

1 **Title**

2 IHR-PVS National Bridging Workshops, a tool to operationalize the collaboration between human and
3 animal health while advancing sector-specific goals in countries

4

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37 **Abstract**

38 Collaborative, One Health approaches support governments to effectively prevent, detect and
39 respond to emerging health challenges, such as zoonotic diseases, that arise at the human-animal-
40 environmental interfaces. To overcome these challenges, operational and outcome-oriented tools
41 that enable animal health and human health services to work specifically on their collaboration are
42 required. While international capacity and assessment frameworks such as the IHR-MEF
43 (International Health Regulations - Monitoring and Evaluation Framework) and the OIE PVS
44 (Performance of Veterinary Services) Pathway exist, a tool and process that could assess and
45 strengthen the interactions between human and animal health sectors was needed. Through a series
46 of six phased pilots, the IHR-PVS National Bridging Workshop (NBW) method was developed and
47 refined. The NBW process gathers human and animal health stakeholders and follows seven sessions,
48 scheduled across three days. The outputs from each session build towards the next one, following a
49 structured process that goes from gap identification to joint planning of corrective measures. The
50 NBW process allows human and animal health sector representatives to jointly identify actions that
51 support collaboration while advancing evaluation goals identified through the IHR-MEF and the OIE
52 PVS Pathway. By integrating sector-specific and collaborative goals, the NBWs help countries in
53 creating a realistic, concrete and practical joint road map for enhanced compliance to international
54 standards as well as strengthened preparedness and response for health security at the human-
55 animal interface.

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59 Introduction

60 In recent decades, the world has seen increasing emergence of infectious zoonotic diseases,
61 including Severe Acute Respiratory Syndrome (SARS) in 2003, novel strains of Highly Pathogenic
62 Avian Influenza (HPAI) in 1997 and in 2003, H1N1 Influenza pandemic in 2009, Middle Eastern
63 Respiratory Syndrome Coronavirus (MERS-CoV) in 2012, Ebola virus in West, Central and Eastern
64 Africa in 2014, 2018, 2019, 2020 and, most recently, the emergence of Severe Acute Respiratory
65 Syndrome Coronavirus 2 (SARS-CoV-2), known as COVID-19 (1-4). Out of all infectious organisms
66 known to be pathogenic to humans, over 60% are zoonotic in nature. This figure increases to 75%
67 when considering emerging pathogens (1), with a large proportion originating from wildlife (2, 5). A
68 variety of ecological and demographic factors, such as encroachment of human activities in the
69 natural habitat of wild animals, intensified systems of agriculture, and increased volumes of traffic
70 and trade are precipitating both the emergence of such diseases and their subsequent spread (6-9).

71 With these observations, the One Health concept, loosely defined as *“the collaborative efforts of*
72 *multiple disciplines working locally, nationally, and globally, to attain optimal health for people,*
73 *animals, and our environment”*(10), has gained great momentum over the past two decades as it
74 becomes clear that collaboration between the different sectors can help countries to better face
75 current and upcoming health threats (11-14).

76 The benefits of One Health go beyond emerging infectious diseases. It is also a much needed
77 approach for other major global health challenges such as antimicrobial resistance (15, 16), food
78 safety (17-19), bioterrorism (20), disaster recovery and response (12), and climate change(21) among
79 others.

80 However, after decades of siloed medicine evolution, implementing this approach can incur many
81 obstacles. Uncertain cost-effectiveness, availability of human resources, limited laboratory capacity,

82 and long-standing barriers of privacy and distrust are some of the factors hindering the
83 operationalization of the concept at country-level (22, 23).

84 To overcome these challenges, operational and outcome-oriented tools that engage and enable
85 animal health and human health services to focus specifically on their collaboration, are required
86 (24).

87

88 **WHO's IHR-MEF (International Health Regulations Monitoring and** 89 **Evaluation Framework) and OIE's PVS (Performance of Veterinary** 90 **Services) Pathway**

91 Both the human health and the animal health sectors have distinct tools and frameworks to assess
92 current capacities and to plan for improvements.

