

Submitted: 22/10/2023

Accepted: 02/02/2024

Published: 31/03/2024

Development and piloting of One Health curriculum in Jordan

Sameeh M. Abutarbush^{1*} , Lora Alsawalha², Alaa Hamdallah³, Majid Hawawsheh⁴, Heba Mahrous⁵
and Nour Abu Elizz⁴

¹Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine,
University of Science and Technology, Irbid, Jordan

²Jordan Country Office, World Health Organization, Amman, Jordan

³Jordan Ministry of Health, Amman, Jordan

⁴Jordan Ministry of Agriculture, Amman, Jordan

⁵World Health Organization Regional Office for the Eastern Mediterranean, Cairo, Egypt

ABSTRACT

Background: In Jordan, several steps have been done to implement One Health (OH) approach. To increase the awareness for OH concept and approach among health professionals, there was an apparent need to develop an OH curriculum or package to orientate human, animal, and environmental health officials and professionals.

Aim: The aim of this study was to describe the development and piloting of a OH curriculum for human, animal, and environmental officials and professionals in Jordan.

Methods: OH curriculum was developed and consisted of four chapters/sections, each of which contained series of power point presentations that covered subject thoroughly and met the learning objectives for each section. Four day workshops on OH curriculum were done for four cohorts of participants from different OH partners. Each section started and ended with a quick knowledge assessment consisting of multiple choice questions (MCQs) (pre- and post-chapter). Comparison of the pre- and post-chapter knowledge assessment scores/results were used to assess gain of knowledge after each section of OH curriculum was completed. The scores of correct answers were compared within the different cohorts using Pearson's chi-square test with p -values ≤ 0.05 considered significant.

Results: Of the total attendance, pre- and post- training quizzes were scored for 102 participants (816 quizzes). Pre-training scores for the different cohorts ranged from 29% to 36%, while post-training scores for the different cohorts ranged from 80% to 87%. Post-training correct answers scores were significantly higher than those were for pre-training scores for the different cohorts ($p < 0.05$). Percentage of knowledge gain ranged from 41% to 62% for the first section, 34% to 47% for the second section, 41% to 55% for the second section, and 48% to 60% for the fourth section. Average percentage of knowledge gain for the first, second, third, and fourth cohorts were 51%, 53%, 47%, and 47%, respectively, and was 50% for all cohorts.

Conclusion: The developed OH curriculum improved different OH partners and officials understanding of the OH concept and approach.

Keywords: Curriculum, Zoonotic diseases, Jordan, Inter-sectoral collaboration, One Health.

Introduction

The One Health (OH) concept, in which human health and animal health are interdependent and bound to the health of ecosystems, is a concept known for more than a century (Evans and Leighton, 2014). OH approach has been implemented in the middle east region and globally (Farag *et al.*, 2019; Mahrous *et al.*, 2020; Fasina *et al.*, 2021; Pettan-Brewer *et al.*, 2021). OH is a collaborative global approach to understanding risks for human, animal and ecosystem health as one unit. Main challenges of OH include zoonotic and food-borne diseases and antimicrobial resistance (AMR), which threaten animal and public health (Nzietchueng

and Santana, 2021). Reducing such threats requires a multi-disciplinary and multi-sectoral collaboration, coordination and cooperation approach between the human, animal and environmental sectors. This represents the implementation the OH approach.

In Jordan, a roadmap to implement OH approach has been created and implemented. Initial steps included a review and mapping of ministerial mechanisms of zoonotic disease reporting and control, and inter-sectoral collaboration (Abutarbush *et al.*, 2022a), joint risk assessment of rabies and avian influenza utilizing the tripartite operational tool (Abutarbush *et al.*, 2022b), and zoonotic diseases prioritization (Kheirallah *et al.*,

*Corresponding Author: Sameeh M. Abutarbush. Department of Veterinary Clinical Sciences, Faculty of Veterinary Medicine, Jordan University of Science and Technology, Irbid, Jordan. Email: smabutarbush@just.edu.jo

Articles published in Open Veterinary Journal are licensed under a Creative Commons Attribution-NonCommercial 4.0 International License



2021). Zoonotic diseases prioritization in Jordan was done utilizing a semi qualitative method developed by the U.S. Centers for Disease Control and Prevention (CDC) OH Office. Joint risk assessment for important zoonotic diseases in Jordan was conducted using the operational tool of tripartite guide to addressing zoonotic diseases in countries that was developed by World Health Organization (WHO), Food and Agriculture Organization of the United Nations and World Organization for Animal Health (Haddadin *et al.*, 2008; Al-Natour and Abo-Shehada, 2012; WHO-FAO-WOAH, 2020).

