

***FIELD BIORISK MANAGEMENT:
AN ASSESSMENT OF THE
BIOLOGICAL SAFETY PROFESSION***

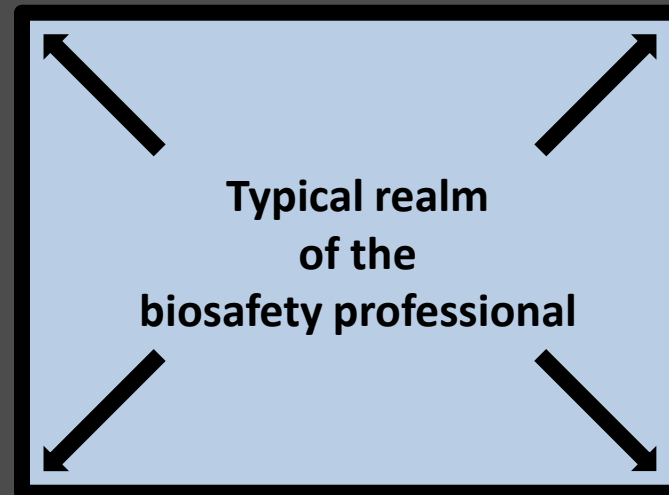
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Applicability to the Biosafety Profession

- Why does the topic of field research safety concern biosafety professionals????

Research laboratory working
with infectious biological agents



EXAMPLES OF FIELD COLLECTION ACTIVITIES INVOLVING POTENTIALLY INFECTIOUS SPECIMENS:

Human specimens

- From field screening activities
- During an emergency/disaster
- Forensic samples
- Obtained in clinical setting

Animals/Plants/Fish/Insects

- Whole animals
- Diseased parts
- Specimens / Field necropsy

Water samples

- Ambient
- From untreated sources
- From badly polluted sources
- Cooling towers

Mold/Fungi

- Routine sampling
- Gross contamination

Food

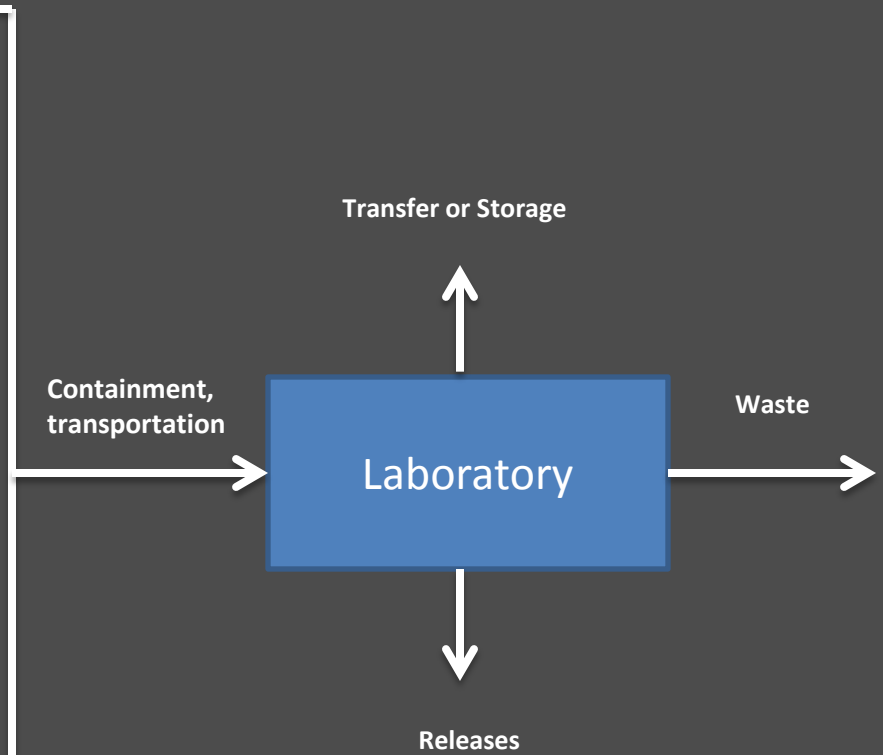
- Routine screening for contamination
- Foodborne illness outbreak investigation

Archeological samples

- Retrospective investigation of infectious disease

Quality Assurance testing

- Air, mold samples



USDA ARS Presentations / Resources

- **Dr. Robert Ellis – Risk Assessment for Field Work**
http://arssymposium.absa.org/usdaarswp/wp-content/uploads/2015/02/1400_Ellis_ARS_USDAFeb3_2015.pdf
- **Dr. Patrice Klein – Veterinary Concerns for Biosafety in Field Research**
http://arssymposium.absa.org/usdaarswp/wp-content/uploads/2015/02/1530_Klein_ARS_USDAFeb4_2015.pdf
- **Dr. Sue VandeWoude – Field Biosafety Issues in Animal Wildlife Research**
<http://arssymposium.absa.org/pdf2013/V-VandeWoude.pdf>
- **Dr. Kathrin Summermater – From the Field to the Laboratory**
<http://arssymposium.absa.org/pdf2011/Session2RoundtableGriot.pdf>
- **Dr. Rocky Smiley – Strategies for Conducting Field Research Safely**
<https://www.ars.usda.gov/ARSUserFiles/50800000/IntroFieldSafetyCourse.pdf>
- **And others...**

Examples of Field-Associated Infections

- **Ebolavirus during a field necropsy on a Chimpanzee in the Ivory Coast (Le Guenzo, 1999)**
- **Aerosol exposure to surface waters with toxigenic bloom of dinoflagellate *Pfiesteria piscicida* in Maryland; seven individuals affected (Haselow, 2001)**
- **Hantavirus pulmonary syndrome case following field collection of live small animals in West Virginia (Sinclair, 2007)**
- **Fatal case of pneumonic plague from direct blood and aerosol exposure during necropsy of a mountain lion in Arizona (Wong, 2009)**
- **Zika virus transmission from exposure that occurred during collection of mosquitoes in Senegal (Foy, 2011)**
- **Infection with *Leishmania (Viania) naiffi* after capturing and handling birds in Brazil (Felinto de Brito, 2012)**