93 WHO Member States adopted a legally binding instrument, the International Health Regulations (IHR
94 2005) (25), for the prevention and control of events that may constitute a public health emergency of
95 international concern. Through these regulations, State Parties to the IHR (2005) are required to
96 develop, strengthen and maintain minimum national core public health capacities to early detect,
97 assess, notify and rapidly respond to public health threats. Various assessment and monitoring tools
98 have been developed by WHO, including the States Parties Annual Report (SPAR) and the Joint
99 External Evaluation (JEE) Tool. The SPAR is a self-assessment conducted by countries who are
100 obligated, under the IHR (2005), to assess their core public health capacities and annually report the
101 results to the IHR secretariat (26). The JEE, on the other hand is run on a voluntary basis by Member
102 States, and under the leadership of WHO. The JEE begins with a self-assessment by the country, using
103 the JEE tool (27) which covers 19 technical areas to be assessed on a scale of 1-to-5 levels of
104 advancement. A panel of nominated international experts then conduct a one week in-country visit
105 to meet with national stakeholders for a peer-to-peer review of the country's national capacities and
106 to provide joint recommendations for their improvement.

107 The Performance of Veterinary Services (PVS) Pathway was launched in 2007 by the World
108 Organisation for Animal Health (OIE). It supports the sustainable strengthening of national Veterinary
109 Services (VS) for greater compliance with OIE animal health standards (28) by providing countries
110 with independent evaluations of their VS and tailored capacity-building activities (29). The PVS
111 Evaluation is a key component of the PVS Pathway, sometimes seen as the 'diagnosis' phase, and
112 which paves the way for other support options such as the PVS Gap analysis which involves strategic
113 planning and budgeting of VS activities. It is generally conducted through a 2-to-3 week in-country
114 mission (up to 6 weeks for large countries) during which OIE trained PVS experts meet with national
115 stakeholders to conduct an in-depth qualitative assessment of the country's Veterinary Services'
116 strengths and weaknesses (30). The mission uses the robust OIE PVS Tool, in which 45 Critical
117 Competencies are to be assessed on a scale of 1-to-5 levels of advancement (31).

118 While both the OIE PVS Pathway and the SPAR/JEE do contain and promote some elements of
119 transdisciplinary and intersectoral collaboration, lending to the concept of One Health, the need for a
120 specific tool to operationalize the concept and support countries in improving and implementing
121 collaborative efforts at the interface between humans and animals remained.

122 The OIE and WHO first conducted an analysis of the differences and synergies between the two
123 frameworks and their associated tools in 2013. This initially focused on reviewing the linkages
124 between the PVS Pathway approach as a whole and the IHR, including the annual reporting tool. This
125 was first summarized in the 'WHO-OIE operational framework for good governance at the human-
126 animal interface: Bridging WHO and OIE tools for the assessment of national capacities' (32). By
127 capitalizing on the strength of these existing sector-specific institutional frameworks, the two
128 organizations jointly developed methods to facilitate communication between the animal health and
129 human health sectors. This resulted in workshops organized in countries, allowing national
130 counterparts to better understand both the IHR and the PVS, allowing them to agree upon priority

131 needs and jointly elaborate on their bridging efforts (33). Through a series of consultations, this
132 fostered the development of the IHR-PVS National Bridging Workshops (NBWs).
133 The NBWs offer national stakeholders a unique opportunity to first ‘diagnose’ their existing
134 collaboration challenges and gaps that exist between sectors, and then jointly develop actionable
135 steps to strengthen collaboration that supports both PVS and IHR. Unlike other collaborative
136 evaluation tools, NBWs link One Health actions directly to international policies and frameworks,
137 providing a global approach that leverages shared actions across many countries.

138 In this article we introduce NBWs as a novel diagnostic and planning tool by describing its
139 development, detailing its method and material and by discussing the preliminary outputs obtained
140 from NBWs conducted in 32 countries.