During implementation of OH approach in Jordan, there was an apparent need to develop a OH curriculum or a package to orientate human, animal, and environmental health officials and professionals on OH concept, and review the basic knowledge and skills required for inter-ministerial, interdisciplinary collaborations and communications before and during biohazardous events involving humans, animals, and the environment. Furthermore, there was a need to enhance understanding of OH bio-surveillance and event-based surveillance (EBS) concepts and describe current ministerial procedures to identify gaps in collaboration and communication. In addition there is a need to better understanding of the AMR threat across global, national and local levels in the OH approach. The previous needs were raised up to create a suitable environment to ensure efficient, coordinated response efforts in the event of a potential biological incident.

The aim of this study was to describe the development and piloting of OH curriculum for human, animal, and environmental officials and professionals in Jordan.

Materials and Methods

OH curriculum contents

The OH curriculum consisted of four chapters/sections, each of which contained series of power point presentations, which covered subject thoroughly and met learning objectives for each section. The total time required to complete was approximately 5 hours. A certificate of completion was given upon successful completion of the OH curriculum and passing of the post-chapter knowledge assessments. These four curriculum sections were OH concept and operational framework for action for the WHO EMRO region, OH Bio-surveillance/EBS, AMR, and OH approach implementation in Jordan.

Learning objectives of the different sections of the OH curriculum

Section 1: OH concept and operational framework for action for the WHO EMRO region

- a. To review and understand the history and various definitions of OH
- b. To realize the added values and challenges of the OH approach

- c. To understand various aspects of the framework for implementing a “One Health” approach as an introduction to the joint risk assessment and overview of the operational tool

Section 2: OH bio-surveillance/EBSa.

- a. To review EBS definition and rationale
- b. To understand various aspects of surveillance system structures in terms of reporting, event definition, data management, responding to an event, and monitoring and evaluation.

Section 3: AMRa.

- a. To understand the AMR threat across global, national and local levels.
- b. To identify next steps to optimize the correct use of antimicrobials in different health and social settings in the country.

Section 4: Approach implementation in Jordan

- a. To understand the national Jordanian context of OH approach, including structures and infrastructures
- b. To review the various ministerial electronic disease reporting systems
- c. Awareness of various OH approach implementation achievements and activities in Jordan

OH curriculum piloting, knowledge gain assessment method, and analysis

Piloting OH curriculum was planned to be done in a workshop enrolling attendants from several OH partners in Jordan. These included participants from Ministry of Health, Ministry of Agriculture, Ministry of Environment, and Royal Medical Services.

The content of the curriculum was delivered in four sections as power point presentations and interactive sessions as described above.

Each section started and ended with a quick knowledge assessment consisting of multiple choice questions (MCQs) (pre- and post-chapter) (Table 1). Each quiz had an answer stating that the participants was not sure about the answer. Comparison of pre- and post-chapter knowledge assessments scores/results can provide data about the gained knowledge after the OH curriculum sessions completion. Wrong answers included incorrect answers or the choice stating that the participant was unsure about the answer. Thus, wrong answers indicated a participant had inaccurate, incomplete, or no knowledge of OH concepts and approaches.

Thus, results were entered into an Excel spreadsheet and analyzed. Percentage of correct answers was compared among curriculum sections and cohorts. Percentage of knowledge gain was calculated by subtracting pre-training scores from post-training scores among cohorts and by training sections. The scores of correct

Table 1. Knowledge assessment MCQs for the different sections of the OH curriculum developed in Jordan.