More Recent Tragedies

- **Sharon Gray** – plant biology post-doc at UC-Davis, killed when rock went through car window and hit her during land rights protest in Ethiopia – October 2016
<https://www.ucdavis.edu/news/sharon-grays-mentorship-lives-on/>
- **Gordon Hamilton** – professor at UMaine conducting climate systems research, died in snowmobile crash into crevasse in Antarctica – October 2016
<https://umaine.edu/news/blog/2016/10/23/leading-umaine-researcher-perishes-accident-antarctica/>
- **Jana Robeyst** – Wildlife Conservation Society field researcher, killed by getting charged by wild elephant in Democratic Republic of Congo – April 2016
<http://voices.nationalgeographic.com/2016/04/15/a-tribute-to-jana-robeyst-remembering-her-dedication-to-wildlife/>
- **Keren Embar** – post-doc at Ben Gurion University (Israel) studying hantavirus, died of hantavirus while studying voles in Finland – August 2014
<http://www.ynet.co.il/articles/0,7340,L-4555889,00.html>
- **Luigi Michaud** – research fellow at University of Messina (Italy) developing new antibiotics for the treatment of cystic fibrosis, died while diving in Antarctica collecting marine bacteria – January 2014
http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11190446
- **Subramanian Bupathy** – herpetologist at Salim Ali Centre for Ornithology and Natural History (India), died from severe fall in mountains while studying reptiles – April 2014
<http://www.deccanchronicle.com/140430/nation-current-affairs/article/scientist-falls-death-agasthyamalai-hills>

Issues to Consider

- **LAI's have been well documented, but occurrences of field-associated illnesses and injuries during research activities have not**
- **Field collection protocols may not be held to same level of scrutiny, or may be missed altogether, for risk assessment and safety committee review/approval**
- **Biosafety professionals not typically trained on field collection activities or applicable safety controls**
- **Key resources (i.e. vets, occ health docs) may not always be readily available or accessible; may need to rely on research staff competencies**
- **Limited literature, guidance documents targeted to biosafety professionals on the topic**

Research Objectives

- Are biosafety professionals considering and evaluating field collection protocols?
- If yes, what current types of biosafety controls are being employed in the field?
- Are biosafety committees involved in the review and approval of such protocols?
- Are biosafety professionals currently equipped with the knowledge to review field collection protocols?
- Do biosafety professionals have access to key resources to assist in the risk assessment process?
- Would the profession benefit from training on the topic? Would biosafety professionals be willing to take such a course? What venue would be most appropriate for this training?

Methods

- **Study design: cross-sectional survey of biosafety professionals**
- **Study subjects: individuals practicing in the biosafety profession, either full or part-time, who are current members of ABSA with dues paid for 2013**
- **Study population: 1,451 members of ABSA at time of survey (of which 371 are recognized CBSPs or RBPs, or both)**

Methods

- **Web based survey tool developed using Survey Monkey[®] for electronic distribution to biosafety professionals**
- **Survey included 33 questions**
- **Endorsed by American Biological Safety Association (ABSA) Executive Council; survey sent through ABSA membership email directory**
- **Pilot survey conducted with members of Southern Biosafety Association (ABSA affiliate) to refine questions**
- **Survey available for completion: July 8 – July 26, 2013**

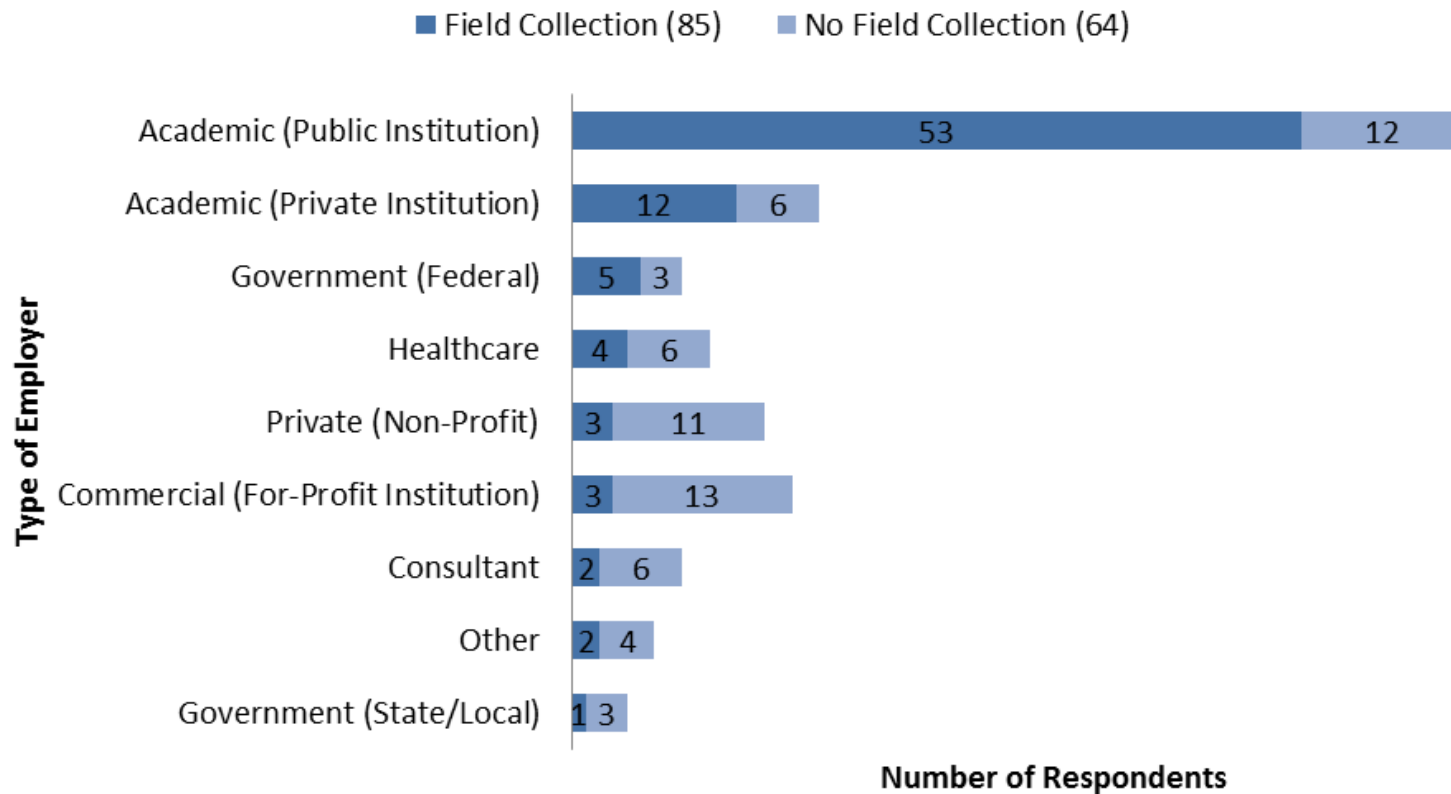
Results

- **168 survey responses submitted, but 13 omitted:**
 - 3 declined to provide informed consent
 - 9 declared they did not perform biosafety functions as part of their job
 - 1 indicated they perform biosafety functions but failed to continue the survey after the first question
- **Thus, n = 155**