141

142

143 **Method**

144 Driven by OIE’s and WHO’s interest in better understanding and supporting countries to improve
145 their IHR and PVS performances, the objective for NBWs was to develop a process which would give
146 stakeholders from the human and animal health sectors an opportunity to discuss and evaluate their
147 current collaboration and jointly plan for its strengthening. The purpose is not to provide them with
148 recommendations or solutions, but to create an enabling environment during which they can identify
149 what works best for them and how they can realistically improve the collaboration with nationally
150 grounded solutions that fit their system and context.

151 The NBW method was developed through an iterative process involving two phases, each consisting
152 of three in-country pilots. In phase one, an outline of activities that supported assessment and action
153 planning was established and piloted in Azerbaijan, Costa Rica and Thailand as a proof of concept. In

154 phase two, evaluative feedback from phase one facilitated the modification and strengthening of
155 activities during pilots in Pakistan, Indonesia and Uganda. The strengthened approach enables
156 countries to elaborate a comprehensive and very detailed joint Roadmap as a key output.
157 Throughout both phases, different sessions and tools were trialed and tested, the results of which,
158 along with feedback collected from participants and partners, were used to conduct evaluations after
159 each pilot, to adapt the method and material and improve the tool.

160 **Phase one: Developing the concept**

161 **Azerbaijan (2013) (46 national experts, 1.5 days)**

162 In this first pilot, the method included presentations from the two sectors, along with a working
163 exercise to look at the results of the respective assessments and discuss their linkages. The working
164 group exercise consisted of facilitated discussion around a dozen key questions. The meeting was
165 conducted over 1.5 days and included over 46 national experts.

166 The meeting was challenged by the low level of knowledge of the participants on the IHR (2005), the
167 PVS Pathway and the associated tools. This shortcoming limited the ability for both sectors to engage
168 in the discussion of outputs reported for either IHR or PVS. In the post-workshop survey, participants
169 suggested a longer workshop, with more time for discussion and expressed high appreciation for the
170 working group exercise.

171 **Thailand (2014) (59 national experts, 2 days)**

172 Following the experience from Azerbaijan, some key changes to the method were implemented: the
173 workshop was extended to two full days, a session was added to give more in-depth explanations on
174 the IHR, the PVS and their connections, and a working group exercise was added to identify
175 opportunities for synergetic actions between the two sectors. It was in the preparation for this
176 second pilot that technical experts from OIE and WHO considered the opportunity to visually
177 illustrate the interface of human and animal health in a matrix that reflected both IHR and PVS. This

178 was one of the most important evolutions in the NBW process, resulting in the development of the
179 IHR-PVS matrix (Fig 1) which crosses the indicators of the IHR (in rows) and the Critical Competencies
180 of the PVS Pathway (in columns). This allowed participants to easily visualize all the connections
181 between the two sectors and the two frameworks.

182

183 **Fig 1. The IHR-PVS matrix is a 5x3 meter presentation stand used by participants during the NBW.**

184 The matrix crosses the indicators from the IHR-MEF in rows and the Critical Competencies of the PVS
185 Pathway in columns. Two versions of the matrix exist regarding the IHR-MEF: one with SPAR
186 indicators and one with JEE indicators. The matrix was produced in English, French, Russian and
187 Spanish versions.

188 In the post-workshop survey, participants once again asked for a longer workshop with more time for
189 discussion and group exercises. They also felt that there were too many presentations and found the
190 working group sessions to be the most productive ones.

191 **Costa Rica (2016) (60 national experts, 2.5 days)**

192 The third pilot incorporated a number of critical changes, including an increase to two-and-a-half
193 days total duration, the reduction of the number of presentations, the replacement of some
194 presentations by videos and the addition of a working group exercise using short outbreak scenarios
195 (Table 1) to allow stakeholders to self-assess their level of collaboration for 15 key technical areas.

196 This exercise resulted in the mapping of strong and weak areas in the collaboration, which
197 participants used to draft the outline of a strategy to improve their inter-sectoral work.

198 When presented with simple scenarios, participants could more easily identify the strengths and
199 weaknesses of their current collaboration and the conceptualization of joint activities was better
200 facilitated.