Section 1- “One Health” concept and operational framework for action for the WHO EMRO region (Chapter knowledge assessment)
<p>Q1- The latest formal definition of “One Health” was released by:</p> <ol style="list-style-type: none">OIEWHOUnited Nation’s agencies’ One Health High-Level Expert Panel (OHHLEP)I am not sure
<p>Q2- All of the followings are added values of a One Health approach except:</p> <ol style="list-style-type: none">Combined use of infrastructure and skill sets to improve the use of underutilized resources and create opportunities for cooperation and collaboration;Separation of the information and data systems between the veterinary and human health sectorsSystematic allocation of resources for integrated disease surveillance and mitigation programsI am not sure
<p>Q3- The One Health framework is built upon:</p> <ol style="list-style-type: none">The outcomes of IHR joint external evaluation missionsThe outcomes of national internal evaluation missionsThe outcomes of CDC external evaluation missionsI am not sure
<p>Q4- All of the followings are components of the “One Health” framework except:</p> <ol style="list-style-type: none">Governance and managementNetworks and partnershipsBasic and theoretical researchI am not sure
<p>Q5- All of the followings organizations are working directly on “One Health” except:</p> <ol style="list-style-type: none">World Organization for Animal Health (OIE)One Health InitiativeUS Food and Drug Administration (FDA)I am not sure
Section 2- “One Health” Bio-surveillance/EBS(Chapter knowledge assessment)
<p>Q1- All of the followings are correct about EBS except:</p> <ol style="list-style-type: none">It is an organized and rapid capture of informationGathered information is about events that are a potential risk to public health.This information cannot be rumorsI am not sure
<p>Q2- Ideally, an EBS system includes all potentially relevant reporting sources.</p> <ol style="list-style-type: none">TrueFalseI am not sure
<p>Q3- In EBS, case definitions of indicator-based surveillance for immediately notifiable diseases cannot be used</p> <ol style="list-style-type: none">TrueFalseI am not sure
<p>Q4- Report confirmation is the process by which a report from the community, media or health care worker can be substantiated, i.e. event is considered to be a REAL event.</p> <ol style="list-style-type: none">TrueFalseI am not sure
<p>Q5- Routine feedback is essential to maintaining EBS systems and without relevant and useful feedback people will stop reporting events.</p> <ol style="list-style-type: none">TrueFalseI am not sure

Table 1. Continued

Section 3- AMR (Chapter knowledge assessment)
Q1- AMR occurs when bacteria (not parasites or viruses or fungi) change to protect themselves from the effects of antimicrobial drugs designed to destroy them. a. True b. False c. I am not sure
Q2- Antimicrobials are divided into four categories based on their importance in human medicine. a. True b. False c. I am not sure
Q3- Microbes can become resistant to drugs for both biological & social reasons. a. True b. False c. I am not sure
Q4- Global action plan on AMR was developed to ensure continuity of the ability to treat and prevent infectious diseases. a. True b. False c. I am not sure
Section 4 - "One Health" approach implementation in Jordan (Chapter knowledge assessment)
Q1- "One Health" approach implementation in Jordan has started recently in 2020: a. True b. False c. I am not sure
Q2- In Jordan, tuberculosis was identified as one of the priority zoonotic disease list a. True b. False c. I am not sure
Q3- In Jordan, rabies is one of the priority zoonotic diseases that should be reported within 24h of diagnosis: a. True b. False c. I am not sure
Q4- In Jordan, a "One Health" operational plan for 2021-2024 has already been developed: a. True b. False c. I am not sure

answers were compared within the different cohorts using Pearson's chi-square test with p -values ≤ 0.05 considered significant.

Results

Of the total attendance, pre- and post- training quizzes were scored, for 102 participants (816 quizzes). Pre-training scores for the different cohorts ranged from 29% to 36%, while post-training scores for the different cohorts ranged from 80% to 87% (Fig. 1). Post-training correct answers scores were significantly higher than those were for pre-training scores for the different cohorts ($p < 0.05$). Average pre-training scores for the different cohorts was 33%, while post-training scores was 83%.