Note: differences existed in the number of completed questions provided, therefore, some of the response summaries represent fewer than 155 responses

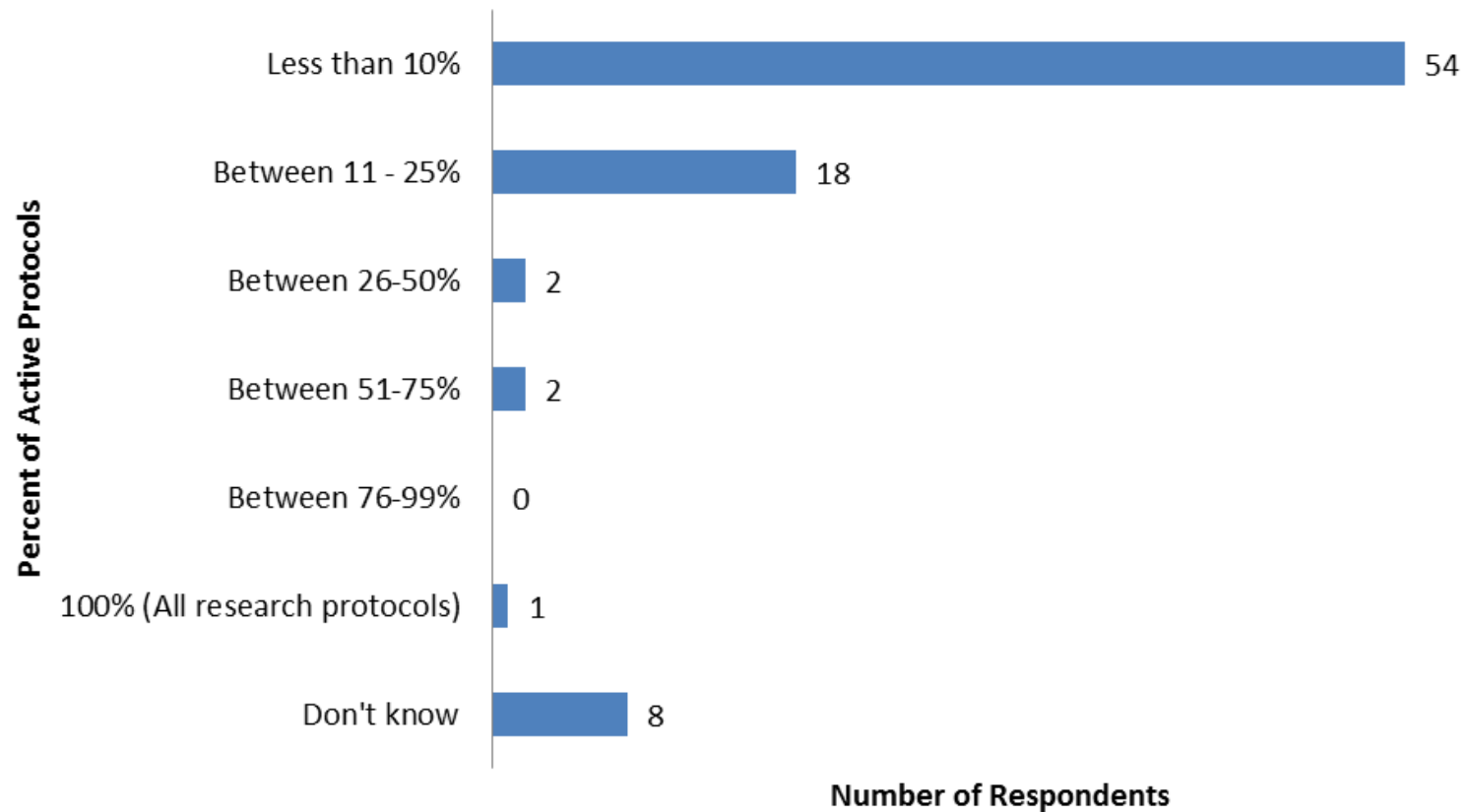
Results

Biosafety Professionals Indicating Whether Their Institution Conducts Research Activities Involving Field Collection of Biological Specimens, By Type of Employer (n=149)



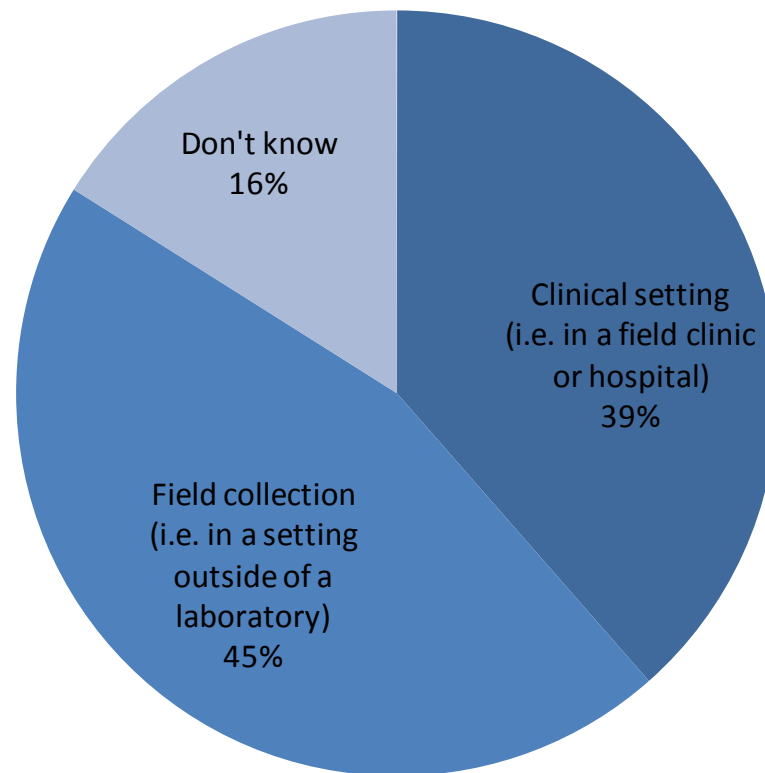
Results

For Institutions Conducting Field Collection of Biological Specimens,
Percent of Active Research Protocols That Involve Field Collection by
Research Staff/Students (n=85)



