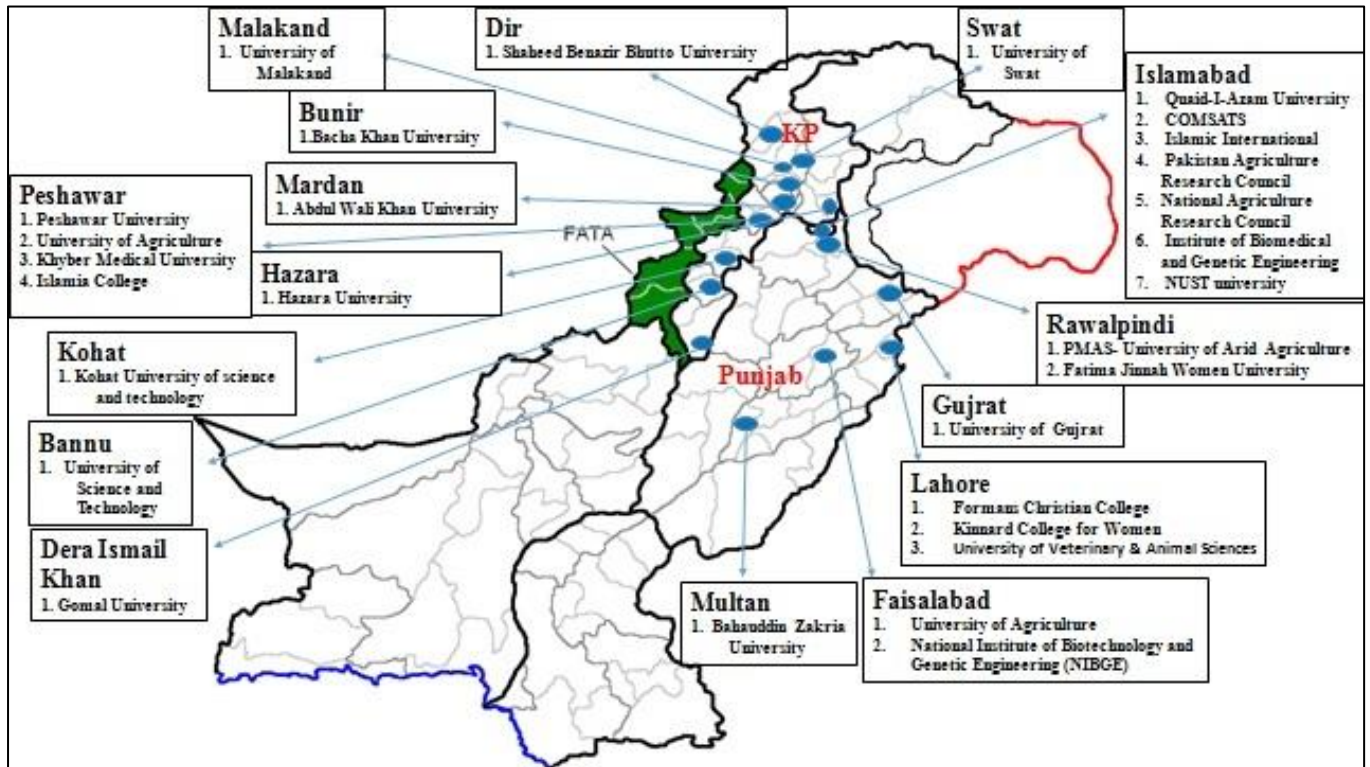
## Introduction

Pakistan Academy of Sciences, in collaboration with Department of Biotechnology Quaid-I-Azam University, has been actively engaged in raising awareness and promoting education on Dual Use related concepts in life sciences specifically the emerging disciplines like Biotechnology. Several activities have been initiated to raise the knowledge among the life scientists about bioethics and responsible science conduct. These activities were conducted under the project “**Survey and Awareness of Dual Use Education in Pakistan**” funded by Inter Academy Panel. The activities included a survey to assess knowledge and awareness about dual use concepts in educators of life sciences disciplines, capacity building through incorporation of dual use education in the curriculum taught at the Department of Biotechnology, Quaid-I-Azam University and several interactive workshops on raising awareness about this concept.

### 1. Survey on Educators’ Awareness about Dual use concepts

A survey was conducted in Pakistan (under the IAP project) from August 2013 to October 2014 by QAU among educators of life science disciplines in various universities across Pakistan (mainly Punjab and Khyber Pakhtunkhawa). It included both quantitative and qualitative data. A total of 651 questionnaires were collected out of which 619 were valid. The aim of the survey was to assess knowledge and awareness level in the faculty/professors of the educational institutes offering life sciences subjects in Pakistan.

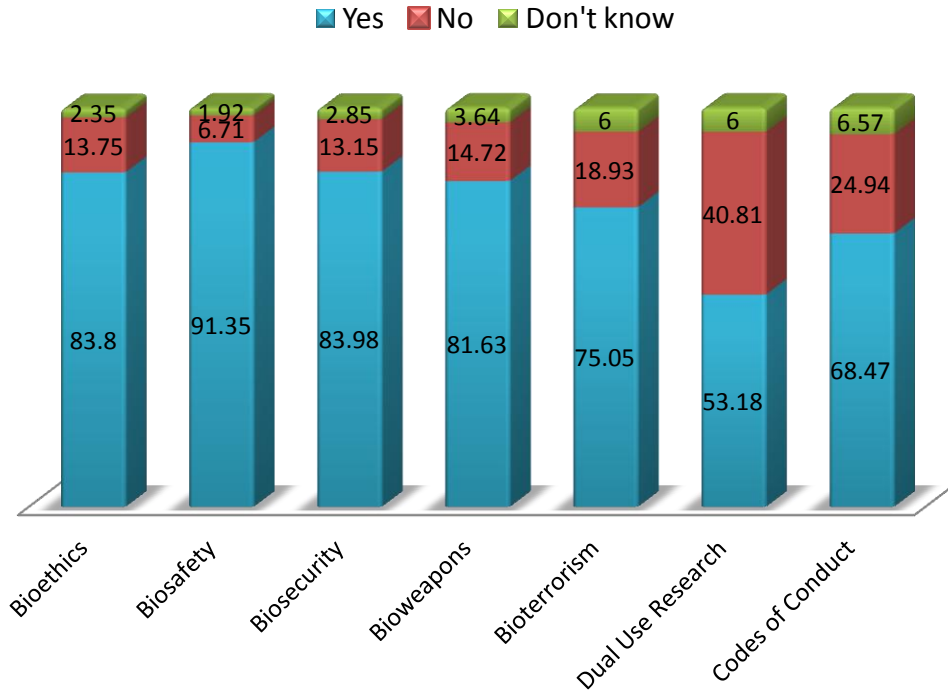
The first part of the survey assessed the knowledge of educators of graduate life sciences in institutions of higher learning in Pakistan about dual use related terms. The first question asked “Have you ever heard about the following?” A large number of respondents seemed well-aware of the terms Bioethics, Biosafety, Biosecurity and Bioweapons for which responses higher than 80% were observed. The terms Bioterrorism and Codes of Conduct scored 75.05 and 68.47% slightly less than the other terms mentioned above. However, only 53.18% of the faculty members showed familiarity with the term ‘Dual Use Research’.



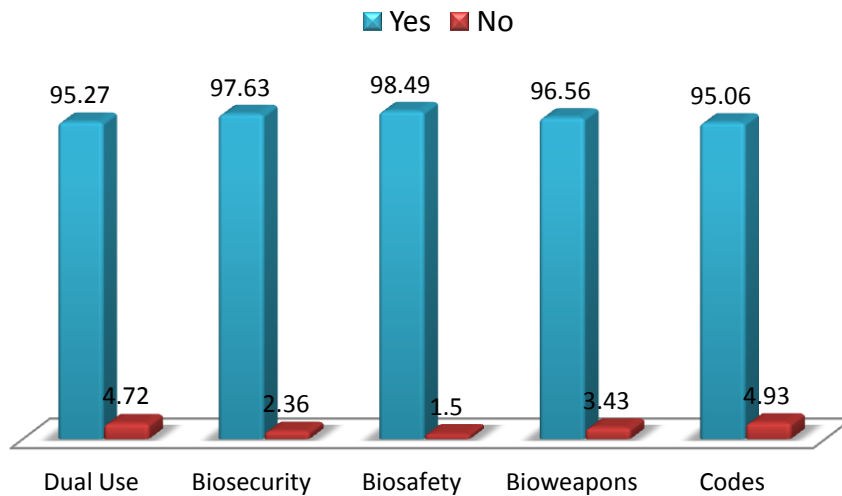
Map showing Pakistani universities/institutes offering life sciences disciplines/research which participated in the survey

In the second question (Q2), certain definitions were given of the terms such as dual use, biosecurity, biosafety, bioweapons and codes of conduct and the educators were asked whether they agreed on these proposed definitions as given in table 1.1.

**Q1. Have you ever heard about the following?**



**Q2 Please consider the proposed definitions. Would you agree on them?**



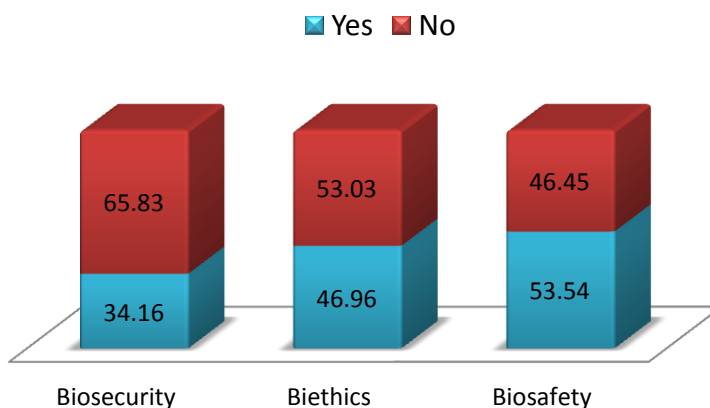
**Table 1.1 Proposed definitions of the given terms (Q2)**

<b>Terms</b>	<b>Definitions</b>
Dual use	The term "dual-use" is used to describe technologies that could have both benign and malign usage, specifically in the form of biological weapons. There are at least three different dimensions of dual use (1) ostensibly civilian facilities that are in fact intended for military or terrorist bioweapons development and production; (2) equipment and agents that could be misappropriated and misused for biological weapons development and production; and (3) the generation and dissemination of scientific knowledge that could be misapplied for biological weapons development and production.
Biosecurity	In this context, Biosecurity refers to “mechanisms to establish and maintain the security and oversight of pathogenic microorganisms, toxins and relevant resources”. In practice biosecurity systems are normally comprised of the following components “Physical protection, Personnel reliability, Adequate scientific and commercial program oversight, Pathogen accountability, Transportation security, Information security”.
Biosafety	In this context, Biosafety refers to “the containment principles, technologies and practices that are implemented to prevent unintentional exposure to pathogens and toxins, or their accidental release”. There are three key elements to biosafety: “laboratory practice and technique, safety equipment and facility design and construction”.
Bioweapons	Biological Weapons, as defined by the Biological and Toxin Weapons Convention, are (1) Microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes; (2) Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict."
Codes	Codes refer to the ethical or practical guidance documents promulgated amongst the community to advice or guide individuals on an issue or issues. Examples include the Hippocratic Oath.

According to the questionnaire data analyzed, above 90% of the educators agreed upon the definitions of all the given terms. Among those who replied “No” to the question, a few of the respondents said they were unaware of these terms and probably could not make an opinion. Others left the space blank and did not give any reason for saying no to the proposed definition they did not agree with.

The second part of the questionnaire was intended to evaluate the existing educational offerings in research institutions about dual use concepts. Also, the respondents were inquired about their information regarding national, international regulations and codes of conduct that apply to life scientists.

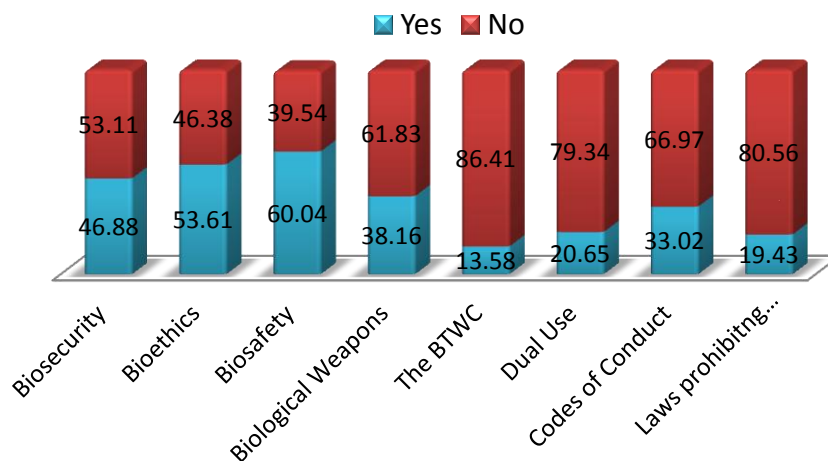
**Q3 During the graduate curriculum you teach in, are there any specific modules focused primarily on the following topics**



More than half of the total questionnaire responses given by faculty members informed that topics such as bioethics and biosecurity were not included in the curriculum taught at their universities. The term biosafety scored a little below 50% in this regard (Q3). Thus there is a need that these topics may be offered either as separate courses or at least incorporated into the existing curriculum of life sciences disciplines in universities.



**Q4 In the course(s) you teach, or in other courses taught during the graduate curriculum, are there any references made to the following topics**



Around 45-60% of the respondents agreed that references to the following terms such as biosecurity, bioethics, biosafety were made in the graduate curriculum taught at their universities. For other terms like biological weapons, BTWC, dual use, codes of conduct and laws prohibiting biological weapons, quite lower percentages i.e. 38, 13, 20, 33 and 19% respectively were reported (Q4). Overall, it can be inferred that information regarding laws and regulations was not sufficiently provided to the graduate students.

In response to the question posed to find out whether dual use related terms appear in any of the course readings, only 46.10% gave positive answers. A large number of respondents i.e. 71% indicated that there was no Institutional Bioethics or Biosafety Committee in their university. This calls for greater measures to set up an organizational structure in terms of bioethics/biosafety committees at the institutional level in Pakistan. When asked if they had knowledge about organizations concerning the dual use issues, majority (79%) was unaware of any local or international organization/ research group that work on analyzing and regulating dual use research and biosecurity. Also a large majority of educators did not know any international or national regulation prohibiting the non-peaceful use of life sciences research (77% and 84% respectively).

A question posed to find out the level of information about existing codes of conduct in the dual use related issues among educators revealed that 78.26% were not aware of such codes. Also, it seemed that majority of the universities were not offering any separate courses on bioethics,



biosafety, biosecurity and dual use research topics as 69.68% of the educators indicated in their answers and a large number of faculty members (82.84%) did not attend any international workshop or seminar on dual use issues. Such a response to educational offerings related to biosecurity, biosafety and associated concepts indicates that improvements are needed at the institutional levels to incorporate the dual use education and to raise awareness about the related concepts.