201

202 **Table 1. The five short disease scenarios used during the NBW Pilot in Thailand.**

Disease	Scenario
Rabies	A case of rabies, which has been confirmed in a dairy cow recently inseminated and regularly milked, generates panic in the population
H7N9 avian influenza	H7N9 was confirmed in a vet who returns from a conference in China and lives in the northern part of Thailand
Anthrax	Nine people showed identical anthrax-like lesions reported in a district hospital close to a border post. One is working in village slaughterhouse
Streptococcus suis	An exporting country suspects that a shipment of piglets to Thailand was contaminated with <i>Streptococcus suis</i> and entered into the market
Unknown disease	Private Veterinarian reports unusual mortality among piglets in a commercial farm. Workers on the farm also show illness

203

204 Key lessons learned from these three preliminary pilots include (i) the need to have a shared
205 understanding of sector-specific assessments such as IHR and PVS, (ii) the need to have
206 representatives from different levels (national, sub-national, local) along the chain of command to
207 have a good overview of the current collaboration and discuss operationalisation of the outputs; (iii)
208 the need for stakeholders to engage as early as possible in scenario-based exercises, so that the
209 conceptualization of joint activities is facilitated and gaps can easily be identified and discussed; (iv)
210 the option for additional work sessions to be developed to transform the results of the discussions
211 into an implementation plan, these sessions being as interactive as possible; and (v) a well-structured
212 approach and robust facilitation are required for these events.

213

214 **Phase two: Refining the tool**

215 **Pakistan (2017), Indonesia (2017) and Uganda (2017)**

216 After an in-depth look at the feedback collected from participants and partners during the three first
217 pilots, a substantial revision of the material and method was conducted. Special focus was given to
218 the development of three working exercises (i) to simplify the extraction of relevant information
219 from the SPAR/JEE and PVS Pathway, (ii) to use the outcomes of the discussions to initiate a joint

220 roadmap, with a list of activities identified jointly by both sectors, and (iii) to fine-tune this roadmap
221 and discuss on the way forward while giving full ownership of the process and result to the country.
222 The overall duration was increased to three days to optimally facilitate these changes.

223 The whole set of material, which included videos, activity cards and posters, was revised and
224 adjusted. These updated method and material were tested in Pakistan (May 2017). This was the first
225 time that a detailed roadmap was developed and then anchored in Kazakhstan's National Action Plan
226 for Health Security (NAPHS).

227 Following next pilots in Indonesia (August 2017) and Uganda (September 2017), the method and
228 material were further fine-tuned and ultimately finalized. Notable improvements included the
229 development of participant handbook (S1 Appendix), the addition of a prioritization exercise (via an
230 online vote when possible, or by using small stickers as votes) and an additional step where
231 participants were invited to detail the operational process for the implementation of the joint
232 activities they have identified.

233 At this stage, the method and material were considered complete and only very minor modifications
234 were brought in the subsequent workshops, often just to adapt to different cultural contexts.

235

236 **Organization and facilitation of NBWs**

237 The roll-out of NBWs is undertaken on a voluntary request from countries. Organization of the
238 workshop begins when one or both of relevant Ministries makes an official request to either WHO or
239 OIE. Once requested, NBWs are facilitated by at least two lead facilitators from both WHO and OIE.
240 Country demands for NBWs exceeded expectations and the number of trained facilitators in the core
241 team quickly became insufficient. Regional facilitators were therefore trained in both organizations
242 for the roll-out of NBWs in their respective regions. Training was conducted through a formal two-
243 day training (one in Copenhagen, Denmark in 2018 and one in Lyon, France in 2019). Trained

244 facilitators then must follow one or two NBWs as a support facilitator before being able to lead a
245 workshop. As of 16 July 2020, 10 facilitators are able to lead a NBW, and 22 more can act as support
246 facilitators. A Facilitator's Manual (S2 Appendix) and Facilitator's Checklist-kit (S3 Appendix) were
247 developed and all NBW materials have been standardized to ensure consistent messaging.
248 An advocacy tool-kit was also produced to raise awareness on this tool, including the NBW Fact-sheet
249 (S3 Appendix), various advocacy videos as well as presentations and posters presented in numerous
250 regional or international conferences and meetings.