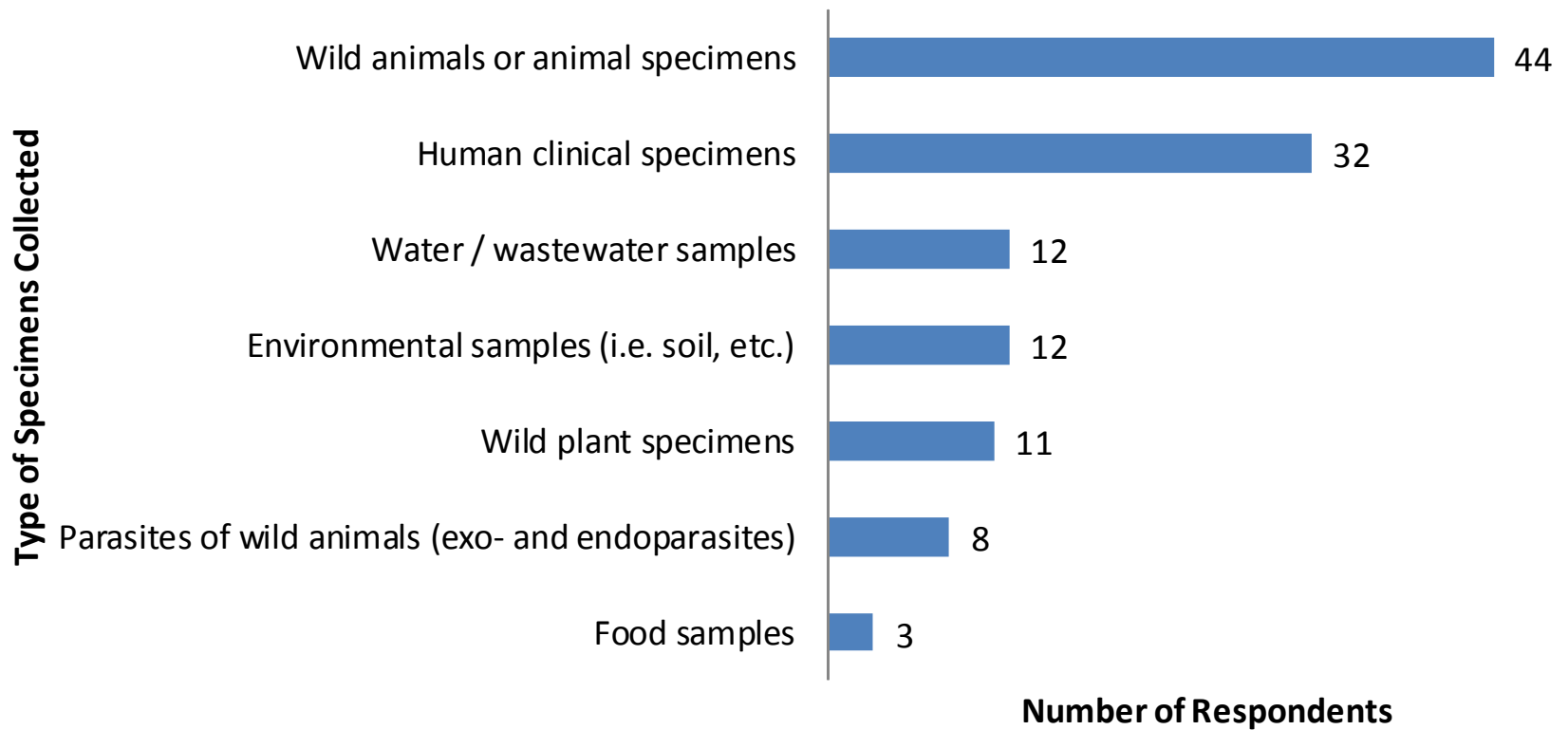
Results

Setting where biological specimens are typically collected in the field



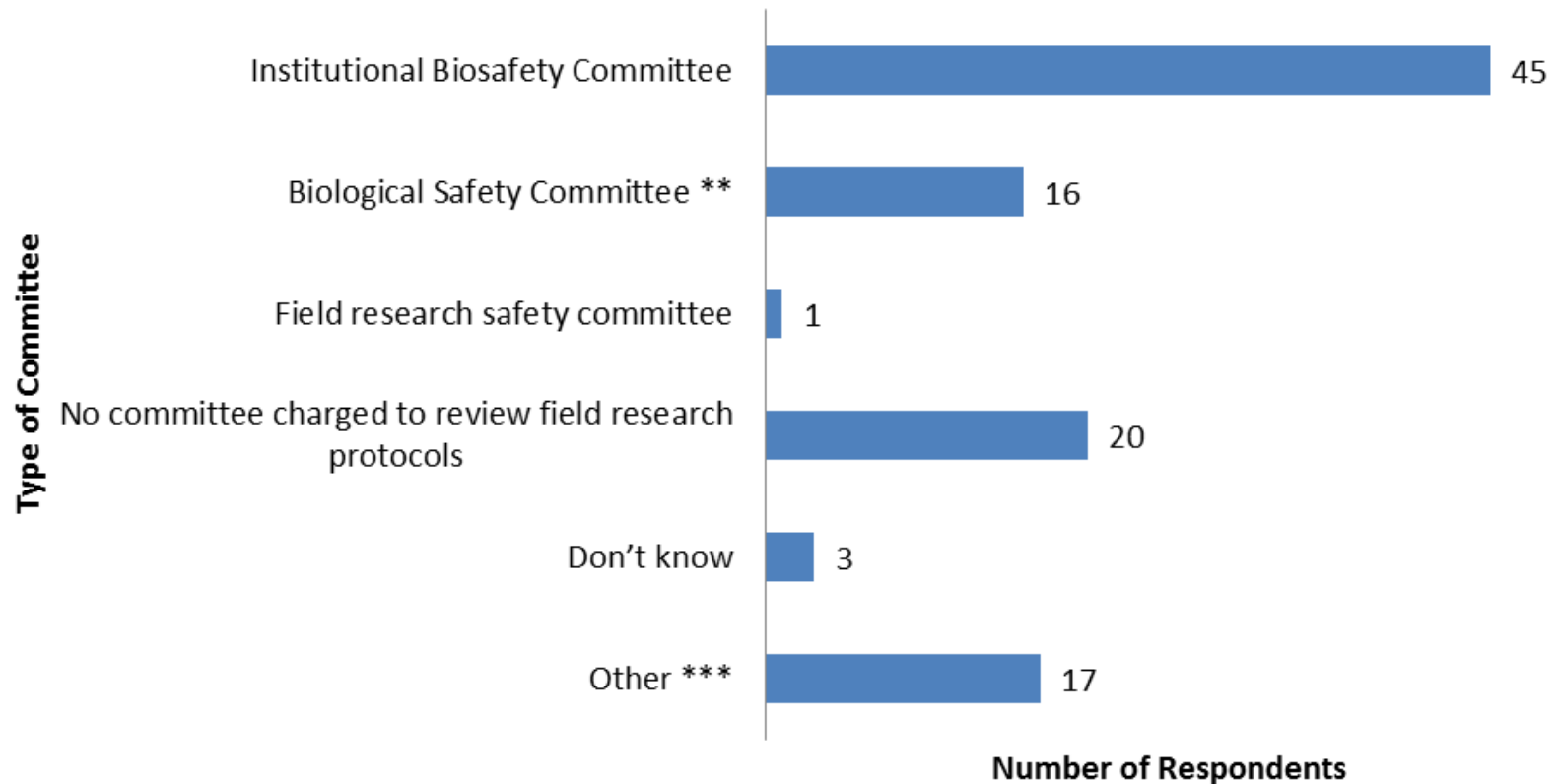
Results

Description of field collection of biological specimens performed by respondents, by