Educators were questioned whether dual use related topics were ever discussed among their colleagues and it was found that 70.90% of them never talked about these issues. Moreover, majority of the faculty members (75.40%) denied that they ever conducted or taught research that had dual use potential, did not believe (63.54% of them) that their field of study involved any such techniques with potential to be misused and 79.61% rejected the possibility of their laboratory set up being used for preparation of some biological weapon. Only 32.30% of educators said to have delivered a lecture dealing with topics such as dual use research, biosecurity, bioterrorism etc owing to lack of availability of experts on the subject. Among all, 65.83% pointed out that there is a lack of educational materials and resources on these issues for professors. However, surprisingly, 63.04% of the respondents were not willing to change their courses in order to accommodate dual use related topics. They might be having difficulty finding easy and relevant material to incorporate into the courses they teach.

Only 30% of the universities/research institutions were offering separate courses on dual use issues. Majority of the courses were designed on bioethics and biosafety as more number of positive responses came for these topics. Very few addressed biosecurity and dual use education.

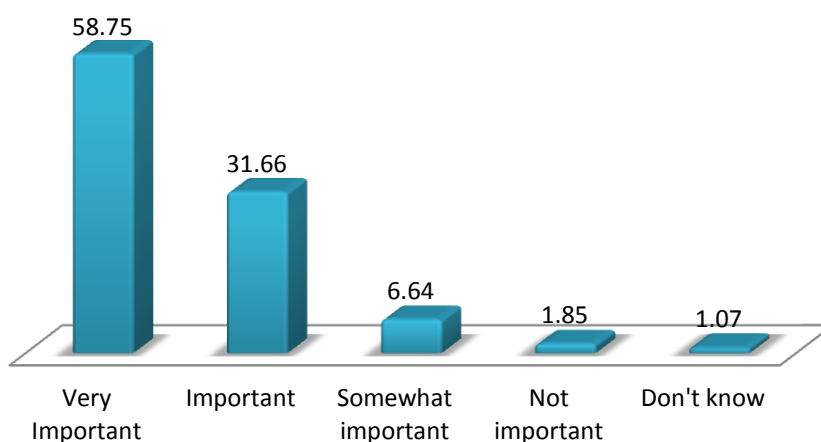
**Table 1.2. Please consider the following (Q5)**

QUESTIONS	Yes	No
1. Do the above mentioned topics (biosecurity, dual use, bioterrorism, biosafety etc.) appear in any of the course readings (bibliography, textbooks...)	46.10%	53.89%
2. Do you have any Bioethics or Biosafety committee in your Institution?	28.59%	71%
3. Do you know any local or international organization/ Research group that work on analyzing and regulating dual use research and biosecurity?	20.87%	79.12%
4. Are you aware of any INTERNATIONAL regulation prohibiting the non-peaceful use of life science research or regulating their oversight (including international treaties, and standards)?	22.37%	77.62%
5. Are you aware of any NATIONAL regulation prohibiting the non-peaceful use of life science research (including civil and penal legislation, export controls,...)	15.08%	84.91%
6. Do you know any examples of “codes” of responsible conduct which apply to life scientists and biotechnologists and related professionals?	21.73%	78.26%
7. Have you attended any international workshop or seminar on biosecurity, bioterrorism, biosafety and dual use issues?	17.15%	82.84%
8. Do you think that you conducted, managed or taught research that had dual use potential?	24.59%	75.40%
9. Do you think that your field of study involves techniques that have the potential to be misused as defined above?	36.45%	63.54%
10. Ever you think that your laboratory set up can be used for preparation of material for terrorist activities?	20.37%	79.62%
11. Have some of your colleagues ever talked to you about these topics?	29.09%	70.90%
12. Do you have any plans to change your course or module to accommodate such topics?	36.95%	63.04%
13. Have you ever delivered a lecture dealing with topics such as dual use research, biosecurity, bioterrorism etc.?	32.30%	67.69%
14. Do you think there is a lack of educational materials and resources on these issues available for professors?	65.83%	34.16%
15. Is your University/College offering a separate course covering topics like bioethics, biosafety, biosecurity and dual use research?	30.31%	69.68%

The opinions of educators about potential misuse of scientific research; rules, regulations and policies about dual use risks and importance of these issues was also inquired. Only 28.09% of the respondents feel that laboratory setups at educational institutes can be used for preparation of materials for harmful purposes. The educators (42.74%) were of the view that it is highly likely that certain undesirable elements can gain access to scientific laboratories and misuse them. A number of educators (around 50%) agreed that study materials on dual use, biosafety and biosecurity should be

increased in the course work and policies and regulations must be developed by research funders and government regarding funding of dual use research. Moreover, 71.56% were of the view that journals must regulate the dual use risks of scientific data before publishing and 43.96% agreed that misuse of biological knowledge is more destructive as there is no barrier to control it.

**Q7 Do you think above mentioned topics are important for life sciences students to be aware of?**



Overall, 58.75% of the faculty members considered educating students about dual use and associated issues as “very important” and 31.66% considered it “important” (Q7).

The educators were asked to mention the difficulties they think are a big constrain in way of inserting these topics in curricula. More number of respondents mentioned “Lack of awareness” “Lack of training” “lack of educational material” as the issues that are creating hurdles in terms of incorporation of dual use concept in the existing curricula.

**Table 1.3. Please tick the appropriate option according to the extent to which you agree or disagree (Q6)**

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. Laboratory setups at educational and research institutes can be used for preparation of materials for non-peaceful purposes.	26.08%	26.09%	16.36%	28.09%	4.86%
2. Undesired elements can gain access to scientific techniques, anywhere in the world, to be misused for hostile activities.	17.72%	15.86%	17.29%	42.74%	6.36%
3. Oversight, security mechanisms and regulations at the national level should be increased for safe, secure and responsible conduct of scientific research.	5.07%	6.64%	10.43%	51.82%	26.52%
4. Scientists have low level of awareness on national civil (including export controls) and penal laws regulating potential misuse of science.	7.14%	13.86%	18.72%	30.31%	17.44%
5. The use of a “code” that includes the danger of the misuse of science is auspicious for biologists.	3.21%	10.07%	28.51%	45.67%	17.51%
6. Educational and research institutions should include study material on dual use, biosafety and biosecurity in course work.	2.85%	4.64%	9.29%	50.60%	32.45%
7. Research funders (foundations, governments, ...) should have policies regarding funding dual use research	4.28%	4.71%	15.22%	50.60%	29.45%
8. Scientific journals should have policies regulating the publication of dual use research.	3.07%	4.07%	12.57%	71.56%	28.66%
9. Misuse of biological knowledge/techniques is more destructive because there is no defined barrier to control it.	4.07%	5.07%	11.93%	43.96%	35.45%

## 2. Awareness raising workshops

In addition to the survey, several workshops were conducted to raise awareness about conduct of responsible science under the IAP funded project. The overall agenda of these workshops was to raise awareness about conduct of responsible science among life scientists especially the young researchers and promote dual use education using the instrument of interactive learning.

### 2.1 International workshop on Raising Awareness on Dual Use Concerns in Biotechnology

The first one entitled, “**International workshop on Raising Awareness on Dual Use Concerns in Biotechnology**”, was held on **25<sup>th</sup> March 2014** at **School of Politics and International Relations, Quaid-I-Azam University, Islamabad**. The event was jointly organized by Pakistan Academy (PAS) of Sciences and Department Of Biotechnology, Quaid-I-Azam University, Islamabad. His Excellency Hiroshi Inomata (Ambassador of Japan) was the chief guest in the inaugural session while Dr. Mukhtar Ahmed (the then Executive Director Higher Education Commission) in the concluding session of the workshop.

The aim of this workshop was to develop awareness about dual use issues arising from the present biotechnologies in public and researchers and to develop a novel system that could provide risk free technologies to the consumers. The workshop also reviewed the efforts of QAU in educating the scientists and youth about the dual use education. The technologies that are used for good versus evil purposes, non armed purposes or armed purposes, harmful purposes versus fruitful purposes are generally termed as dual use.

#### 2.1.1 Short Description of the Program

09:00-09:30 Registration & Guests to be Seated, PRE-Seminar Questionnaire

#### Session I

- 09:30 –10:40 Inaugural Ceremony, Chief Guest (**HE- Hiroshi Inomata, Ambassador of Japan**)
- 09:30 **Recitation from Holy Quran**
- 09:35 Updating the Gap and Situational Analysis of Dual Use Education in Pakistan (Prof. Dr. Zabta Khan Shinwari, Chief Organizer)
- 09:50 QAU Efforts in Raising Emerging Issues (Prof. Dr. Eatzaz Ahmed, VC-QAU)
- 10:00 Role of Institutional Collaboration in Dual Use Education (Prof. Dr. Khan

- Bahadar Marwat, VC-SBBU-Dir)
- 10:10 Inaugural Address (HE -Hiroshi Inomata, Ambassador of Japan)
- 10:20 Vote of Thanks & Presentation of Souvenirs (Prof. Dr. Asghari Bano, Dean)
- 10:30 Refreshment for Guests

## Session II (Co-ordinator Dr.Bilal Haider Abbasi)

- 10:35-10:50 Code of Conduct for Life Scientists (Dr. Col. Aamir Ikram, Sec. Gen. PBSA)
- 10:50-12:30 Interactive Learning (Group work):
- Group I: Science & Biosecurity
  - Group II: Emerging Technologies & Dual Use Applications
  - Group III: Falsification, Fabrication & Plagiarism
  - Group IV: Right of Publications
- 12:30-12:45 POST-Seminar Evaluation Questionnaire
- 12:45-13:00 Biosecurity and Pakistan: A Critical Appraisal (Dr. Zafar Nawaz Jaspal)
- 13:00-13:15 Discussion on Questionnaires

## Session III

- 13:15 –14:00 Concluding Ceremony, Chief Guest (**Prof. Dr. Mukhtar Ahmed, ED-HEC**)
- 13:15 Recitation from Holy Quran**
- 13:20 Conduct of Responsible Science (Prof. Dr. Zabta Khan Shinwari, Chief Organizer)
- 13:35 QAU Future Initiative (Prof. Dr.Eatzaz Ahmed, VC)
- 13:45 Concluding Address (**Prof. Dr. Mukhtar Ahmed, ED-HEC**)
- 13:55 Vote of Thanks, Presentation of Souvenirs, Certificate Distribution
- 14:00-15:00 Lunch & Prayers: Discussion on Lunch, Social Interactions

### 2.1.2 Participants

A total of 74 students' along with faculty members from various universities participated in the workshop. Majority of them were from Biotechnology department of Quaid-I-Azam University whereas some students from Biotechnology department, Islamic International University, Islamabad and Environmental Sciences department, Fatima Jinnah Women University, Rawalpindi also attended the workshop.





Participants of the workshop



Students presenting their posters

### 2.1.3 Speakers' Presentations

In this workshop, the experts of Biotechnology in Pakistan such as Dr. Anwar Nasim (Pakistan Academy of Sciences), Dr. Aamer Ikram (Sec. General, Pakistan Biological Safety Association), Dr. Khan Bahadar Marwat (VC, Shaheed Banazeer Bhutto University Sheringal Dir Upper), Dr. Eatazaz Ahmad (VC of QAU), Dr. Zabta Khan Shinwari (Chairman Dept. of Biotechnology, QAU and chief organizer of the event) and international delegates from Japan and Italy delivered their speeches on dual use concerns of Biotechnology and life sciences research. Dr. Zabta Khan Shinwari talked about the dual use/ misuse of the scientific research and stressed on making the conduct of science more responsible. He said efforts are needed both at individual and collective level to recognise our duties as a scientist in this respect. Dr. Eatazaz Ahmed reviewed the efforts of QAU in educating the scientists and youth about the dual use education.



#### 2.1.4 Poster presentations

Among participants, a number of students (mainly M.phil 1<sup>st</sup> and 2<sup>nd</sup> Semester) enrolled in a course “Bioethics and Dual Use Education” taught at the department of Biotechnology, QAU by Prof. Dr. Zabta Khan Shinwari participated in the 2<sup>nd</sup> session of the workshop by presenting their posters that were designed after multiple sessions and group activities done in the classroom. The posters were presented on the following themes:

- Science & Biosecurity
- Emerging Technologies & Dual Use Applications
- Falsification, Fabrication & Plagiarism
- Right of Publication

# Emerging Technologies and Dual Use Applications

Adeel, Amir, Fariza, Joham, Ranjha, Tanzila, Zainab  
Department of Biotechnology  
Quaid-i-Azam University  
Islamabad

**DUAL-USE**





**TECHNOLOGY**

**Dual use Technologies:**  
Technologies used for civilian versus military purposes, peaceful versus non-peaceful purposes, benevolent versus malevolent purposes or weapons-related purposes is generally known as dual use”

**Synthetic Biology:**

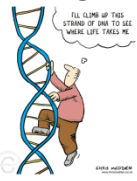
- Wedding of Biology with engineering approaches
- Design of Biological devices and systems
- Synthetic DNA &Genome synthesis
- Synthia





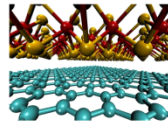
**Genetic Manipulation & Cloning:**

- Transforming genes of an organisms
- Cloning for production of genetically identical organisms
- Dolly 1996
- Golden Rice
- Flavor Saver tomato




**Nanotechnology:**

- Engineering of functional system at molecular and atomic level
- Nanomedicines
- Tissue reconstruction
- Target drug delivery
- Chemical imaging



**Stem Cell Technology:**

- Non specialized cells that have a natural tendency of differentiation and automatic renewal
- Resolve defects of birth and play major role in human development
- Potential for regeneration of damaged tissues



- The Dual Use Applications**
- 1.Playing God by re-writing life
  - 2.Out break of hostile and novel strains
  - 3.Soul or body? Sanctity of life issues
  - 4.Synthetic Human, an angle or a monster?
  - 5.Revival of extinct species
  - 6.Extortion from bio-hackers
  - 7.Bioterrorism & Biodefence issues
  - 8.Threats from “Garage Biotechnology
  - 9.Ethnic or race specific Biological agents
  - 10.Humans as Guinea pigs for experiments
  - 11.Intervention in Biodiversity




- 12.Grudged “Lone Operators” a silent threat
  - 13.Opertunists and Bioterrorists
  - 14.Global Commercial Monopolies
  - 15.Gene Escape in Environment
  - 16.Organic Farming vs GMO issues
  - 17.After effects of Chimeric Organisms
  - 18.Regionalized Bioeconomy
  - 19.Personalized Bioweapons
  - 20.Issues on Embryo status
  - 21.Brain privacy concerns and issues
  - 22.Conflict of Science and Religion

- SUGGESTIONS**

  - Raising awareness regarding the dual use research in scientific communities.
  - Establishing institutional biosafety committees for reviewing dual use risks of research.
  - Need for Biosecurity,Bioterrorism and dual use research awareness programs.

- Self governance of scientific community.
  - New Advisory Boards to provide guidance to government regarding the oversight of dual use research.
  - Need for international collaboration in the oversight of dual use of life sciences research.



**Conclusions?**

- The danger is not just “ Bioterror ” but “ Bioerror”
- Good Science can be put to “Bad uses "intentionally or by accident.