Percentage of knowledge gain for each OH curriculum section varied among cohorts. Percentage of knowledge gain for the first section ranged from 41% to 62%, 34% to 47% for the second section, 41% to 55% for the third section, and 48% to 60% for the fourth section. The knowledge gain in the various OH curriculum sections and cohorts showed little variability. Knowledge gain percentage for the first cohort ranged from 47% to 55%, the second cohort 44% to 62%, third cohort 41% to 60%, and the fourth cohort 34% to 58%. Overall, the average percentage of knowledge gain for the first, second, third, and fourth cohorts were 51%, 53%, 47%, and 47%, respectively. The average percentage of knowledge gain for all cohorts was 50%. Comparison

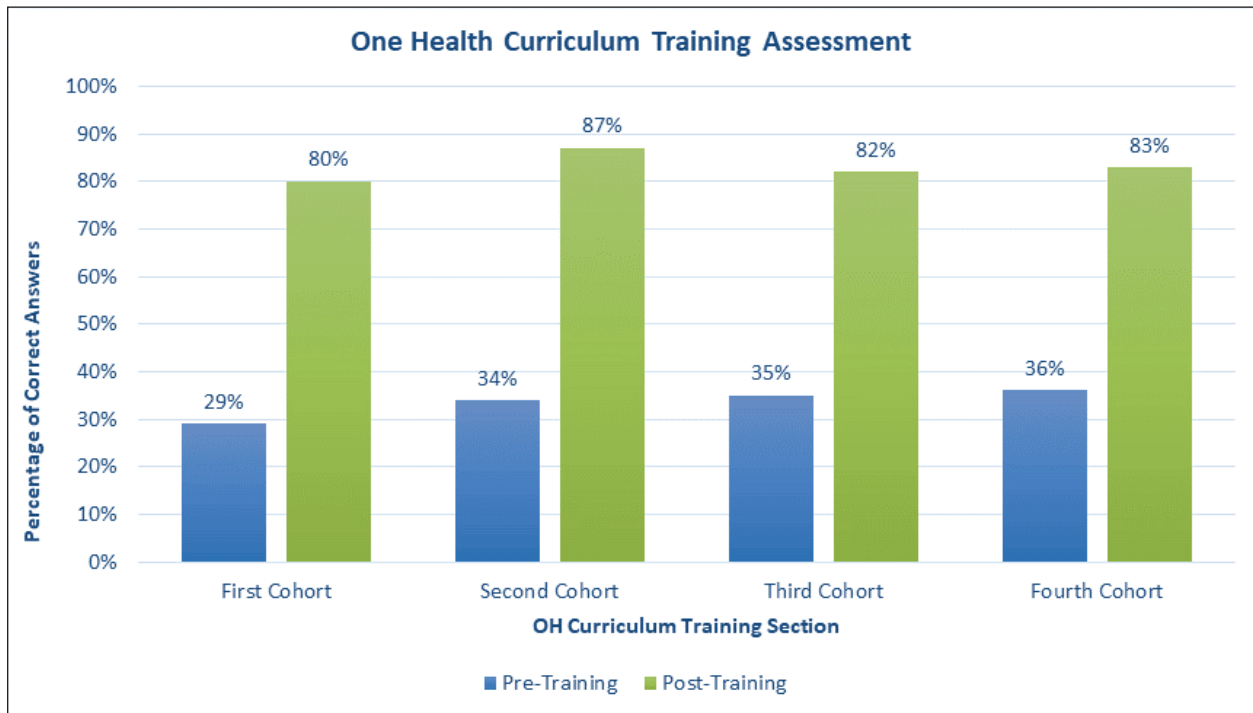


Fig. 1. Comparison of pre- and post- training quizzes correct answers scores for the different cohorts in OH curriculum piloting in Jordan. Post-training correct answers scores were significantly higher than those were for pre-training scores for the different cohorts ($p < 0.05$).