type of specimens collected (n=122)



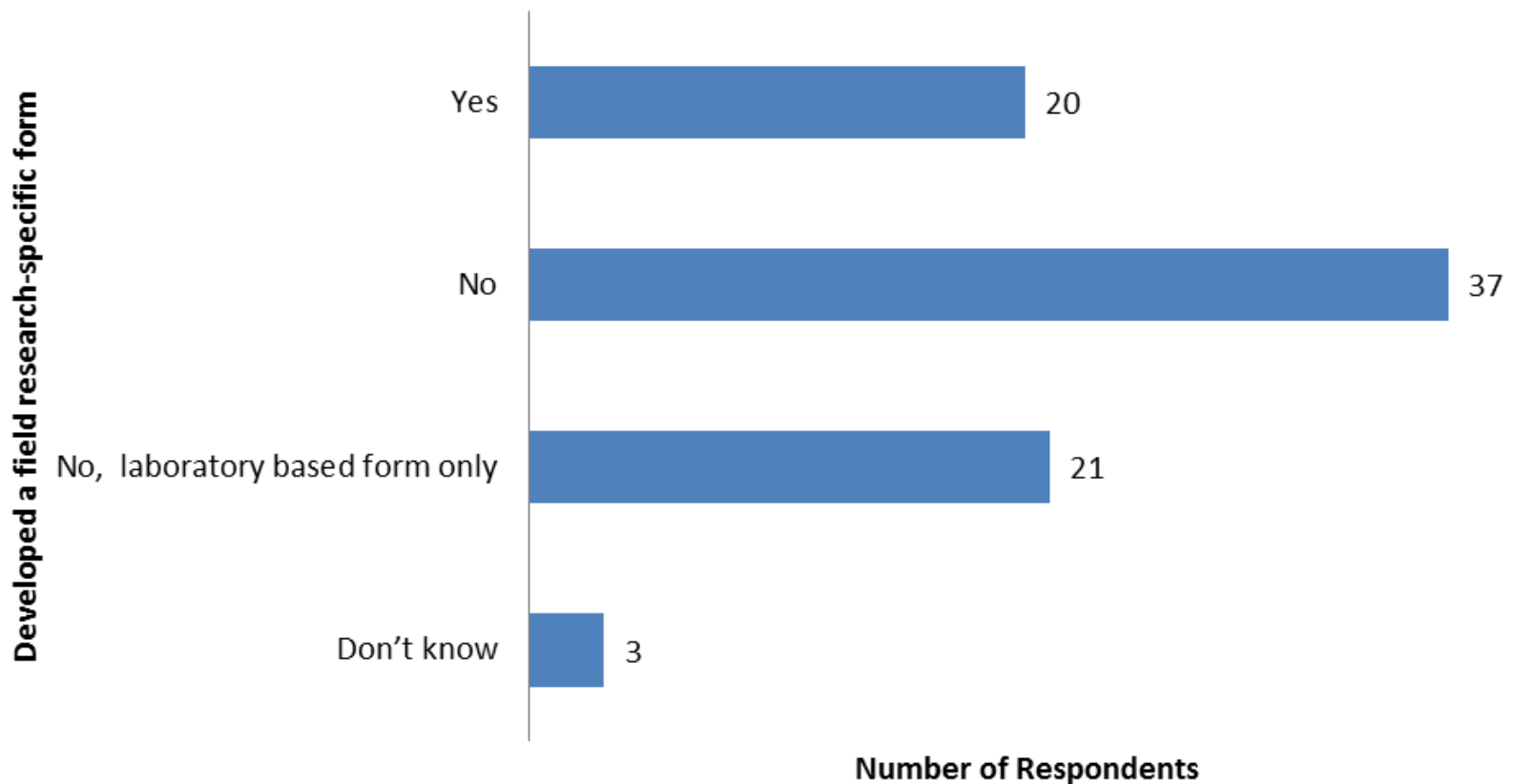
Results

Institutional Committee Charged to Review and Approve Safety Protocols Involving Field Collection of Biological Specimens or Other Field Research Activities (n=85)*