A poster on “Emerging technologies and dual use applications”



# SCIENCE AND BIOSECURITY

Department of Biotechnology, Quaid-i-Azam University Islamabad

Saad Qayum, Faiez Shah, Hina Khalid, Bilal Khan,  
Sumaira Anjum, Bushra Ata Hashmi, Sarmad Manya, and Tariq Ahmed

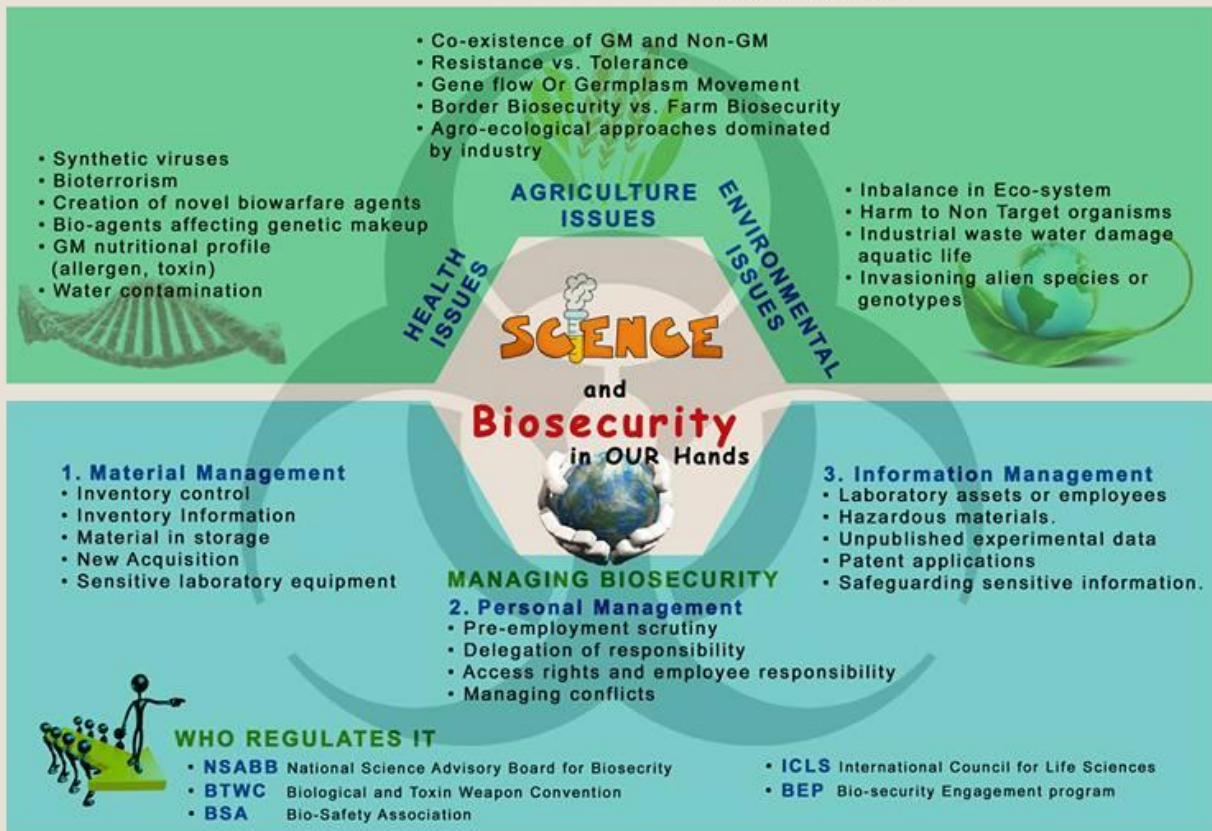
## BIOSAFETY

Describes the containment principles, technology and practices that are implemented to prevent the unintentional exposure to Biological agents and toxins or their accidental release.

VS

## BIOSECURITY

Describes protection, control and accountability for valuable biological materials within laboratories, in order to prevent their loss, theft, misuse, diversion of, unauthorized access or intentional release.



## SUGGESTIONS

1. Do harmless research
  - i. Avoid bioterrorism or biowarfare
  - ii. Don't take risks to contribute biological agents
2. Do ethical and beneficial research
3. Biological weapons should be accessible to only trustworthy researchers
4. Restrict dissemination of dual use information about biological weapons

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Contact Email  
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Poster on "Science and Biosecurity"



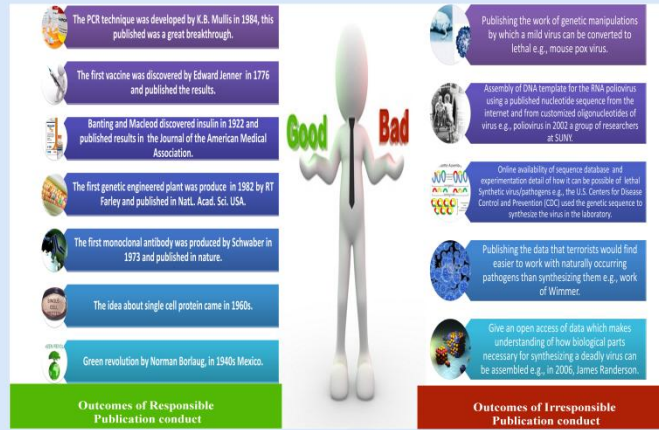
# RIGHT OF PUBLICATIONS

Hafiz Jafar Hussain, Hina Bangash, Khaista Rehman, Mehwish Yaqoob, Mehmood-ul-hassan Gilani, Safia Riaz, Sohail Ahmad Jan, Usama Sarwar  
DEPARTMENT OF BIOTECHNOLOGY  
QUAID-I-AZAM UNIVERSITY ISLAMABAD

“It’s just a bad idea for scientists to turn a lethal virus into a lethal and highly contagious virus. And it’s a second bad idea for them to publish how they did it so others can copy it” -Dr. Thomas Inglesby

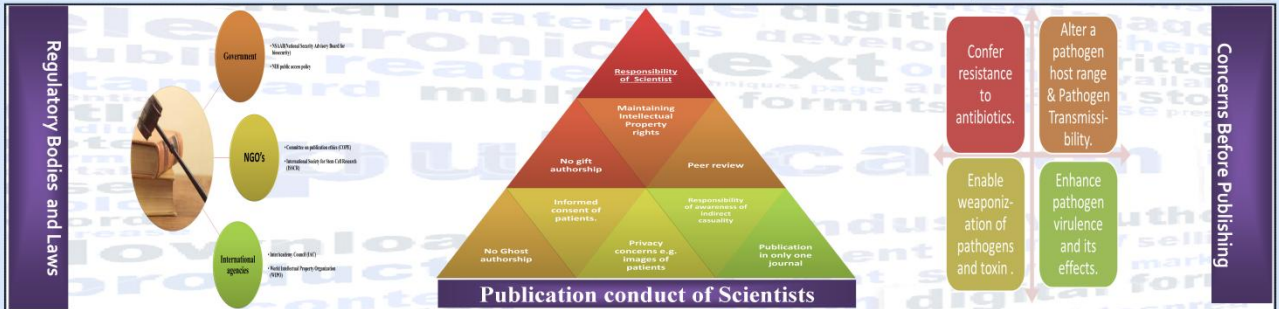
### INTRODUCTION

**R**ight of publication deals with; researcher obligation, responsibility of institution and publishing authority, role of governmental and non-governmental bodies and international agencies to work for maximizing benefit and minimizing harm including ethical values and dual use issues in publication of research. Publication right is a copyright granted to the publisher who first publishes a previously unpublished work.



### Publication Rights

Germany had publication right since 1965. The publication right was introduced in all countries of E.U. under U.N. Directive 93/98/EEC with a 25 years term. In UK Publication Right was introduced by the Copyright & Related Rights Regulation 1996. In Japan, Japanese Society for Rights of Authors, Composers & Publishers (JASRAC) was formed in 1939. Copyright Law of China 1990 provides unlimited term of protection to the rights of authorship. In Pakistan Publication rights were legally formed under “The west Pakistan publication of books (regulation and control) ordinance XV,1969”. This ordinance defines not only the rights but restriction on publication of certain books or works, application for permission, appeal, exemptions, penalties, forfeiture of the book or work, cognizance and trial of offences. Power to make rules.



### Regulatory Bodies & Laws

Following bodies which regulate and keep an eye on the publication rights and dual use leads to maximize pleasure and minimize harm.

### Research Plan & Values

To maintain integrity of research and publication; Plan must be made to avoid self plagiarism, favoring undeserved authorship & duplication of material that readers expect to be original including research values; honesty, fairness, objectivity, openness, accountability and reliability.

### Concerns Before

Influential in dual use debate and policy development to make discoveries with informed consideration prior to publication. Some issues should be addressed as shown above.

### RED ALERT!!!!

After the attack of anthrax in 2001, the U.S. National Science Advisory Board for Biosecurity (NSABB) was created, asked two major science journals such as Nature and Science not to publish the key details of the bird flu experiments, rather edited versions. The U.S. government asked to journals not to publish the details of experiments on the deadly H5N1 virus, for fear that the information could be used with malice.

- ### RECOMMENDATIONS
1. Authors should not republish or not resubmit the same findings in more than one journal.
  2. Authenticity and objectivity must be the key for good publication.
  3. Avoid sampling and measurement bias.
  4. Ethical treatment of humans and animals.
  5. Disclosure of conflicts of interest.
  6. Gift authorship should be avoided.
  7. Foreseeable risks should be considered before publishing.

### REFERENCES

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Poster on “Right of Publications”

### 2.1.5 Pre- Seminar Questionnaire Evaluation

Total number of participants = 74

Questions	No. of responses
<b>Are you enrolled in a course?</b>	
Yes	56
No	12
<b>What is the level of your current course/research?</b>	
Undergraduate	3
Graduate (Master)	51
PhD	14
Post Doctoral	0
<b>What is your field of study/research?</b>	
Biology	1
Biotechnology	65
Microbiology	2
Medicine	0
Chemistry	0
Toxicology	0
Non-Life Science (please indicate)	0
<b>What do you hope to gain from today's session</b>	
To learn about dual use/misuse/security issues	47
To learn about the broader context of life science (e.g. social, ethical, legal aspects, etc)	21
To have contacts with diverse opinions and experiences	11
To interact with fellow colleagues	1
To acquire new skills and experience	7
Others	0
<b>What do you understand by the term "dual use" in the life sciences?</b>	

The uncertainty on results characterizing new technologies	5
The potential of obtaining positive results beyond expectations	1
The possibility that they are applied both for peaceful and hostile purposes	60
The ambiguity of life science and technology	2
<b>Laboratory biosafety refers to:</b>	
Measures and policies for preventing the deliberate misuse of pathogens	13
Measures for preventing theft and loss of pathogens	0
Measures for preventing the unauthorized access to pathogens and toxins	9
Measures for preventing the unintentional exposure to biological agents and toxins, or their accidental release	50
<b>Which statement about laboratory biosecurity is NOT true?</b>	
It comprises policies and practices that require life scientists to consider the ethical, social and legal implications of their work	20
It comprises measures and policies against the theft and loss of pathogens	13
It comprises measures and policies against the unauthorized access to pathogens and toxins	16
It comprises measures and policies that seek to prevent the intentional release of pathogens and toxins	19
<b>Which was the first International treaty to prohibit the use of toxic and biological weapons?</b>	
The Hague Declaration, 1907	0
Geneva Protocol, 1925	16
Biological and Toxin Weapons Convention, 1972	49
Chemical Weapons Convention, 1993	1

Majority of the students were of Graduate level (M.phil research scholars) and had Biotechnology as their major field of study. Students were of the view that they learnt about dual use/biosecurity concerns in biotechnology while a few also said that they got information about social, ethical and legal aspects of life sciences research in the workshop. A large majority of the students understood the meaning of “Dual Use” i.e. “a possibility that they are applied both for peaceful and hostile purposes” as evident from their responses to the relevant question in the pre-seminar questionnaire. That is possibly because students of Biotechnology department Quaid-I-Azam University are taught a complete course on bioethics/dual use education and are thus pre-informed about some of these terms such as dual use.

In post-seminar questionnaire responses, most of the students agreed that although they had information about dual use/misuse/biosecurity issues as these were discussed during the courses taught to them yet the current workshop proved to be very useful for enhancing their further knowledge and information. According to them, the scientists must be aware of social, legal, ethical aspects of their research work. When asked “What did they gain from this session?”, the majority of the students said that they learned about dual use/ misuse of research and had information regarding social, legal aspects of scientific research. Students learned about biosafety/biosecurity issues from their university library and a number of them mentioned a few websites such as HEC digital library, NCBI, Pubmed, NSAAB, Science Direct from where they got information.



### 2.1.6. Post Seminar questionnaire Evaluation

Questions	No. of responses
<b>Was your previous knowledge sufficient to follow the seminar?</b>	
Yes	34
Yes, even if having further information would have been helpful	26
No, but I could follow the seminar easily anyway	5
No, and this proved difficult	0
<b>Were the topics addressed discussed in other courses?</b>	
No	11
Yes, but it was useful to discuss them today	37
Yes, a few	14
Yes, most of them	3
<b>Had you any prior knowledge about the potential “hostile misuse” of life sciences?</b>	
Yes	53
No	12
<b>What did you gain from today’s session?</b>	
I learnt about dual use/misuse/security issues	34
I learnt about the broader context of life science (e.g. social, ethical, legal aspects, etc)	30
I learnt about diverse opinions and experiences	2
I interacted with fellow colleagues	4
I acquired new skills and experience	3
Other	0
<b>What are the important things to remember about Dual Use/Misuse?</b>	
Life scientists should be aware of the social, ethic and legal implications of their work	30

Life scientists should be aware both of the national and international regulations relevant to their work	19
Cost-benefit analysis is an essential element in mitigating the risks associated to life science research of concern	1
There are potential risks and impacts on society to consider	11
It is important to balance freedom of research and regulation of science	8
Other	0
<b>Laboratory biosafety refers to:</b>	
Measures and policies for preventing the deliberate misuse of pathogens	14
Measures for preventing theft and loss of pathogens	4
Measures for preventing the unauthorized access to pathogens and toxins	8
Measures for preventing the unintentional exposure to biological agents and toxins, or their accidental release	38
<b>Which statement about laboratory biosecurity is NOT true?</b>	
It comprises policies and practices that require life scientists to consider the ethical, social and legal implications of their work	24
It comprises measures and policies against the theft and loss of pathogens	22
It comprises measures and policies against the unauthorized access to pathogens and toxins	6
It comprises measures and policies that seek to prevent the intentional release of pathogens and toxins	13
<b>What tools do you have available to acquire new information and enrich your knowledge about biosafety/biosecurity issues?</b>	
University library	27
Web Sites (please name one _____)	34
E-learning web platforms (please name one _____)	5

### 2.1.7 UNICRI part of the questionnaire

Questions	No. of Responses
1. I was well <b>informed</b> about the objectives of this workshop	
1 = strongly agree	31
2 = agree	34
3 = neither agree nor disagree	0
4 = disagree	1
5 = strongly disagree	0
9 = N/A	0
2. This workshop lived up to my <b>expectations</b>	
1 = strongly agree	24
2 = agree	42
3 = neither agree nor disagree	0
4 = disagree	1
5 = strongly disagree	0
9 = N/A	0
3. The workshop content is <b>relevant</b> to my job	
1 = strongly agree	28
2 = agree	29
3 = neither agree nor disagree	6
4 = disagree	0
5 = strongly disagree	0
9 = N/A	3
4. In my view, the <b>objectives</b> of the workshop were achieved	
1 = strongly agree	25
2 = agree	39
3 = neither agree nor disagree	2
4 = disagree	0

5 = strongly disagree	0
9 = N/A	0
5. The overall <b>quality</b> of the workshop was high	
1 = strongly agree	25
2 = agree	38
3 = neither agree nor disagree	3
4 = disagree	1
5 = strongly disagree	0
9 = N/A	1
6. The workshop presented information <b>clearly</b>	
1 = strongly agree	24
2 = agree	42
3 = neither agree nor disagree	0
4 = disagree	0
5 = strongly disagree	0
9 = N/A	0
7. The workshop allowed me to <b>participate and interact</b> with others	
1 = strongly agree	26
2 = agree	39
3 = neither agree nor disagree	2
4 = disagree	0
5 = strongly disagree	0
9 = N/A	0
8. Potential <b>language limitations</b> were well taken into account and adequately managed at the workshop	
1 = strongly agree	19
2 = agree	45
3 = neither agree nor disagree	1
4 = disagree	1
5 = strongly disagree	0
9 = N/A	0

Students agreed that the workshop was of the high quality, achieved its objectives and presented information clearly. Moreover, they agreed that the content presented in the workshop was relevant to them and it lived up to their expectations.