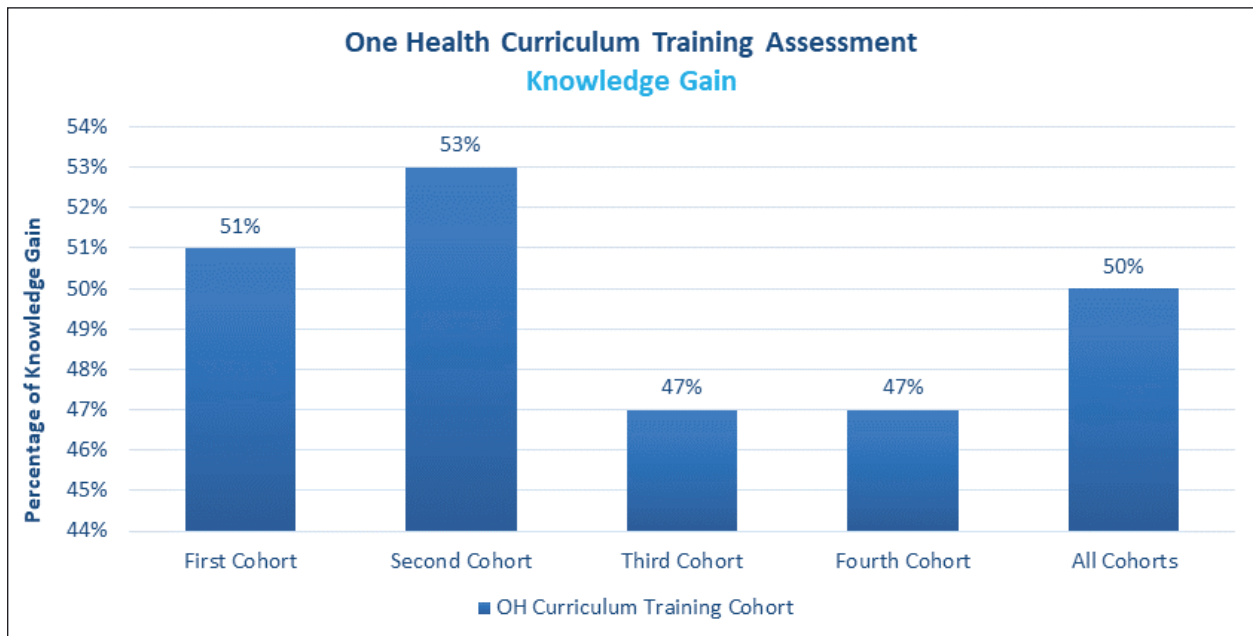


Fig. 2. Comparison of the knowledge gain among the different cohorts in OH curriculum piloting in Jordan.

of the knowledge gain among the different cohorts is illustrated in Figure 2.

Discussion

Jordan is considered a pioneering country in developing the OH curriculum globally. The idea was initiated by the OH team that consists of OH partners in the country to enrich health professionals' and stakeholders' knowledge about OH approach implementation, due to its vital need in successful combat of zoonotic diseases. Human, animal, and environmental officials and professionals in any country should have thorough understanding of OH concept in general and its implementation and approach. In Jordan, the need for implementing the OH approach has been identified as a priority and the roadmap to its implementation has been outlined. The use of this OH curriculum package provides a useful and quick resource to build the knowledge base and understand the different details about OH concept and its implementation for OH partners' officials, workers and stakeholders.

It is recommended that OH curriculum be adopted by health sector governmental and non-governmental bodies and to have it part of their required courses for continuing education or promotion. In addition, it can be embedded in health academic institutions curricula. This will further foster the understanding of OH concept and approach across the different sectors in the country. OH curriculum can be easily modified and adopted globally by different countries and can be beneficial to officials, workers, and partners in the human, animal, and environmental health sectors.

Conclusion

OH curriculum package provides a useful and quick resource to build the knowledge base and understand the different details about OH concept and its implementation for OH partners' in any country. The developed OH curriculum improved knowledge and understanding of the OH concept and approach for different OH partners and officials.

Acknowledgment

None.

Conflict of interest

The authors declare that they have no financial and/or competing interests.

Funding

The project or effort depicted was or is sponsored by the United States Department of Defense, Defense Threat Reduction Agency. The content of the information does not necessarily reflect the position or the policy of the Federal Government of the United States, and no official endorsement should be inferred.

Authors' contributions

Sameeh M. Abutarbush: design of the study, methods, and writing the original draft. Lora Alsawalha, Alaa

Hamdallah, Majid Hawawsheh, Heba Mahrous and Nour Abuelez : formal analysis, visualization, and review and editing the manuscript. All authors have approved the content, fulfill the authors' criteria, and have contributed significantly to work. All authors presented substantial contributions to this study and participated in the submitted version's correction and final approval.