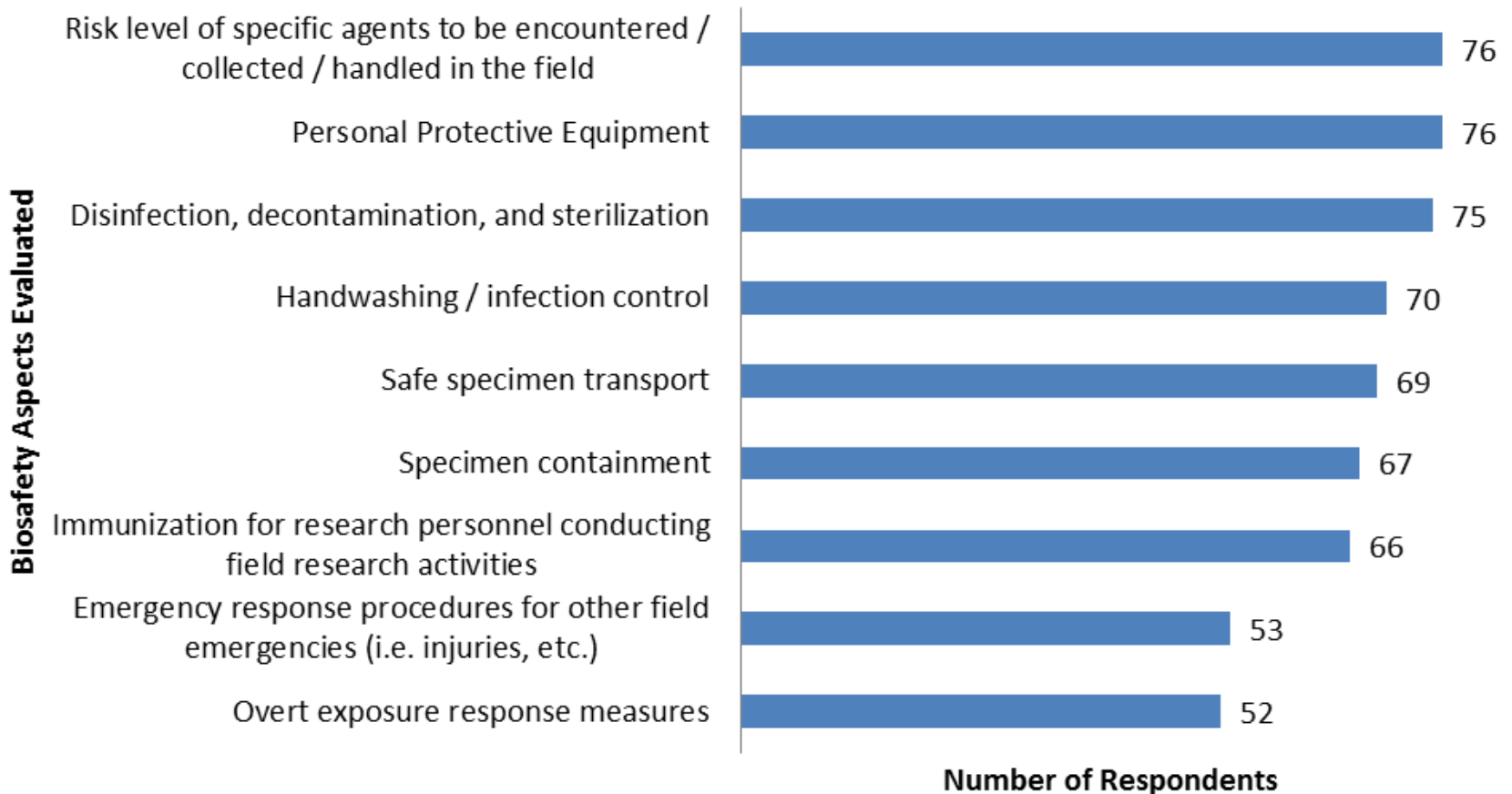
Results

Institutions Conducting Field Collection of Biological Specimens That Have Developed a Field Research-Specific Risk Assessment Form for Completion by Field Researchers (n=81)



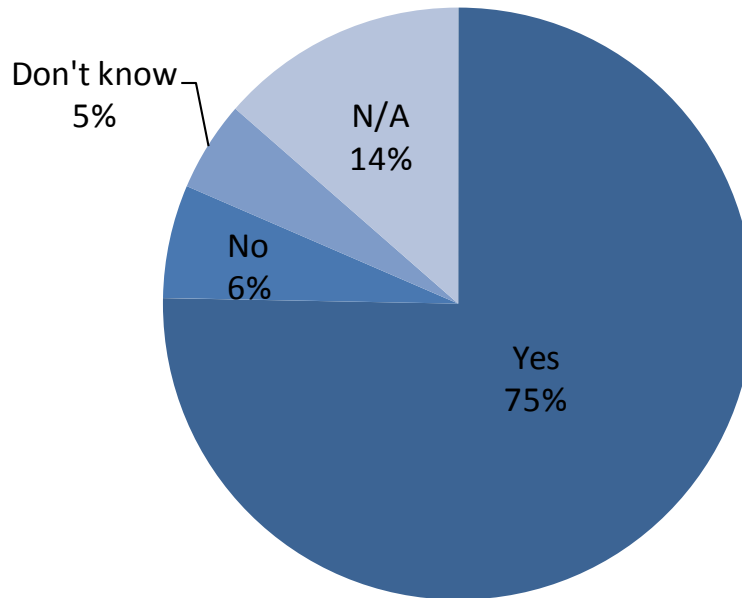
Results

Biosafety Aspects Evaluated During Initial Protocol Screening and Risk Assessment Review by Institutional Oversight Committee



Results

Percentage of respondents indicating that if animals are observed, trapped, or directly handled during field collection activities, they have access to individuals knowledgeable in veterinary medicine and zoonotic disease transmission