Majority of the students gave positive feedback about the outcome of workshop. The interactive session and the poster presentations of the students were appreciated by them as majority mentioned in their comments. A number of students also mentioned that their knowledge and awareness about biosecurity issues was increased after attending the workshop and they were informed about various organisations working for the cause of biosafety and biosecurity. Students appreciated the motivating talks of the guest speakers and asked to increase the duration of the workshop in order to convey further information. It was also said that information presented by the speakers and the students who presented their posters was not only latest but also appropriate with clear referencing. They suggested that a discussion forum must be provided in such workshops where innovative ideas can be shared between the speakers and new researchers (students) regarding policy making in biosecurity/biosafety related issues.



## **2.2 International workshop on Strengthening the Culture of Responsibility: Dual Use Research and Biosecurity**

The second one was held in the remote part of the country, Chitral, a beautiful valley surrounded by high mountains of the Hindu Kush in the Khyber Pakhtunkhawa province of Pakistan. The workshop, “**International workshop on Strengthening the Culture of Responsibility: Dual Use Research and Biosecurity**” held from **23-24 May, 2014** was sponsored by Pakistan Academy of Sciences, Pakistan and organised by Department of Biotechnology, QAU and Shaheed Benazir Bhutto University, Dir. Miss Fauzia Bibi, Member Provincial Assembly (MPA) of Kyber Pakhtunkhawa was the chief guest in the inaugural session which was presided over by Prof. Dr. Khan Bahadar Marwat (Vice chancellor, SBBU). The main agenda of the workshop was to create awareness about dual use of research in Biosciences among university students of the remote areas of Pakistan such as Chitral, Dir, Swat.

### **2.2.1 Short Description of the Program**

Arrival of Guests: 22 May, 2014  
Registration of participants: 5:00-8:00pm  
Reception Dinner: 8:00pm to 9:00pm

#### **Day 1 (23 May)**

**09:00-09:30** Registration of remaining participants and guests to be seated

#### **Session I**

**09:30 –10:30** Pre seminar Questionnaires  
**10:30** Recitation from Holy Quran  
**10:35** Welcome guests & importance of workshop (**Dr. Gul Hassan**)  
**10:45** Role of youth in Nation development (**Dr. Anwar Nasim**)  
**11:00** Implementation of responsible conduct of science (**Dr. Mushtaq Ahmed**)  
**11:15** Fabrication, Falsification and Plagiarism (**Dr. Bilal Haider Abbasi**)  
**11:30** Tea break  
**11:55** Inaugural address by chief guest (**Miss Fauzia Bibi, MPA-Kyber Pakhtunkhawa**)



- 12:05** Collaboration: Key to success (**Dr. Khan Bahadar Marwat, VC- SBBU**)
- 12:20** Biosafety, Biosecurity: National and International Obligation (**Zabta Khan Shinwari**)
- 12:35** Vote of thanks (....) & Presentation of souvenirs
- 12:50** Group work announcements (**Facilitator-Dr. Bilal, Dr. Midrar & Dr. Mushtaq**)
- Group I: Collaborative science
- Group II: Mentor-mentee relationship
- Group III: Access & Benefit sharing
- Group IV: Research on Infectious diseases: Prospects & Challenges
- 14:30-15:00** Lunch & Prayers

### **Day 2 (24 May)**

- 09:05-09:30** Way ahead in awareness raising of Dual Use education (**Zabta Khan Shinwari**)
- 09:30-10:30** Interactive learning (Group work)
- 10:30-11:00** Tea Break
- 11:00-11:45** Group Presentation (# 1 & 4)
- 11:45-12:30** Group presentation (# 2 & 3)
- 12:30-13:30** Lunch & Prayers
- 13:30-14:30** Post-Seminar Evaluation Questionnaire
- 14:30-15:00** Concluding session

### **2.2.2 Participants**

A total of 148 students and faculty members from various universities participated in the workshop. Majority of them belonged to Abdul Wali Khan University; Shaheed Benazir Bhutto University, Dir and its Chitral campus. Although majority of the students had biology as their field of study but a few students from social sciences department of the host university also attended the workshop. Students from Quaid-I-Azam University, Islamabad





helped the local students of KP universities in group work activity as they already had a good experience of interactive learning session from the previous workshop held in their home university.

### 2.2.3 Pre- Seminar Questionnaire Evaluation

Total number of participants = 148

Questions	No. of responses
<b>Are you enrolled in a course?</b>	
Yes	142
No	0
<b>What is the level of your current course/research?</b>	
Undergraduate	22
Graduate (Master)	118
PhD	2
Post Doctoral	0
<b>What is your field of study/research?</b>	
Biology	110
Biotechnology	0
Microbiology	3
Medicine	0
Chemistry	0
Toxicology	0
Non-Life Science (please indicate)	29
<b>What do you hope to gain from today's session</b>	
To learn about dual use/misuse/security issues	58
To learn about the broader context of life science (e.g. social, ethical, legal aspects, etc)	11
To have contacts with diverse opinions and experiences	12
To interact with fellow colleagues	1
To acquire new skills and experience	60
Others	0

<b>What do you understand by the term “dual use” in the life sciences?</b>	
The uncertainty on results characterizing new technologies	7
The potential of obtaining positive results beyond expectations	3
The possibility that they are applied both for peaceful and hostile purposes	117
The ambiguity of life science and technology	15
<b>Laboratory biosafety refers to:</b>	
Measures and policies for preventing the deliberate misuse of pathogens	14
Measures for preventing theft and loss of pathogens	4
Measures for preventing the unauthorized access to pathogens and toxins	49
Measures for preventing the unintentional exposure to biological agents and toxins, or their accidental release	75
<b>Which statement about laboratory biosecurity is NOT true?</b>	
It comprises policies and practices that require life scientists to consider the ethical, social and legal implications of their work	83
It comprises measures and policies against the theft and loss of pathogens	15
It comprises measures and policies against the unauthorized access to pathogens and toxins	14
It comprises measures and policies that seek to prevent the intentional release of pathogens and toxins	30
<b>Which was the first International treaty to prohibit the use of toxic and biological weapons?</b>	
The Hague Declaration, 1907	7
Geneva Protocol, 1925	4
Biological and Toxin Weapons Convention, 1972	121
Chemical Weapons Convention, 1993	10



Majority of the students were of graduate level with Biology (Botany, zoology mainly) as their major field of study. However, a few students from the management sciences and social sciences were also there and showed active participation (there were certain aspects in the speeches of the national speakers at the event that were useful even to the general audience such as plagiarism, responsible conduct of research, collaboration). Majority of the students wanted to learn about the dual use research and related security issues and seemed more interested in developing new skills and experiences as this workshop was a great platform for this purpose.

#### **2.2.4 Speakers' Presentation**

Dr. Anwar Nasim secretary general Pakistan Academy of Sciences, Professor Dr. Zabta Khan Shinwari Chairman Department of Biotechnology, Quaid-I- Azam University, Prof. Dr. Khan Bahadar Marwat the chief organiser of the event and other intellectuals spoke on the event. Dr. Anwar Nasim encouraged the youth to come forward for the cause of a more responsible nation in terms of dealing with ethical and legal implications of research and take the first step to develop the culture of responsibility at the individual level.

Dr. Zabta Khan Shinwari briefed the students about the biosafety and biosecurity issues and the necessary measures needed to be taken at individual, social and governmental level. Dr. Bilal informed the students about plagiarism, fabrication and falsification and guided them on how can they avoid from these practices in their research work and practical life. Dr. Mushtaq talked about the responsible conduct of science and to avoid misuse or even accidental/intentional release of research data that may pose a threat. Miss Fouzia Bibi, the chief guest, stressed on conducting several training workshops for the students and appreciated the efforts of the resource persons for this event.



Prof. Dr. Zabta Khan Shinwari, Prof. Dr. Khan Bahadar Marwat, Miss Fauzia Bibi (Chief guest) and Dr. Anwar Nasim (from right to left)

### 2.2.5 Student's group activity

The students were divided into four main groups with each group guided by one teacher for the interactive learning session. Students were encouraged to design their own posters with the help of the teacher and through mutual cooperation among themselves. Following were the four main groups:

- Group I: Collaborative science
- Group II: Mentor-mentee relationship
- Group III: Access & Benefit sharing
- Group IV: Research on infectious diseases: Prospects & Challenges



Teacher training the students of his group



Students' participation in group activity

## 2.2.6 Poster presentations

On the second day of the workshop, the four groups presented their posters. Students from Quaid-I-Azam University not only presented their own posters but also helped the other students in designing their posters which were presented by the students of SBBU and AWKUM (Abdul Wali Khan University, Mardan).





Students presenting their respective posters



Participants of the workshop

## 2.2.7 Post seminar Questionnaire Evaluation

Questions	No. of responses
<b>Was your previous knowledge sufficient to follow the seminar?</b>	
Yes	51
Yes, even if having further information would have been helpful	46
No, but I could follow the seminar easily anyway	23
No, and this proved difficult	22
<b>Were the topics addressed discussed in other courses?</b>	
No	47
Yes, but it was useful to discuss them today	53
Yes, a few	35
Yes, most of them	7
<b>Had you any prior knowledge about the potential “hostile misuse” of life sciences?</b>	
Yes	55
No	87
<b>What did you gain from today’s session?</b>	
I learnt about dual use/misuse/security issues	51
I learnt about the broader context of life science (e.g. social, ethical, legal aspects, etc)	31
I learnt about diverse opinions and experiences	24
I interacted with fellow colleagues	5
I acquired new skills and experience	31
Other	0
<b>What are the important things to remember about Dual Use/Misuse?</b>	
Life scientists should be aware of the social, ethic and legal implications of their work	72
Life scientists should be aware both of the national and international regulations relevant to their work	49
Cost-benefit analysis is an essential element in mitigating the risks associated to life science research of concern	4
There are potential risks and impacts on society to consider	8



It is important to balance freedom of research and regulation of science Other	10
<b>Laboratory biosafety refers to:</b>	
Measures and policies for preventing the deliberate misuse of pathogens	59
Measures for preventing theft and loss of pathogens	24
Measures for preventing the unauthorized access to pathogens and toxins	22
Measures for preventing the unintentional exposure to biological agents and toxins, or their accidental release	37
<b>Which statement about laboratory biosecurity is NOT true?</b>	
It comprises policies and practices that require life scientists to consider the ethical, social and legal implications of their work	57
It comprises measures and policies against the theft and loss of pathogens	32
It comprises measures and policies against the unauthorized access to pathogens and toxins	43
It comprises measures and policies that seek to prevent the intentional release of pathogens and toxins	10
<b>What tools do you have available to acquire new information and enrich your knowledge about biosafety/biosecurity issues?</b>	
University library	105
Web Sites (please name one _____)	33
E-learning web platforms (please name one _____)	4

Most of the students agreed that although they had a little information about dual use/misuse/biosecurity issues yet the current workshop proved to be very useful for enhancing their knowledge and information. According to majority of the students, the scientists must be aware of social, legal, ethical aspects of their research work and have information about national and international regulations regarding it. When asked “What did they gain from this session?”, the students said that they learned about dual use/ misuse of research, acquired new skills and experiences and had information regarding social, legal



aspects of research. Most of the students learned about biosafety/biosecurity issues from their university library or their course books, however, a few of them mentioned to use the search engine, google.

Majority of the students gave positive feedback about the outcome of workshop. They were of the view that interactive session and the group activity of the students was the most interesting part as it fully engaged all the participants. A number of students' mentioned in their comments that such workshops must be held more and more even on the yearly basis to increase their knowledge and awareness about biosecurity issues in life sciences. Students appreciated the teachers' help in the interactive learning sessions and were impressed by the speeches/presentations of the guest speakers who conveyed their message in simple but the most effective way.

Students did have a little problem in understanding the questionnaires as English is not their native language and they were the local people who prefer to use their own local languages for communication. Also many of the students asked to hold multiple training sessions for them.

## 2.2.8 UNICRI part of the questionnaire

9. I was well <b>informed</b> about the objectives of this workshop	
1 = strongly agree	72
2 = agree	47
3 = neither agree nor disagree	15
4 = disagree	2
5 = strongly disagree	4
9 = N/A	2
10. This workshop lived up to my <b>expectations</b>	
1 = strongly agree	45
2 = agree	78
3 = neither agree nor disagree	12
4 = disagree	4
5 = strongly disagree	0
9 = N/A	3
11. The workshop content is <b>relevant</b> to my job	
1 = strongly agree	53
2 = agree	47
3 = neither agree nor disagree	8
4 = disagree	28
5 = strongly disagree	2
9 = N/A	4
12. In my view, the <b>objectives</b> of the workshop were achieved	
1 = strongly agree	59
2 = agree	55
3 = neither agree nor disagree	10
4 = disagree	6
5 = strongly disagree	1
9 = N/A	1
13. The overall <b>quality</b> of the workshop was high	
1 = strongly agree	53
2 = agree	78
3 = neither agree nor disagree	9
4 = disagree	2

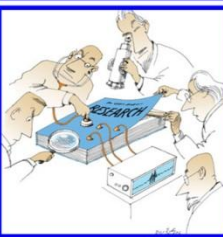


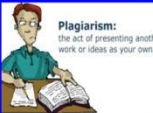


5 = strongly disagree	0
9 = N/A	0
<b>14. The workshop presented information clearly</b>	
1 = strongly agree	50
2 = agree	73
3 = neither agree nor disagree	5
4 = disagree	12
5 = strongly disagree	1
9 = N/A	1
<b>15. The workshop allowed me to participate and interact with others</b>	
1 = strongly agree	96
2 = agree	42
3 = neither agree nor disagree	2
4 = disagree	0
5 = strongly disagree	0
9 = N/A	2
<b>16. Potential language limitations were well taken into account and adequately managed at the workshop</b>	
1 = strongly agree	28
2 = agree	97
3 = neither agree nor disagree	6
4 = disagree	6
5 = strongly disagree	1
9 = N/A	3

Students agreed that the workshop was of the high quality, achieved its objectives and presented information in a clear and understandable way. The workshop not only gave them a platform to enhance their skills but also encouraged mutual interaction.