Data availability

The database generated and analyzed during the current study is available with the corresponding author.

References

- Abutarbush, S.M., Hamdallah, A., Hawawsheh, M., Alsawalha, L., Elizz, N.A. and Dodeen, R. 2022a. Implementation of One Health approach in Jordan: review and mapping of ministerial mechanisms of zoonotic disease reporting and control, and inter-sectoral collaboration. *One Health* 8(15), 100406.
- Abutarbush, S.M., Hamdallah, A., Hawawsheh, M., Alsawalha, L., Elizz, N.A., Dodeen, R., Mousa, A.B., Alhawarat, M.N., Hailat, E. and Mahrous, H. 2022b. Implementation of One Health approach in Jordan: joint risk assessment of rabies and avian influenza utilizing the tripartite operational tool. *One Health* 1(15), 100453.
- Al-Natour, M. and Abo-Shehada, M. 2012. H5N1 influenza outbreak during March 2006 in Jordan. *Health* 4, 1371–1379.
- Evans, B.R. and Leighton, F.A. 2014. A history of One Health. *Rev. Sci. Tech.* 33(2), 413–420.
- Farag, E., Nour, M., Islam, M.M., Mustafa, A., Khalid, M., Sikkema, R.S., Alhajri, F., Bu-Sayaa, A., Haroun, M., Van Kerkhove, M.D., Elkholy, A., Malik, S.M.R., Reusken, C., Koopmans, M. and AlHajri, M.M. 2019. Qatar experience on One Health approach for middle-east respiratory syndrome coronavirus, 2012-2017: a viewpoint. Amsterdam, The Netherlands: *One Health*, 7, p: 100090.
- Fasina, F.O., Fasanmi, O.G., Makonnen, Y.J., Bebay, C., Bett, B. and Roesel, K. 2021. The One Health landscape in Sub-Saharan African countries. Amsterdam, The Netherlands: *One Health*, vol. 13, p: 100325.
- Haddadin, R., Hussein, S., Khazally, H., Mhedat, A., Al-Rashdan, M., Al-Nsour, M. and Al-Hajawii, B. 2008. Animal bites and animal rabies surveillance, Jordan, 2000–2007. Poster Presented at Journées de veille sanitaire, pp: 26–28.
- Kheirallah, K.A., Al-Mistarehi, A.H., Alsawalha, L., Hijazeen, Z., Mahrous, H., Sheikali, S., Al-Ramini, S., Maayeh, M., Dodeen, R., Farajeh, M., Masadeh, N., Alemam, A., Alsulaiman, J. and Samhoury, D. 2021. Prioritizing zoonotic diseases utilizing the One Health approach: Jordan's experience. *One Health* 1(13), 100262.

- Mahrous, H., Redi, N., Nguyen, T.M.N., Al Awaidy, S., Mostafavi, E. and Samhouri, D. 2020. One Health operational framework for action for the Eastern Mediterranean Region, focusing on zoonotic diseases. *East. Mediterr. Health. J.* 26(6), 720–725.
- Nzietchueng, S. and Santana, Y. 2021. FAO focuses on strengthening One Health preparedness and response capacity and capabilities in Africa. Rome, Italy: FAO.
- Pettan-Brewer, C., Martins, A.F., de Abreu, D.P.B., Brandão, A.P.D., Barbosa, D.S., Figueroa, D.P., Cediél, N., Kahn, L.H., Brandespim, D.F., Velásquez, J.C.C., Carvalho, A.A.B., Takayanagui, A.M.M., Galhardo, J.A., Maia-Filho, L.F.A., Pimpão, C.T., Vicente, C.R. and Biondo, A.W. 2021. From the approach to the concept: One Health in Latin America-experiences and perspectives in Brazil, Chile, and Colombia. *Front. Public. Health.* 9, 687110.
- WHO-FAO-WOAH. 2020. Joint risk assessment operational tool (JRA OT): an operational tool of the tripartite zoonoses guide: taking a multisectoral, One Health approach: a tripartite guide to addressing zoonotic diseases in countries. Geneva, Switzerland: WHO.