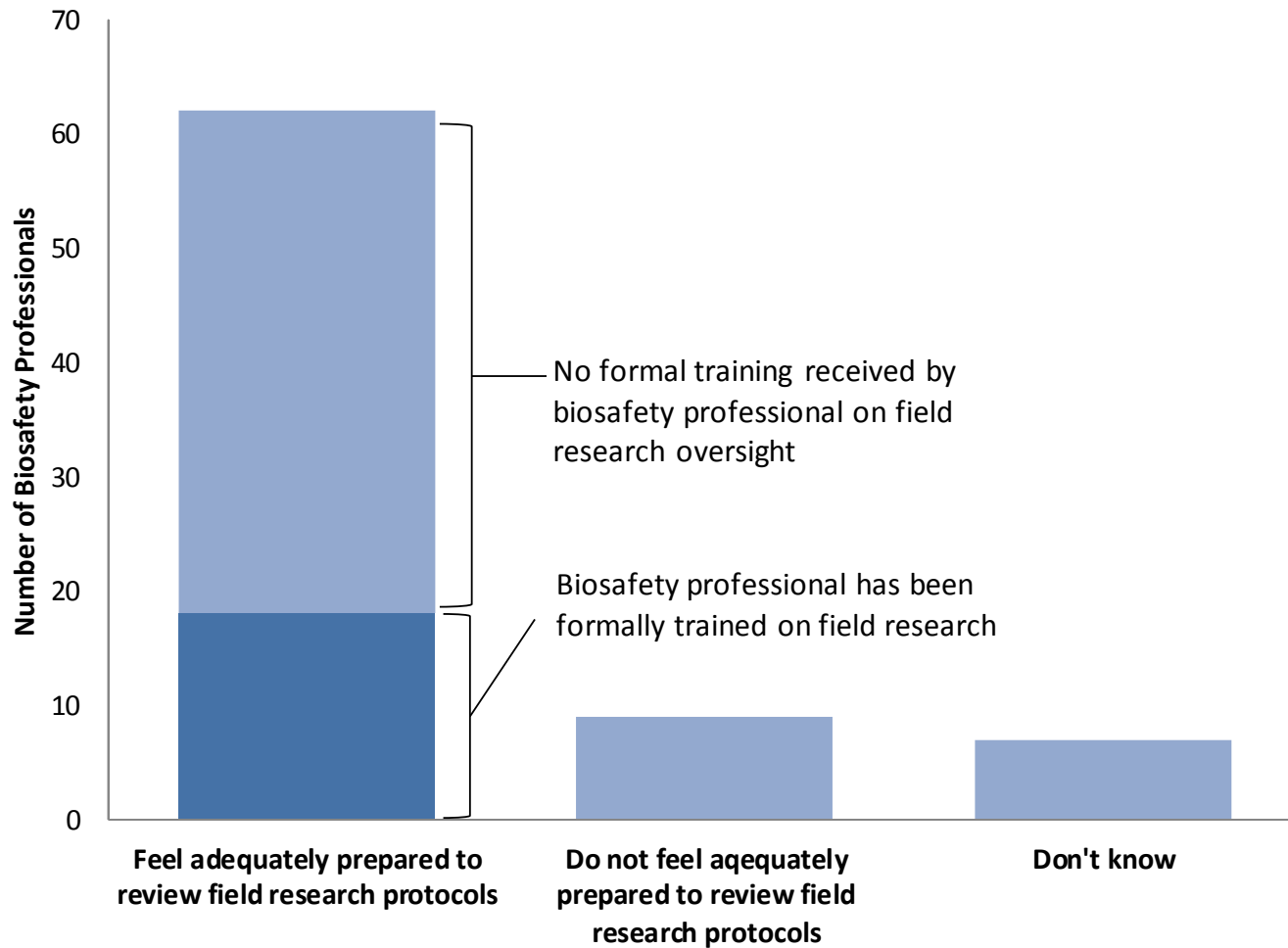
Results

Key Resources Identified by Biosafety Professionals When Considering an Ideal Field Research Oversight Program