# RESEARCH MISCONDUCT

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All serious deviation from accepted ethical research practices in proposing, performing, or reviewing research, or in reporting research results (Nylenna *et al.*, 1999; Smith, 2000).

<p><b>Fabrication:</b> Making up data or results and recording or reporting them</p> <p><b>Falsification:</b> Manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record</p> <p><b>Plagiarism:</b> The appropriation of another person's ideas, processes, results or words without giving appropriate credit (Office of Science and Technology Policy, 2000)</p>		<p><b>Why faculties do it?</b></p> <ol style="list-style-type: none"> <li>1) Lack of competence and commitment</li> <li>2) Deep professional conflicts of interest</li> <li>3) Pressure to publish or perish</li> <li>4) Desire to get ahead, insecure position</li> <li>5) Reliance on others</li> <li>6) Recognition (Neaves, 2012)</li> </ol>
	<p style="color: blue; font-weight: bold; font-size: 1.2em;">SCIENTIFIC PROFESSIONALISM</p>	<p><b>Social Impacts</b></p> <ol style="list-style-type: none"> <li>1) Damage the scientific records</li> <li>2) Wastage of funds</li> <li>3) Hurt the population</li> <li>4) Loss of trust in scientists</li> </ol>
<p><b>Why does it happen?</b></p> <ol style="list-style-type: none"> <li>1) Lack of integrity</li> <li>2) Lack of responsibility</li> <li>3) Lack of communication</li> <li>4) Lack of knowledge/awareness</li> </ol> <p style="color: blue; font-weight: bold;">“This is what made me do it” (Intentionally or knowingly, or recklessly)</p>	<p style="color: blue; font-weight: bold; font-size: 1.2em;">RESPONSIBLE CONDUCT OF RESEARCH (RCR)</p>	<p><b>Ethical penalties</b></p> <ol style="list-style-type: none"> <li>1) Withdrawal or correction of all pending and published papers and abstracts</li> <li>2) Restitution of funds</li> <li>3) Reprimand, removal from the project</li> <li>4) Rank and salary reduction, or dismissal from the institution</li> </ol>
<p><b>Why students do it?</b></p> <ol style="list-style-type: none"> <li>1) Supervisor expectations</li> <li>2) Pressure to publish</li> <li>3) Overworked/insufficient time</li> <li>4) Insufficient supervision/mentoring</li> <li>5) Poor communication/coordination</li> <li>6) Laziness or poor analytical skills</li> <li>7) Desire to succeed</li> <li>8) Personal problems (Stemwedel, 2010)</li> </ol>	<p style="color: blue; font-weight: bold; font-size: 1.2em;">PLAGIARISM FABRICATION FALSIFICATION</p>	<p><b>Recommendations</b></p> <ol style="list-style-type: none"> <li>1) Raising the overall level of scientific integrity and honesty</li> <li>2) Good systems for investigating, judging, and reporting cases</li> <li>3) Adopting a policy of zero tolerance</li> <li>4) Whistleblowers must be protected to the extent possible</li> <li>5) Institution should have to provide training in how to report potential cases</li> <li>6) Train mentors in proper ethical behavior and modeling good practices at Lab</li> <li>7) Implements legislative and policy changes applicable to research misconduct and motivation behind it</li> <li>8) Discuss the consequences of misconduct &amp; ethical guidelines at lab meetings (<a href="http://www.research.vt.edu">www.research.vt.edu</a>)</li> </ol>
  	<p style="color: blue; font-weight: bold; font-size: 1.2em;">SCIENTIFIC MISCONDUCT</p>	
		
		

**References:** (1).Smith, R. (2006). Research misconduct: the poisoning of the well. *J R Soc Med.*, 99:232-237. (2). Neaves, W. (2012). The roots of research misconduct. *Nature*, 488:121-122. (3). Stemwedel, J.D. (2010). Adventures in Ethics and Science. What causes scientific misconduct? *Research Blog*. (4). Smith R. (2000). What is research misconduct? *J Roy Coll Physicians Edin*, 30:4-8. (5). Office of Science and Technology Policy. (2000). Executive office of the President. Federal Policy On Research Misconduct. Federal Register, 76260-4.

Poster on “Research Misconduct”





# Mentor-Mentee Relationship

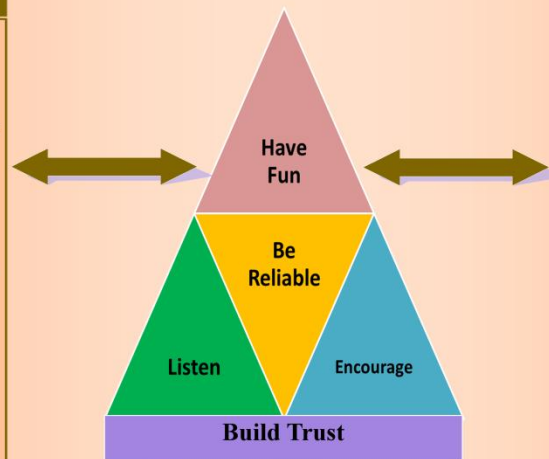
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**MENTORING IS NOT WHAT WE GIVE BUT WHAT WE SHARE,  
FOR THE GIFT WITHOUT GIVER IS BARE**

**Mentor Traits**

**M**eets regularly.  
 .Remains consistent.  
 .Maintains confidentiality.  
 .Provides constructive feedback.  
 .Maintains mutual trust and respect.  
 .Supports & Encourages.  
 .Provides guidance on becoming a professional in your field.  
 .Interested in you as a person and scholar.  
 .Reads and comments on material in a timely manner.



**Mentee Traits**

**M**aintain contact.  
 .Communicate your needs.  
 .Show initiative and accept criticism.  
 .Be organized and use mentor's time effectively.  
 .Exhibit personal integrity  
 .Come to the meeting on time.  
 .Listen to mentor & do not interrupt.  
 .Exhibit professionalism, maturity, and a strong work ethics.  
 .Be responsive to advice.  
 .Be honest about progress.  
 .Call or e-mail and leave a message about when you need an appointment.



**Conclusion**

- Mentor and mentee- a dyadic relationship
- Always Bring solutions not problems
- A mentor empowers a person to see a possible future and believe it can be obtained.

Poster on “Mentor Mentee Relationship”



### **2.3 Workshop on Responsible Conduct of Research**

Third workshop was conducted by QAU in collaboration with Pakistan Academy of Sciences in Shringal, Dir upper, a remote area of Pakistan on August 29, 2014. A similar format was adopted as done in the previous workshops. Students were given a lecture by Dr. Zabta Khan Shinwari on issues such as research misconduct and compliance, threats to humans and environment from deadly pathogens created through emerging technologies such as genetic engineering, synthetic biology and the need to focus our research on biodefense. Dr. Anwar Nasim emphasized that this is an era of interactive learning where active participation of students is a must. He also introduced the concept of NGIs (Non-Governmental Individuals) to the students attending the workshop explaining that each one of us can play a role individually fostering the culture of responsibility for the welfare of our country. Interactive learning was encouraged among the participants. They were given two hours to prepare posters of their respective groups through discussion and mutual cooperation. They were divided into three groups:

Group I: Collaborative science

Group II: Mentor-mentee relationship

Group III: Plagiarism, falsification, fabrication

Students of the three groups presented their posters at the end of the session sharing their ideas about their respective topics and what they understood from the talks of the respected speakers. Overall, the workshop provided a great platform for the students of a remote area to develop their skills in interactive learning. They were informed about the other side of the picture that is the use of science for hostile purposes and trained to avoid unintentional/ accidental or intentional misconduct of research.





Participants of the workshop



Dr. Zabta Khan Shinwari and Dr. Anwar Nasim speaking at the workshop



Students presenting their posters

## 2.4 International workshop entitled “Policy Makers and Practitioner’s Awareness Workshop on Dual-Use Education”

Two days International workshop entitled “Policy Makers and Practitioner’s Awareness Workshop on Dual-Use Education” was organised by Pakistan Academy of Sciences (PAS) in collaboration with Department of Biotechnology Quaid-I-Azam University, Islamabad on 29-30th March, 2015. The workshop was held under the project “**Survey and Awareness of Dual Use Education in Pakistan**” awarded to PAS by The Global Network of Science Academies (IAP). The basic aim of this workshop was to promote a culture of safe conduct of scientific research among practitioners as well as entice the policy makers to make preemptive policies and take legislative measures on Dual-Use Research Concerns (DURC).

### 2.4.1 Agenda of the workshop

The main agenda of the workshop was to provide a platform for policy makers, stakeholders and practising scientists including the young researchers to come together for a comprehensive oversight and discussion on importance of policies pertaining to dual use research issues in life sciences particularly Biotechnology.

The specific objectives were as follows:

- Develop awareness and understanding of a range of dual use ethical dilemma



- Facilitate further research on ‘dual use’ issues
- Develop policies and practices that will prevent the misuse of knowledge generated through biomedical research

Moreover, raising awareness using an effective approach of interactive learning was incorporated in the workshop programme in order to fully engage the participants.

#### 2.4.2 Short Description of the Program

- Arrival of Guests: 29 March, 2015
- Registration of participants: 04:00 pm - 08:00 pm
- Reception Dinner & Networking: 8:00 pm - 9:00 pm

09:00-09:30	Registration of the Participants
09:30-12:25	<b>Inaugural session</b> <b>Guest of Honour:</b> Prof. Dr. Mukhtar Ahmed (Chairperson HEC) <b>Chief Guest:</b> Ahsan Iqbal Chaudhry (Federal Minister for Planning, Development & Reforms)
09:30-10:00	Welcome note (Dr. Anwar Nasim) Importance of Sound Policies in Biological Sciences (Prof. Dr. Ara Tahmassian) Dual Use Research: The Role of Researchers and Universities to Ensure Safe Conduct of Science (Prof. Dr. Abid Azhar)
10:00-12:25	Remarks on importance of workshop (Prof. Dr. Mukhtar Ahmed) Ethics & clinical Trials (Dr. Tanweer Ahmed-UK) Biosecurity through Public Science Literacy Program (Prof. Dr. Muhammad Mukhtar) Inaugural Address by Chief Guest (Ahsan Iqbal Chaudhry)



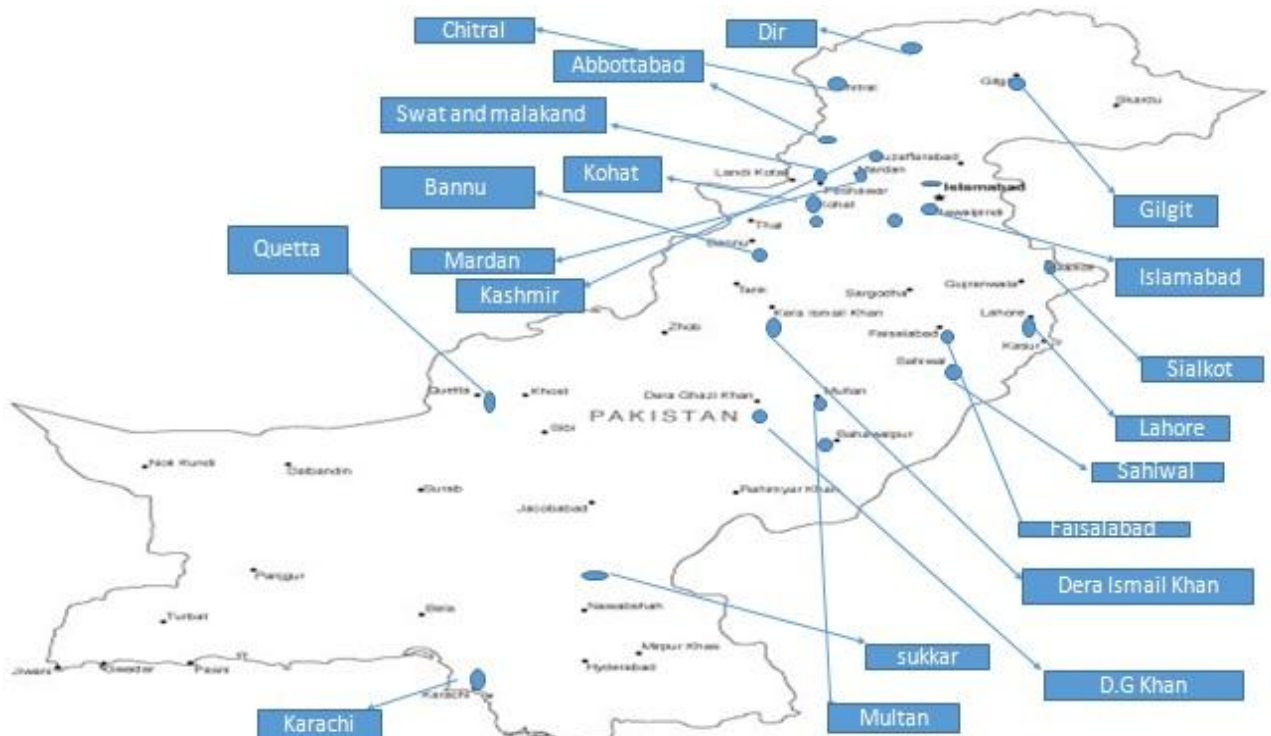
	Dual Use Dilemma and Policy Issues (Prof. Dr. Zabta Khan Shinwari)
	Involvement of young Researchers from KP-Province in Responsible conduct of Science (Prof. Dr. Khan Bahadar Marwat)
	Presentation of Souvenirs
12:25-12:40	Tea/Coffee Break
<b>Session II</b>	Chaired by Prof. Dr. Masoom Yasinzai
12:40-01:10	Involving policy makers and practitioners to address dual use dilemma of emerging sciences (Prof. Dr. Zabta Khan shinwari)
01:10-2:00	Group Poster Presentations <ul style="list-style-type: none"><li>○ Bio laboratory Management</li><li>○ Enhancing National Preparedness to Bio-Threats</li><li>○ Policy Issues and Dual Use Education</li></ul>
	Future initiative by Quaid-i-Azam University in Dual Use Education (Prof. Dr. Javed Ashraf)
02:00-02:40	Lunch & Prayer Break
<b>Session III</b>	Chaired by Prof. Dr. Khan Bahadar Marwat
02:40-03:00	Skit (Dual Use Education: The Level of Awareness)
03:00-03:20	Group Poster Presentation <ul style="list-style-type: none"><li>○ Strategies to Mitigate Biosafety and Biosecurity Concerns in Research</li></ul>
03:20-03:30	Skit (Potential Threats of Emerging Technologies)
03:30-04:00	Special lecture on Religion supports “Responsible conduct of Research” (Mufti Adnan Kakakhel)
04:00-05:00	<b>Concluding Session</b> Science Advice to Government (Prof. Dr. Zabta Khan Shinwari) Concluding Remarks (Dr. Anwar Nasim, Prof. Dr. K. B. Marwat & Prof. Dr. Masoom Yasinzai) Vote of Thanks (Prof. Dr. Zabta Khan Shinwari) Presentation of Souvenirs and distribution of certificates

### 2.4.3 Participants

The workshop covered a wide range of audience based on

1. Diversity in teams of participation from different parts of the country (as shown in figure 1)
2. A large number of policy makers, stakeholders, practitioners, faculty members of various institutions and young scientists

A total of 110 participants (young researchers and faculty) apart from the stakeholders took part in the workshop. The workshop facilitated active participation of scientists, science communicators, and young researchers to exchange their views and experiences as well as discuss various approaches to develop new science policies.



Map showing participation of individuals in workshop from various areas across the country

**Table 2.4.1 List of participants (Young Researchers)**

S.No	Name	Class	Discipline	Address/city
1	IkramUllah	PhD	Biotechnology	Lower Dir
2	Fazal Akbar	PhD	Biotechnology	Mardan
3	Samina Bashir	PhD	Biotechnology	Kohat
4	Sohail Ahmad Jan	PhD	Biotechnology	Dir
5	Irum Iqrar	PhD	Biotechnology	Rahim Yar Khan
6	Faouzia Tanveer	PhD	Biotechnology	Islamabad
7	Ali Talha	PhD	Biotechnology	Peshawar
8	Sumia Khan	PhD	Biotechnology	Mianwali
9.	M. Amir Zia	PhD	Biotechnology	Swabi
10.	Lubna Rehman	M.Phil	Biotechnology	Swat
11.	Hina Khalid	M.Phil	Biotechnology	D. I. Khan
12.	Abdul Wakeel	M.Phil	Biotechnology	Peshawar
13.	Qaiser Khan	M.Phil	Biotechnology	Peshawar
14	Rama Saleem	M.Phil	Biotechnology	Lahore
15	Hina Bangash	M.Phil	Biotechnology	Islamabad
16	Fariza Mehtab	M.Phil	Biotechnology	Chitral
17	Khaista Rehman	M.Phil	Biotechnology	Lower Dir





18	Ramsha Tariq	M.Phil	Biotechnology	Abbotabad
19	Ibrahim Khan	M.Phil	Biotechnology	Upper Dir
20	Lutfur Rehman	M.Phil	Biotechnology	Swat
21	S. Najeeb Ullah	M.Phil	Biotechnology	Islamabad
22	Mariam Manan	M.Phil	Biotechnology	Quetta
23	Fakhara Anjum	M.Phil	Biotechnology	Islamabad
24	Tanzeel Zahra	M.Phil	Biotechnology	Rawalpindi
25	Madeeha Afzal	M.Phil	Biotechnology	Islamabad
26	Tariq Khan	PhD	Biotechnology	Swat
27	Zainab Falak	M.Phil	Biotechnology	Multan
28	Adeel Khan	M.Phil	Biotechnology	Bannu
29	Saad Qayum	M.Phil	Biotechnology	Bannu
30	Mehmood ul Hassan Gillani	M.Phil	Biotechnology	Sadiqabad
31	Joham Sarfraz	M.Phil	Biotechnology	Quetta
32	Mahrukh Falah	M.Phil	Biotechnology	D. I. Khan
33	Hira Zafar	PhD	Biotechnology	Kohat
34	Sadia Banaras	PhD	Biotechnology	Pindi Gheb
35	Abdul Rafay	M.Phil	Biotechnology	Multan

36	Abdus Salam	M.Phil	Biotechnology	Islamabad
37	Aisha Siddiquah	PhD	Biotechnology	Islamabad
38	Ammara Bint-e-Saeed	M.Phil	Biotechnology	Abbotabad
39	Attarad Ali	PhD	Biotechnology	Gilgit
40	Ayyaz Amin	M.Phil	Biotechnology	Rajanpur
41	Ahmad Hassan	M.Phil	Biotechnology	Lahore
42	Beenish Aslam	M.Phil	Biotechnology	Islamabad
43	Bilal Ahmad Khan	M.Phil	Biotechnology	Karachi
44	Hiba Ajaz	M.Phil	Biotechnology	Rawalpindi
45	Kamran Yaqoob	M.Phil	Biotechnology	Lahore
46	Kaneez Fatima	M.Phil	Biotechnology	Gilgit
47	Khuram Liaqat	PhD	Biotechnology	Islamabad
48	M. Khuram Shahzad	M.Phil	Biotechnology	Islamabad
49	Naseer Hamed	PhD	Biotechnology	Islamabad
50	Qurat-UI-Ain Ali	M.Phil	Biotechnology	Nowshehra
51	Rida Noor	M.Phil	Biotechnology	Islamabad
52	Saher Nazir	M.Phil	Biotechnology	Islamabad
53	Saima Mushtaq	M.Phil	Biotechnology	Quetta
54	Sidra Ambreen	M.Phil	Biotechnology	Multan

55	Sumaira	M.Phil	Biotechnology	Peshawar
56	Tahira Batool	M.Phil	Biotechnology	Islamabad
57	Hafiza Rida Riaz	M.Phil	Biotechnology	Rawalpindi
58	Maryam Zamir	M.Phil	Biotechnology	Gujrat
59	Ghazala Yasmin Zamani	PhD	Biotechnology	Mardan
57	Saira Tabassum	PhD	Biotechnology	Rawalpindi
58	Sumaira Anjum	PhD	Biotechnology	Islamabad
59	Zain Aslam	PhD	Biotechnology	Gujrat
60	Zubaida Bibi	PhD	Biotechnology	Abbotabad
61	Noreen Karim	PhD	Biotechnology	Malakand
62	Sanam Tariq Abbasi	M.Phil	Biotechnology	Murree
63	Bushra Ata Hashmi	M.Phil	Biotechnology	D. I. Khan
64	Jalal Shah	PhD	Biotechnology	Mardan
65	Surhan Mariyam	M.Phil	Biotechnology	Sukkur
66	Rabia Javed	PhD	Biotechnology	Islamabad
67	Nabeel Ahmed	PhD	Biotechnology	Islamabad
68	Tariq Ahmed	M.Phil	Biotechnology	Islamabad
69	Lubna Nisar	PhD	Biochemistry	Islamabad
70	Javed Iqbal	M.Phil	Plant Sciences	Islamabad

71	Sadaf Kayani	PhD	Plant Sciences	Abbotabad
72	Maryam Akram Butt	M.Phil	Plant Sciences	Azad Kashmir
73	Anam Fatima	M.Phil	Plant Sciences	Mainwali
74	Hira Zameer	M.Phil	Plant Sciences	Sialkot
75	Khafsa Malik	PhD	Plant Sciences	Haripur
76	Ghulam Yaseen Awan	PhD	Plant Sciences	Badin
77	Zain ul abidin	PhD	Plant Sciences	D. I. Khan
78	M. Pukhtoon Zada Khan	PhD	Plant Sciences	Swat
79	Mohammad Ilyas	PhD	Plant Sciences	Islamabad
80	Sadia Latif	PhD	Plant Sciences	Islamabad
81	Hina Salahuddin	PhD	Plant Sciences	Islamabad
82	Maroof Ali Turi	M.Phil	Plant Sciences	Parachinar
83	Siraj Khan	M.Phil	Plant Sciences	Bannu
84	Shehzad Azam	PhD	Botany	Mirpur
85	Haroon Ahmed	M.Phil	Botany	Mirpur
86	Mehwish Maqbool	M.Phil	Botany	Mirpur
87	Sana Sohail	M.Phil	Environmental Sciences	Islamabad
88	Riffat Shabbir	M.Phil	Environmental Sciences	Chakwal



89	Afshan Bukhari	M.Phil	Environmental Sciences	Bakhar
90	Mubashara Sadia	M.Phil	Environmental Sciences	Rawalpindi
91	Farhat Yasmin	PhD	Botany	Rawalpindi
92	Sumbal Khalil Chaudhry	PhD	Botany	Rawalpindi
93	Huma Qureshi	PhD	Botany	Gujar Khan
94	Raheel Zahid	MS	Health Informatics	Islamabad
95	Wasiullah Khan	M.Phil	Biotechnology	Bannu

**Table 2.4.2 List of Participants (Faculty)**

Sr. No.	Name	Designation	Department	University
96	Dr. Muhammad Naeem	Assistant Professor	Biotechnology	QAU
97	Dr. Muhammad Zia	Assistant Professor	Biotechnology	QAU
98	Dr. Bilal Haider Abbasi	Assistant Professor	Biotechnology	QAU
99	Dr. Fawad Ali	Lecturer	Pharmacy	RIPS
100	Dr. Hassan Afzaal	Lecturer	Pharmacy	RIPS
101	Dr. Imran Khanzada	Lecturer	Pharmacy	RIPS
102	Dr. Mazhar Iqbal Zafar	Assistant Professor	Environmental Sciences	QAU
103	Dr. Mushtaq Ahmad	Assistant Professor	Plant Sciences	QAU



104	Dr. Muhammad Zafar	Herbarium Botanist	Plant Sciences	QAU
105	Dr. Saima Saleem	Assistant Professor	KIBGE	University of Karachi
106	Dr. Sitwat Zehra Jaffery	Assistant Professor	KIBGE	University of Karachi
107	Dr. M. Ishtiaq	Chairman	Botany	MUST
108	Mrs. Waheeda Jawad	Lecturer	Botany	MUST
109	Dr. Muhammad Arshad	Professor/ Chairman	Botany	PMAS-AAUR
110	Dr. Abida Raza	Director	Molecular Biology	NORI

Key: QAU (Quaid-I-Azam Univeristy, Islamabad), MUST (Mirpur University of Science & Technology, Azad Kashmir), FJWU (Fatima Jinnah Women University, Rawalpindi), PMAS-AAUR (Pir Mehar Ali Shah Arid Agriculture University, Rawalpindi), RIPS (Ripah Institute of Pharmaceutical Sciences, Islamabad), NORI (Nuclear Medicine, Oncology and Radiotherapy Institute)

**Table 2.4.3 List of Stakeholders/dignitaries**

Sr. No.	Name	Designation	Organisation/Institute
1	Prof. Dr. Mukhtar Ahmed	Chairperson	Higher Education Commission
2	Ahsan Iqbal Chaudhry	Federal Minister	Planning, Development & Reforms
3	Prof. Dr. Ara Tahmassian	Chief Research Compliance Officer	Harvard University (USA)
4	Prof. Dr. Khan Bahadar Marwat	Vice Chancellor	Shaheed Benazir Bhutto University, Dir
5	Prof. Dr. M. Qaiser	Vice Chancellor	University of Karachi



6	Dr. Tanweer Ahmed	Director & Head	Lincolnshire Clinical Research Facility, Research & Development & IP Lead, United Lincolnshire Hospitals NHS Trust, Research and Development Department, Lincoln County Hospital (UK)
7	Prof. Dr. Muhammad Mukhtar	Chairman	Department of Biotechnology, American University of Ras Al Khaimah, UAE
8	Prof. Dr. Abid Azhar	Dean & Director	Faculty of Sciences, University of Karachi & KIBGE
9	Prof. Dr. Javed Ashraf	Vice Chancellor	Quaid-I-Azam University
10	Dr. Mansoor Akbar Kundi	Executive Director	Higher Education Commission
11	Prof. Dr. Masoom Yasinzai	Rector	Islamic International University, Islamabad
12	Dr. Anwar-ul-Hassan Gillani	Chairperson	Pakistan Council for Science & Technology
13	Dr. Shaukat Hameed Khan	Coordinator General	COMSTECH
14	Dr. G. A. Miana	Rector/Director	Ripah Institute of Pharmaceutical Sciences
15	Prof. Dr. Wasim Ahmed	Dean	Faculty of Biological Sciences, QAU
16	Prof. Dr. Muhammad Yahya Khawaja	Member Information Technology and Science & Technology	Ministry of Planning, Development & Reforms



17	Prof. Dr. Muhammad Ashraf	Chairman	Pakistan Science Foundation
18	Mufti Adnan Kakakhel	Religious Scholar	
19	Dr. N. M. Butt	Chairman	PINSAT

\*COMSTECH (Ministerial Standing Committee on Scientific and Technological Cooperation),  
PINSAT (Preston Institute of Nano Science & Technology)



Dr. Zabta Khan Shinwari delivering his lecture



Guest of Honour Dr. Mukhtar Ahmed addressing the participants during inaugural session



Participants of the workshop



Prof. Dr. K. B. Marwat, Prof. Dr. Zabta K. Shinwari, Mr. Ahsan Iqbal Chaudhry and Dr. Anwar Nasim (from right to left) during second half of the inaugural session



Prof. Dr. Ara Tahmassian delivering his talk on “Importance of sound policies in biological sciences” during first half of the inaugural session



Group Poster Presentations during the workshop



# Biolab Management

Ali Q, Ambreen S, Hassan A, Khan I, Khan S, Riaz R, Saeed A, Zamir M, Zia A.  
Department of Biotechnology, Quaid-i-Azam University, Islamabad.

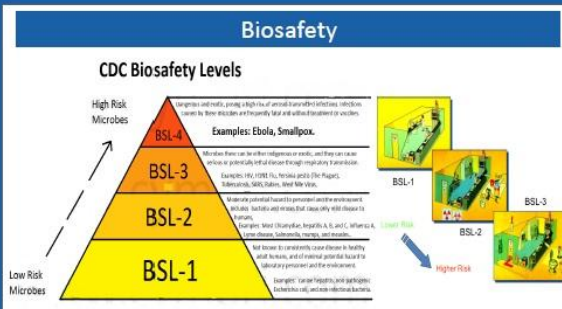
### Introduction

Lab management is integration and coordination of organizational resources (people, equipment, procedure, suppliers) to provide quality lab services as effectively as possible. Biolab management is further divided to address two major domains related to the dual use of resources and information in a lab. These two domains are:

- Biosafety
- Biosecurity

### Biosecurity Management

<b>M</b> aterial Management	<b>P</b> ersonal management	<b>I</b> nformation management
<ul style="list-style-type: none"> <li>Inventory control</li> <li>Inventory information</li> <li>Material in storage</li> </ul>	<ul style="list-style-type: none"> <li>pre-employment scrutiny</li> <li>delegation of responsibility</li> <li>access rights and employees</li> <li>responsibility managing conflicts</li> </ul>	<ul style="list-style-type: none"> <li> safeguarding sensitive biological material</li> <li> unpublished experimental data</li> <li> hazardous material</li> <li> laboratory assets or employees</li> </ul>



### Concerns with Mismanagement

The threat to world or regional public health from the escape of lab pathogens	Significant source of recent data on laboratory-acquired infections	Handling dangerous pathogens in biological safety cabinets only in certain dedicated rooms
Viral isolates expressed "temperature sensitivity"	Carcinogenic chemicals are routinely used and any lack of safety may cause mutation	Some chemicals can cause irritation, skin problems and respiratory tract problems
Lack of proper handling with virulence strains of microorganisms	Drinking and eating inside lab conditions	Lab equipments must be maintained properly to minimize the risks of pseudo results
Transgenic research containments are fully organized to avoid the chances of risk	Biosafety guidelines are not followed	Lab precautionary measures are required for proper management

### Laboratory Practices

	Introduction	Objectives and goals of GLP	Training of Personnel
	Laboratory instruments & equipments	Sampling	Documentation of lab work and records
	Emergency Response and Safety	Precautions for safe storage of chemicals and other sharps	Self-protection
	Waste treatment and Storage of infectious material	Vaccination	Potential Laboratory Hazards

### Situation in Pakistan

- Establishment of National Biosafety Committee and its functions.
- Pakistan Biological Safety Association.
- Biosafety lab opened at NIH and Gilgit to handle microorganisms.
- Violation of biosafety lab rules.