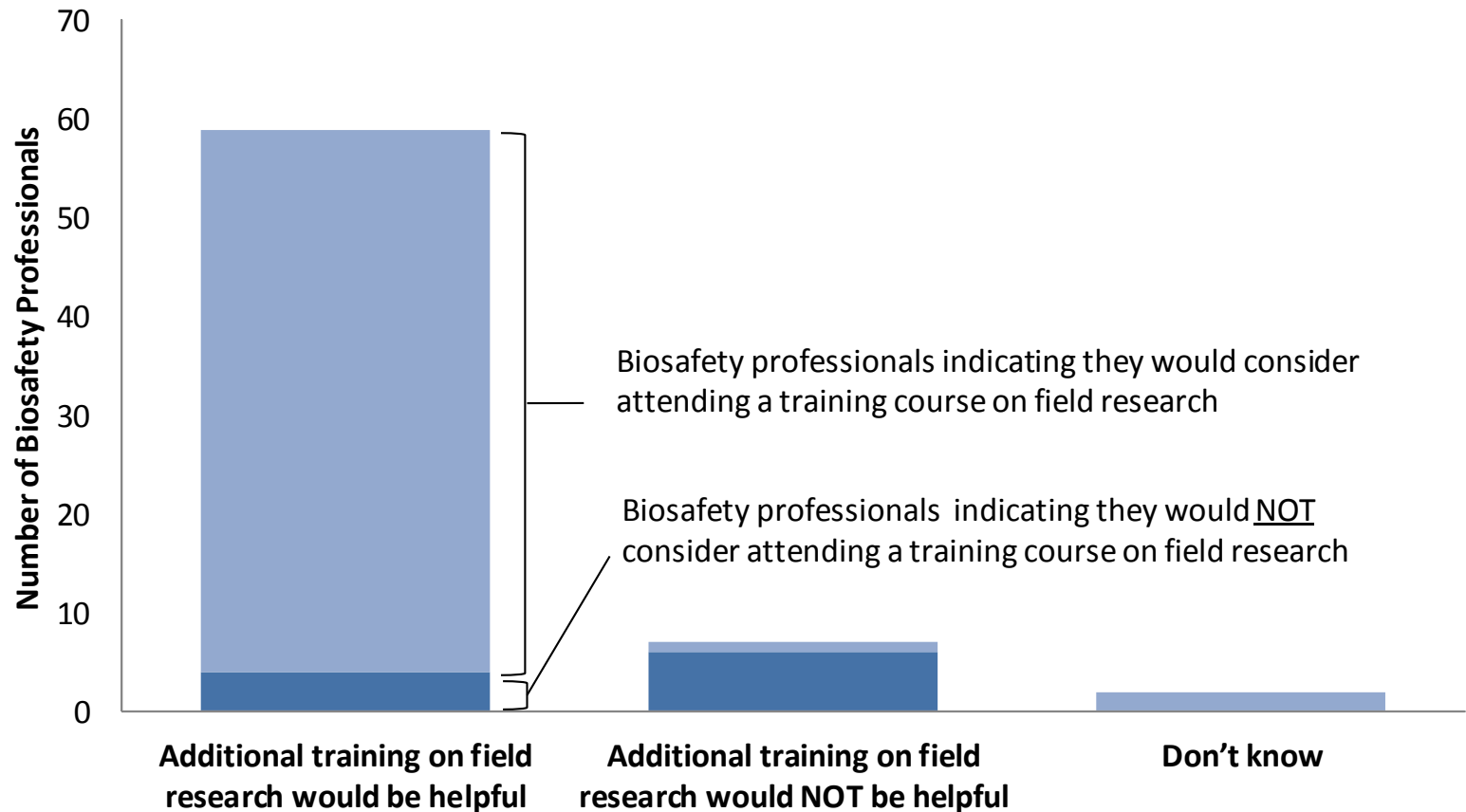
Results

**Level of Preparedness and Training Indicated by Biosafety Professionals
Overseeing Field Research-Related Protocols (n=85)**



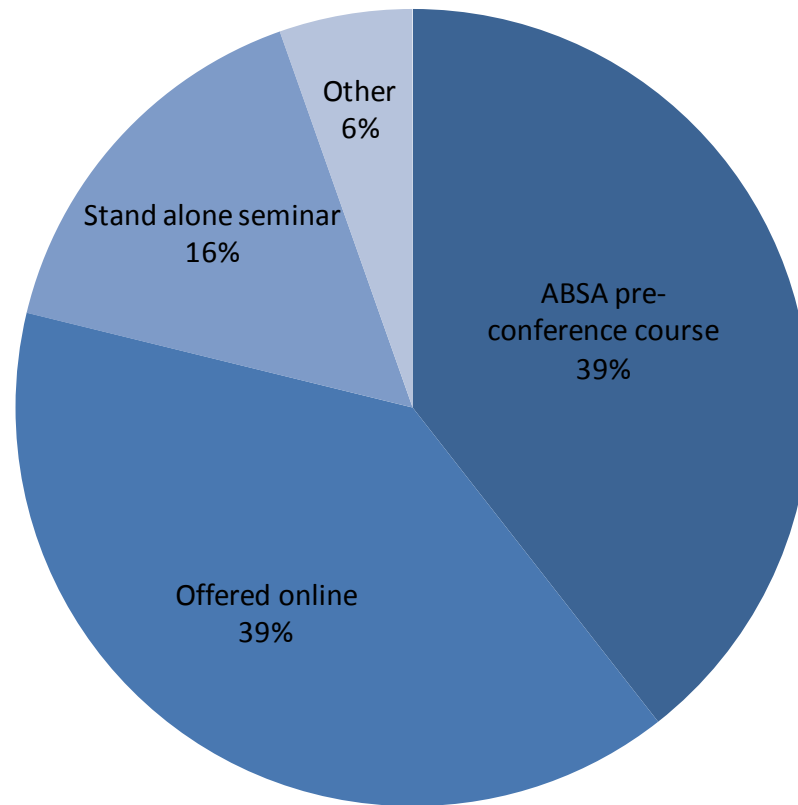
Results

Biosafety Professionals Indicating Whether Additional Training on Field Research Would Be Helpful, Including Willingness to Consider Attending a Field Research Training Course (n=68)



Results

Percentage of Respondents Indicating the Preferred Setting for Field Research Safety Training Courses Offered to Biosafety Professionals



Results

Survey Responses (Provided in Text Responses) Indicating Specific Critical Areas of Training for Biosafety Professionals on Field Research Safety

Field research safety best practices
Risk assessment / risk identification
Overview of zoonotic diseases
Emerging pathogens
Potentially hazardous wildlife
Regulatory issues related to field collection of biological specimens

Basic field survival skills
Communication in the field
Safe specimen collection / handling techniques for the field
Safe specimen transport techniques for biological specimens
Safety considerations and SOPs for wild animal trapping / handling / manipulation
Personal protective equipment
Hand hygiene / infection control
Personnel transportation safety considerations / vehicle driving safety
Field lab set up / considerations

Occupational health requirements for conducting field research
Travel medicine
Establishing / communicating locations to receive treatment (e.g., local clinics, hospitals)
Emergency response / mitigation in the field
Emergency evacuation plans
Overt exposure response
Field first aid

Discussion

- **IACUC or IRB involvement in review of safety aspects of protocols**
- **Field research specific risk assessment form**
- **Biosafety aspects reviewed during risk assessment review similar to lab based review (e.g. elements found in BMBL)**
- **Training of biosafety professionals on field collection risks, inclusive of peripheral risks outside of biosafety**
- **Perceived risk and negative public perception of field research (e.g. research staff donning PPE near public/residential areas)**

Discussion

- **Field research related occupational exposures to potentially infectious agents, subsequent bone fide field acquired infections, and other accidents and injuries were considered but intentionally omitted from survey**
- **Future research could create a compendium of occupationally-acquired field illness or injuries, potentially similar to LAIs**

Discussion

- **Is the survey data skewed towards at certain demographic?**
 - **Statistical significance was observed in that a higher than expected number of CBSPs responded to this survey (25% of the total respondents) compared to ABSA membership (currently 11%)**
 $\chi^2 (1, N = 145) = 31.75, p = < 0.0001$
 - **A slightly higher proportion of individuals from public academic institutions responded to our survey (44% of the total respondents) compared to the ABSA membership (37% according to 2013 data)**
 $\chi^2 (8, N = 151) = 25.33, p = 0.0014$

Conclusion

- **The practice of biosafety has been traditionally focused on the laboratory setting, but many institutions (particularly among private and public academic institutions) indicate research involving field collection of biological specimens is conducted**
- **Many institutions have oversight mechanisms in place for such research**
- **The need exists for the development and implementation of written guidance, training, and resources for biosafety professionals**
- **Development of training specifically targeted towards biosafety professionals is warranted**

THANK YOU!