### Maintenance

- Refurbishing
- Repairing
- Calibration System
- Cleaning

### PAKISTAN BIOSAETY ORDINANCE 2015 and QAU-REC

PAKISTAN BIOSAETY ORDINANCE 2015 (JANUARY 7, 2015)

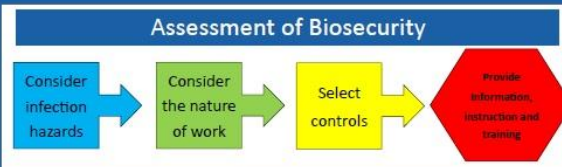
- National Environmental & Biosafety Regulatory Authority
- Quid-i-Azam University Research Ethics Committee
- National biosafety committee
- Technical advisory committee

Quid-i-Azam University Islamabad Pakistan is guided by the ethical principles regarding all research involving humans, experimental animals, plants, microbes and environment.

HUMANS	EXPERIMENTAL ANIMALS	PLANTS RESEARCH	MICROBIAL RESEARCH	BIOLOGICAL DISPOSAL
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### Conclusion

After going through the two basic domains of the biolab management, one may come to the conclusion that there are well defined rules to manage a biolab in terms of biosafety and biosecurity. These rules clearly define and comprise of all the necessary subjects that need to be covered in this aspect. Globally, a loop hole is seldom found between the statement of guidelines and their implication. Moreover, to check the constant application of all the guidelines a feedback mechanism is usually put in place to ensure the safe working simultaneously. But, when it comes to Pakistan, awareness is there and so are the policies as well as guidelines. The only thing that we lack is in application and implication of those guidelines which can be rendered better with time.



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Poster on "Bio-lab Management"

# ENHANCING NATIONAL PREPAREDNESS TO BIO-THREAT

Authors: Nida N., Naseer A., Najeeb ullah S., Mariam K., Ramsha T., Kaneez F., Tanzeel Z., Ghazal K. & Zabta A. S., Deptt. of Biotechnology



## INTRODUCTION:

### ➤ BIOLOGICAL DISASTERS:

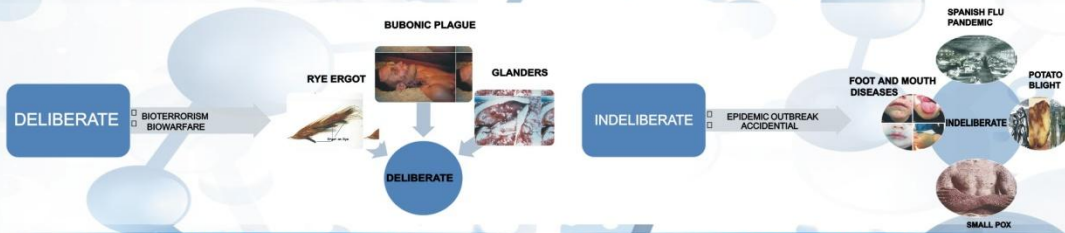
- **INDELIBRATE:** Natural: epidemics or pandemics of existing, emerging or re-emerging diseases
  - **Epidemics:** In 1916 "**POLIO EPIDEMIC**" occurred in the United States.
  - **Accidental:** In 1918 "**THE SPANISH FLU**" mutating influenza viruses swept through the military lines in World War I to the civilian population.
- **DELIBERATE:** Pestilences or man-made, use of disease causing agents in Biological Warfare (BW) operations or incidents of Bioterrorism (BT).
  - **Bioterrorism:**
    - In 6<sup>th</sup> Century "**ERGOTISM BY RYE ERGOT (sclerotia)**" by the Assyrians against the Israelites.
    - In 1763 "**SMALL POX**" infected blankets were given by British Army to Delaware Indians.
    - In 1942 "**ANTHRAX SPORES**" filled five thousand bombs were made by US army and used in experiments at Camp Detrick in Maryland.

### ➤ BIOPREPAREDNESS: is a way to handle biological disaster.

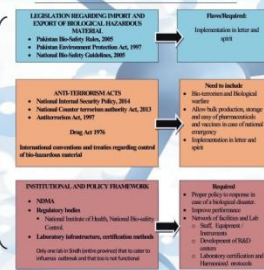
### ➤ Current Pakistan bio-preparedness to bio-threat.

- Various bio-safety and bio-security measures have been taken in this regard using both the legislative/policy instruments.
- The formation of working groups and organizations to ensure public health and safety.

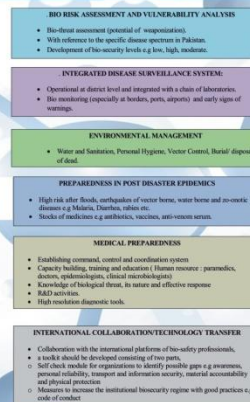
### ➤ Aim of Study: To study existing legislative and regulatory measures regarding bio preparedness and the way of enhancing national bio-preparedness to bio-threat.



## EXISTING NATIONAL LEGISLATION/ POLICY MEASURES



## ENHANCING NATIONAL BIO-PREPAREDNESS



## CONCLUSION:

Keeping in view of the existing legislation and current scenario of the continent, there is a need to enhance national bio-preparedness to bio-threat by means of above mentioned issues including

- Implementation of existing laws.
- Development of diagnostic bioterrorism response strategies
- Multisectoral and international laboratory cooperation to obtain rapid detection and identification of bio-threat agents.
- Laboratory infra structure and standards.
- R&D activities, validation and implementations of methods.
- Efficient IT-systems for sharing of data

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# Strategies to mitigate the Bio-safety and Biosecurity concerns of research

Bilal A. Khan, A. Rafay Javed, Lutfur Rahman, Attarad Ali, Hilba Ejaz, Fakhara Anjum, Madeeha Afzal and Salma Mushtaq  
Department of Biotechnology, Quaid-I-Azam University, Islamabad

## Introduction

Security and safety are among the fundamental principles that lay the foundation of a prosperous society. Hence, any disaster can have a severe impact on the people's life; however, an effective, pre-emptive and well-defined strategy can prevent a significant amount of losses.

## Bio-safety

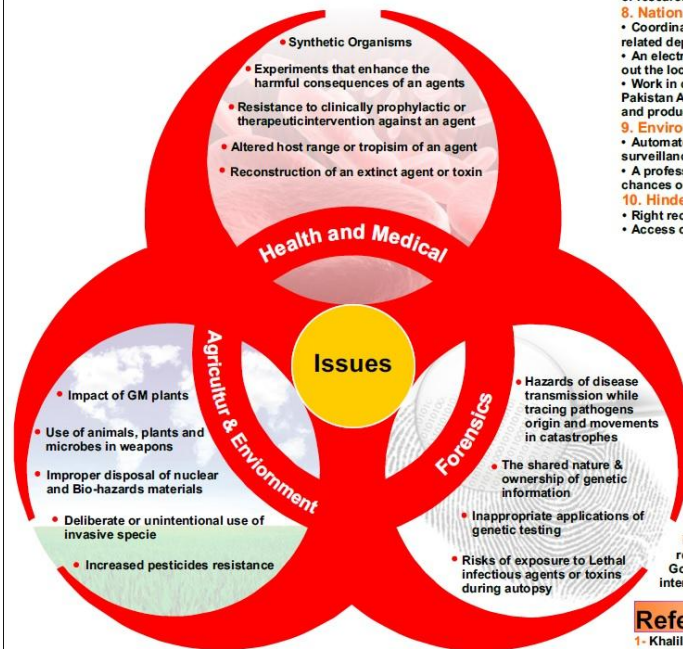
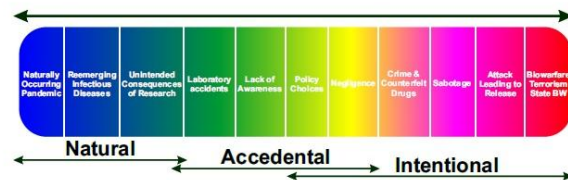
*"Biosafety protects people from germs"*  
The containment principles, technologies and practices that are implemented to prevent unintentional exposure to pathogens and toxins, or their accidental release.

## Bio-security

*"Biosecurity protects germs from people"*  
The protection of microbiological assets from theft, loss or diversion, which could lead to the inappropriate use of these agents to cause public health harm.

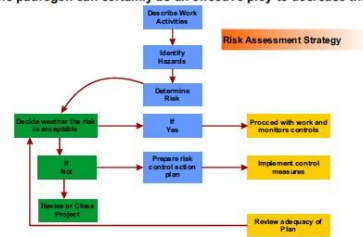
## Mission

To engage scientists worldwide to promote the safe, secure and responsible use of dangerous biological materials, technology and expertise in order to prevent biological weapons proliferation and bioterrorism.



## Strategies

- The export and import of biological agents and toxins**
  - The export requires a license issued by MKE as stipulated under the Foreign Trade Act and the Combined Notification.
  - Imports are regulated under the CBWPA except for cases authorized by the Act on the Prevention of Contagious Animal Diseases and the Plant Quarantine Act
- National declaration and authorization system for biological agents and toxins**
  - To enhance Biosafety by MKE
  - Conducted inspections of facilities producing and possessing biological agents and toxins regulated by the CBWPA
  - Producers and possessors submit declaration reports on production and possession
  - Standards on installation and management of such facilities
  - Certified or declare themselves in accordance with the risk level of pathogens
  - Safety rules at each level in appropriate research facilities
- System for the categorization of export control items**
  - Export Control Numbers compatibility in trade with the EU, Australia and the USA
  - With the revision of the Foreign Trade Act and the Combined Notification: in 23 December 2004, MKE
- A Tracking System to Monitor Highly Dangerous Pathogens**
  - Safe management of specific pathogens - CDC
  - Unique tracking numbers: to the specific traits/ the date of isolation or importation/ the related institution/ other relevant information/ the use, transportation, and conservation of the pathogens are then monitored
  - Diagnostic facilities need to be electronically connected
- Public awareness and Training programs on Biosafety and Biosecurity - two major programs -PCDC**
  - Biological Safety Management Course: researchers in non-governmental institutes
  - Laboratory Biological Safety Course: researchers in government agencies.
  - The Biosafety and Biosecurity Newsletter
  - Provides consultation services - installation and management of the research facilities
- International Symposium on Biosafety and Biosecurity**
  - Strengthen awareness
  - Raise and review the domestic management system
  - National Biosafety center (2005), Environment Protection Agency (EPA) and Pakistan universities
  - Biosafety and biosecurity experts from the USA, Canada, and Japan
- NVRQS: The National veterinary research and quarantine Service**
  - Its own strict regulations
  - Inspections to assess the management of livestock infectious disease agents
  - National Regulations of Livestock Infectious Agents
  - Examine the situation of storage and facilities for infectious agents, the safety management of research facilities, and education on the National Regulations
- National Biosecurity Centre**
  - Coordinate all the related ministries (health, agriculture, livestock, environment) and the related departments
  - An electronic disease reporting system and geographical information system that can trace out the locality of new pathogenic strains
  - Work in collaboration with different societies such as the Pakistan Botanical Society, Pakistan Academy of Sciences, PASTIC, etc., to initiate funding in the area of mutual interest and produce well-equipped knowledge-based human resource.
- Environmental Monitoring and Epidemiological Surveillance**
  - Automated remote sensing capabilities like TWOBIA (two-stage rapid biological surveillance and alarm system) detect pathogen in environment
  - A professional surveillance system is needed to be adopted at the borders to prevent any chances of smuggling across the borders
- Hindering the Biological Weapon Acquisition**
  - Right recipe in right hands
  - Access control to the pathogen can certainly be an effective ploy to decrease the risk.



## Conclusions

'Prevention is better than cure' is a concept that permeates biosafety & biosecurity policy. Management, communication between departments and awareness of community is required. Governments should prioritize funds in prevention, eradication and control of local & international threats.

## References

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A poster on "Strategies to mitigate biosafety and biosecurity concerns of research"



# Policy Issues and Dual use of Education

PRESENTED BY: Aisha Siddiquah  
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*It is just impossible to talk only of technology transfer one should talk of science transfer and technology transfer later, unless you are very good at science you will never be good at technology*  
 " Prof. Dr. Abdu'ss Salam (Nobel Laureate)

### OBJECTIVES

- The dual-use challenge.
- Benignly intended research may be subject to misuse
- Dual-use challenge in relation to scientific responsibility
- Exploring how the dual-use challenge relates to scientific responsibility
- The role of international laws and influence on the conduct of scientific research and its place in the 'web of prevention'.
- To promote specific awareness and understanding and the international legal instruments relevant to the dual-use challenge.

### WHAT IS DUAL USE RESEARCH?

"Research that based on understanding can be reasonably anticipated to provide knowledge products or technologies, that could be directly misapplied by others to pose a threat to public health and safety, agricultural crops and other plants, animals ,the environment, the material."



### DUAL USE IS NOT NEW

- Generation of new knowledge and techniques were often accompanied by misgivings about their abuse and misuse.
- Such as nuclear science, which can be used to produce:
  - Energy(a peaceful purpose)
  - Or for nuclear bombs.

### DUAL USE IN RELATION TO LIFE SCIENCES

- Biotechnology can be subverted for misuse by hostile individuals or nations.
- The major vehicles of bioterrorism, based on materials and techniques that are available throughout the world and are

### INTERNATIONAL LAWS

- Some problems are beyond the ability of individual states to address; in these cases states tend to cooperate internationally to more effectively address common concerns.
- A key form of such cooperation is the development of international law – generally in the form of treaties, conventions, standards and guidelines – to set out expectations for state behaviour.
- 1925 Geneva Protocol
- NCTA(2014) UNSCR (1947)
- NISP (2014) BTWC (1972)
- Legislative bodies

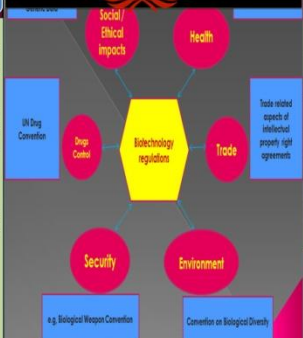
**INTERNATIONAL LAWS**

- EIAW
- NBC
- IBC
- CICB

**INTERNATIONAL LAWS**

- SECDIV
- PBSA
- HCEC
- NACTA





Biotechnology regulations

### National Policies

- Pakistan Biological safety Association
- Strategic Export Control Division
- Establishment of Inter Agency working group. (Task force)
- Pakistan Environmental Protection act (1997)
- Bio-safety rules
- National bio-safety guidelines (2005)
- National Internal security policy (2014)
- Comstech International Committee on Bioethics (CICB)
- Pakistan Export Control list (2005-2011)
- National Bio-safety Center
  - National Bio-safety committee
  - National advisory committee
  - Institutional Bio-safety committee
  - National Bio-ethic committee

### ISSUES

- The lack of international consensus, standardization and enforcement as varying interpretations of risk,
- beneficence and responsibility will affect the development and implementation of dual-use controls

### INTERNATIONAL LAWS

easily acquired (National Research Council, 2004, )

**"With great knowledge comes great responsibility,"**

**Internal Responsibilities of Scientists**  
 Covers several instructional areas:

Human Subjects

Conflict of Interest and Commitment

Animal Welfare

Peer Review

Publication Practices and Responsibilities

Research Misconduct

Collaborative Science

**External Responsibilities of Scientists**

- Scientists must be prepared to consider their responsibilities associated with, for example, emerging technologies (Professional Ethics Report, 2011)

### BUILD RESPONSIBILITIES THROUGH ETHICAL DELIBERATION

- Assess their own research efforts for dual-use potential and report as appropriate.
- Serve as role models for responsible behavior, especially when involved in research that meets the criteria for dual-use research of concern.
- Be alert to potential misuse of research.
- Train others to identify dual-use research of concern, manage and communicate it responsibly.

### Codes of conduct for life scientists

five fundamental principles:

- Awareness
- Safety and security
- Education and information
- Accountability
- Oversight

### WEB OF PREVENTION

- Includes diverse activities such as physical containment and personnel issues
- Improving the communication between security, law enforcement and life science organizations, and the coordination of international oversight. In one formulation include initiatives such as:

Export controls

Disease detection and prevention

Effective threat intelligence

Bio-safety and bio-security initiatives

Oversight of research

International and national prohibitions

Education and codes of conduct

Lentzos F. (2008).

### SUGGESTIONS

- The gap between scientific and regulatory development should be closed.
- Bottom-up ethical governance, through the incorporation of particular norms in scientific research culture must be promoted, rather than relying solely on top-down governmental implementation of international rules.
- The scientific community should be obliged to develop, implement and adhere to precautionary measures
- An introduction to dual use issues should be part of the education of every life scientist.
- Differences in approaches to dual-use issues should be recognized (Bezuidenhout L. & Rappert B., 2009).

### FUTURE DIRECTIONS

- Context Matters
- Learning Matters.
- Criteria for Ethics Programs and Activities
- Interactivity Matters
- Mentoring
- Evaluation
- Social Responsibility and RCR (Responsible Conduct of Research)

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Poster on “Policy Issues and Dual Use Education”



#### 2.4.4 Speakers' Presentations

During the workshop, speakers delivered their talks on a range of subjects related to dual use issues of science highlighting the importance of policy making in regulation of safe conduct of research. Talks on dual use potential of science, risks associated with emerging sciences, role of individual scientists as well as the government in responsible science conduct and the need for policy making were delivered by various eminent scientists. Government representatives, fellows of PAS as well as heads of various scientific organisations attended the workshop. Dr. Mukhtar Ahmed (Chairman HEC) was the guest of honour while Mr. Ahsan Iqbal Chaudhry (Federal Minister) was invited as the chief guest in the inaugural session. Dr. Anwar Nasim (President Pakistan Academy of Sciences, PAS) gave a brief history of PAS during his welcome note. He emphasized on the importance of role of science in the development of the country and requested the Federal Minister for Planning, Development and Reforms that government must be more actively engaged with the scientists of the country for promotion of Science and Technology.

Speaking on the occasion, Dr. Zabta Khan Shinwari (Secretary General PAS) commented that academy can play a pivotal role in the promotion of S & T in the country with the help and support of all stake holders including Government of Pakistan. Keeping in view the current trend of science based economy; Prof. Zabta advised the Minister that Biotechnology should be on the economic agenda of the country. He emphasized that the voice of the scientists should be given importance in the policy making of the country and this may be done either formally through involvement of national academy, advisory committee or informally in which the scientist may be consulted as a periodic “advisor” at all levels of policy making. At the end of his speech he extended full support of the Academy to help the government in promoting science and technology in the country.

In his inaugural address, Federal minister Ahsan Iqbal Chaudhry informed the audience that government has launched a scheme “Technology Innovation Fund” with one billion rupees allocated to country’s young scientists to provide them an opportunity to conduct innovative research. While further explaining the science friendly policies of the current government, he apprised the audience that the government is going to initiate a



Science Talent Farming Scheme in which 500 outstanding students will be selected after Matriculation and they will be given full scholarship both locally and internationally till their PhDs in scientific disciplines. He requested PAS to assist the Government in mentoring such outstanding students and make the scheme successful in achieving its goals. He also appreciated the awareness raising campaign of Pakistan Academy of Sciences about dual use related issues in Pakistan. He commented that dual use of science can be related to the dual nature of human being. Thus individual scientists must recognise their responsibilities in doing ethical science. Dr. Mukhtar Ahmed said that Pakistan is a responsible nation and Pakistani Scientists are well aware of their national as well as global responsibilities.

Prof. Dr. Ara Thamassian was of the view that recent change in research paradigm has enhanced our knowledge base as well as attracted more research spending in science. But at the same time, the safety and security issues have become more prominent and there is a need for research oversight with regulations, policies and practices relevant to each field of science (i.e. risk based). Other eminent scholars Dr. Tanweer Ahmed, Prof. Dr. K. B. Marwat, Prof. Dr. Abid Azhar and Prof. Dr. M. Mukhtar discussed various issues related to dual use education.

Following were the main focus of their talks:

- Science policies being followed internationally including a brief picture of international science regulations
- In biomedical field, highly regulated policies to be developed regarding clinical trials on human subjects
- Enhancing national research ethics and biosecurity through establishing public science literacy programs

A renowned religious scholar Mufti Adnan Kakakhail enlightened us by his special lecture on “religion supports responsible conduct of research, emphasizing the ethics as the very basis of our faith.

#### **2.4.5 Interactive learning (Posters presentation and Skits)**

Active involvement of the students was ensured during the workshop. For this purpose students were given the chance to design posters relevant to the theme of the workshop which were presented by them during various sessions. Two skits were also presented.



The Posters were presented on the following themes:

- Bio-Laboratory Management
- Enhancing National Preparedness to Bio-threats
- Policy Issues & Dual Use Education
- Strategies to Mitigate Biosafety and Biosecurity Concerns in Research

A skit “Dual Use Education: The Level of Awareness” was presented with a lighter mood to draw attention towards lesser awareness of biosafety and biosecurity related concepts among researchers, practitioners and policy makers in the less developed countries like Pakistan and need to take necessary measures. The other skit “potential threats of emerging technologies” was about recent researches on inheritable genetic modifications in humans. It not only highlighted the need for greater control over enhancement technologies and strong measures to regulate these but also encouraged young scientists to be the guardians of science and recognize their responsibilities in doing ethical research i.e. doing science only for the benefit of humanity.

The event was a great success. The organizers were successful in initiating a network that aims at involving scientists and policy makers to promote science within the legal framework. The concept of interactive and participatory learning has been incorporated in the Dual use related awareness raising activities through several training workshops by PAS in collaboration with IAP. This workshop is one of its kinds. This approach has proved effective over and over again.





### **3. Meeting on “Conduct of Responsible Science” at PAS**

A meeting was held at Pakistan Academy of Sciences (PAS) on 1<sup>st</sup> January, 2015 with the main theme of promoting “conduct of responsible science” under the IAP project. It was attended by eminent scientists (also fellows of PAS) and young scientists and researchers from various universities. The newly elected leadership of the institute (Dr. Anwar Nasim as President and Dr. Zabta Khan Shinwari as Secretary General) committed to take forward this agenda and to raise awareness about importance of “responsibility in conducting research with dual use potential” in the scientists.

The main agenda of the meeting was to provide a starting point to ponder over how the academy can contribute towards widening the concept of responsible scientific research in the country. Dr. Anwar Nasim pointed out that lack of education and training was the basic problem in the responsible and quality conduct of science and so the human resource development through continuous training of young researchers is necessary and in turn these trained scientists can serve as an impetus in spreading awareness of this notion further.

Speaking at the meeting, Dr. Zabta Khan Shinwari emphasized that we can accomplish our mission through mutual co-operation and involvement of scientific think tanks as well as youth. He also urged the media to play a role in popularizing the concept of responsible science in masses. Furthermore, views were shared on what strategies to be adopted for wider dissemination of this idea. The representatives of the youth were encouraged in the meeting to give their input as well. It was decided that regular meetings will be held on the subject in order to discuss and develop proper measures. Dr. Mukhtar Ahmad, chairman Higher Education Commission appreciated the participation of young scientists in the meeting.



**Table 3.1 List of attendees of the meeting**

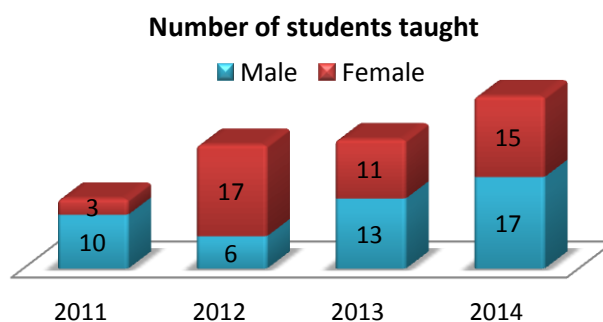
<b>Sr.No.</b>	<b>Name</b>	<b>Designation &amp; Name of Institution</b>
1	Dr.Mukhtar Ahmed	Chairman HEC
2	Dr.Manzoor H. Soomro	ECO Science Foundation
3	Prof.Dr..Masoom Yasinzai	Rector Islamic International University Islamabad
4	Dr. Mansoor Akbar Kundi	Executive Director HEC
5	Prof.Dr.Amin Badshah	Quaid-I-Azam University Islamabad
6	Dr. Anwar Nasim	President PAS
7	Prof.Dr.Gul Majeed Khan	Quaid-I-Azam University Islamabad
8	Prof. Dr. Zabta K.Shinvari	Secretary General PAS
9	Subhan-ud-Din	Pakistan Academy of Sciences
10	Andleeb Zafar	Pakistan Academy of Sciences
11	Dr.Ali Ahmad	National Centre for Physics, Islamabad
12	Dr Bilal H.Abbasi	Quaid-I-Azam University Islamabad
13	Dr. Hamid Saleem	Institute of Space Technology, Islamabad
14	Brig. Aamer Ikram	Armed Forces Institute of Pathology, Rawalpindi
15	Dr.A.Rashid	Pakistan Academy of Sciences
16	Samina Bashir	Student (PhD) Quaid-I-Azam University Islamabad
17	Dr.Riffat M. Qureshi	National Centre for Physics, Islamabad
18	Dr.M.Asam Baig	National Centre for Physics, Islamabad
19	M.Akhter Javad	ICOM Pakistan
20	Javed Ashraf	Quaid-I-Azam University Islamabad
21	Nadia Batool	Student (PhD) Quaid-I-Azam University Islamabad
22	Faouzia Tanveer	Student (PhD) Quaid-I-Azam University Islamabad
23	Fazal Akbar	Student (PhD) Quaid-I-Azam University Islamabad

24	Usman Saeed	National Centre for Physics, Islamabad
25	Dr.Fazeel M. Khan	Institute of Space Technology, Islamabad
26	Mohsin Siddiq	National Centre for Physics, Islamabad
27	Qamar-UI-Haq	PINSTECH (Institute of Nuclear Science and Technology), Islamabad
28	Muhammad Imran Qureshi	National Centre for Physics, Islamabad
29	Shaukat Ali	PINSTECH (Institute of Nuclear Science and Technology), Islamabad
30	Shahbaz Bhatti	The Nation
31	Dr. Bushra Mirza	Quaid-I-Azam University Islamabad
32	Sayed Paras Ali	Technology Times
33	Dr.Waqas Qazi	Institute of Space Technology, Islamabad
34	Dr.Sajid Ghuffar	Institute of Space Technology, Islamabad
35	Ahmed W.Zubairi	Institute of Space Technology, Islamabad
36	Lutfur Rahman	Student (M.Phil) Quaid-I-Azam University Islamabad
37	Zeeshan Ahmad	Student (PhD) Quaid-I-Azam University Islamabad
38	Tariq Khan	Student (PhD) Quaid-I-Azam University Islamabad
39	Ibrahim Khan	Student (M.Phil) Quaid-I-Azam University Islamabad
40	Waqas Bashir	Institute of Space Technology, Islamabad
41	M.Qaiser	Student (M.Phil) Quaid-I-Azam University Islamabad
42	Sohail Ahmad Jan	Student (PhD) Quaid-I-Azam University Islamabad
43	Akhtar Nadhman	Student (PhD) Quaid-I-Azam University Islamabad

44	Dr.Asif Sajjad	World Wildlife Fund Pakistan
45	Muhammad Adil	Student (PhD) Quaid-I-Azam University Islamabad
46	Ikram Ullah	Student (PhD) Quaid-I-Azam University Islamabad
47	Abdual Wakeel	Student (M.Phil) Quaid-I-Azam University Islamabad
48	Amjad Khan	Student (M.Phil) Quaid-I-Azam University Islamabad
49	Khaista Rahman	Student (M.Phil) Quaid-I-Azam University Islamabad

#### 4. Capacity building

In addition to interactive workshops, Department of Biotechnology Quaid-I-Azam University has also been offering a course “Bioethics and Dual Use Education” as a core subject at post graduate level for a period of last few years (figure 4.1). Human resource development through education and training of young scientists about the responsible and quality conduct of science is necessary and has been a part of the efforts done in terms of raising awareness on the respective subject.



**Figure 4.1** Number of students enrolled in course “Bioethics and Dual Use Education” (Years: 2011-2014)



## 5. Publications

Shinwari ZK, Khalil, AT, Nasim, A (2014). Natural or Deliberate Outbreak in Pakistan: How to Prevent or Detect and Trace its Origin: Biosecurity, Surveillance, Forensics. *Archivum immunologiae et therapeuticae experimentalis*, 62(4), 263-275.

Khalil AT, Shinwari ZK (2014). Threats of Agricultural Bioterrorism to an Agro Dependent Economy; What Should be Done?. *J Bioterror Biodef* 5:127. doi: 10.4127/2157-2526.1000127

Khalil AT, Tanveer F, Shinwari ZK (2015). Pakistan's Bio-Preparedness With Regard To Biosecurity, Biodefense Strategies and Policy Measures. *J Bioterror Biodef* 6: 132. doi:10.4127/2157-2526.1000132

Apart from these publications, a book entitled “Dual Use Education Concerns in Biotechnology: A Perspective from Pakistan” including the results of survey on educators has been written and is in the process of editing.

## Conclusion

The survey provided valuable insight on the levels of awareness, attitudes and opinions of educators about dual use issues in addition to the information about the current educational offerings in the life sciences discipline. Seeing the responses of the educators about Dual Use concerns in life sciences, it was obvious that majority was well aware of the Bioethics and its related terms yet the concept of dual use was not taught as a separate course in majority of the universities. There is a need that separate courses may be introduced for the student on dual use concept or at least be incorporated in the curriculum of all the universities offering life sciences subjects in Pakistan.

The workshops were conducted with the aim of raising awareness about dual use related concepts in scientific community of Pakistan. The involvement of practising scientists (young researchers as well as faculty), stakeholders and policy makers was ensured. Thus all these efforts encompass educating life scientists so that they must understand their responsibilities about safe and ethical conduct of research. Awareness raising programs such as seminars, symposia and workshops provide a good platform for training scientists especially the young researchers. It can be inferred from the analysis of interactive workshops that incorporation of



participatory learning in the awareness raising programs proved effective in achieving the goal of imparting education on Dual Use Research Concerns.