251

252 **Results**

253 **Final NBW material and method**

254 The final format of NBWs involves seven sessions (Table 2) over the course of a three-day in-person
255 workshop and is designed to facilitate engagement with 50-to-90 participants. The objective is to
256 ensure equal representation from both sectors, with participants from national, regional and field
257 levels. Other relevant stakeholders, such as officials from the environmental ministry, or observers
258 from collaborating organizations and agencies may also be invited to join, as deemed relevant by the
259 country.

260 **Table 2. Summary of the content and outputs for each session of the NBW.**

261 PDWG = Priority disease working group / TAWG = Technical area working group.

Session	Content	Output
Session 1	-Presentations from both sectors -Video on One Health & Tripartite -Video on successful One Health interactions	-Better knowledge of the other sector -Shared understanding of the event's objective
Session 2	-PDWG: Discussion around short scenarios and evaluation of the current collaboration	-Strengths and weaknesses of the collaboration are identified for 15 key technical areas and 4-5 priority diseases
Session 3	-Video and discussion on IHR, SPAR & JEE -Video and discussion on PVS	-Better understanding of the two sector-specific frameworks and assessment tools -Priority areas where collaboration needs to be strengthened are identified

	-PDWG: Mapping of the cards identified in session 2 on the large IHR-PVS matrix & discussion	
Session 4	-TAWG: Extraction of pertinent information from SPAR/JEE, PVS and other relevant assessment reports	-Key gaps and recommendations from sector-specific frameworks are extracted and discussed
Session 5	-TAWG: Brainstorm on joint activities	-A initial, raw joint roadmap is starting to emerge
Session 6	-TAWG: Fine-tuning of activities and detailing of their implementation process -World Café where each group circulates to provide feedback on the other groups' activities -Prioritization exercise	-The joint roadmap is finalized and prioritized
Session 7	-Discussion on the way forward and next steps -Any other working group exercise as per the country's context and needs	-Ownership of the roadmap by the country -Buy-in and leadership on its future implementation -(Optional: anchoring of the roadmap into a higher mandated national plan) -(Optional: other possible collaborative needs are addressed)

262

263 The first session serves as an introduction, with short videos (S1 and S2 Videos) presenting the
264 concept and history of One Health, and with presentations from both sectors to better introduce
265 themselves (their structure, priorities, capacities, etc.) to each other.

266 In session two, participants are divided into four or five disease groups. Diseases are chosen in
267 discussion with both Ministries, according to the local context and their priorities. Participants use a
268 fictitious outbreak scenario as a base to discuss how they would realistically manage the situation. In
269 doing so, they must evaluate, using a deck of cards, the level of their collaboration for 15 important
270 technical areas (Table 3) on a three-level Likert scale. This exercise was shown to be very successful
271 in breaking the ice between the different sectors and levels, and in the identification of strengths and
272 weaknesses in the current collaboration.

273 **Table 3. Example of Session 2 results from NBW Bhutan.**

274 The collaboration for each of the 15 areas was assessed on a 1-3 Likert scale (1/green meaning 'very
275 satisfactory collaboration'; 2/yellow meaning 'some level of collaboration but improvements are
276 needed' and 3/red meaning 'the level of collaboration is really unsatisfactory').

Technical area (cards)	Rabies	Anthrax	H5N1	Brucellosis	Salmonellosis
------------------------	--------	---------	------	-------------	---------------

Coordination at high Level	2	2	3	2	2
Coordination at local Level	2	2	2	2	2
Coordination at technical Level	2	2	2	2	2
Legislation / Regulation	2	2	3	2	3
Finance	1	1	2	2	1
Emergency funding	3	2	2	2	2
Communication w/ media	2	2	1	1	2
Communication w/ stakeholders	2	2	2	3	3
Field investigation	3	1	2	3	1
Response	2	3	2	2	2
Risk assessment	1	2	2	1	1
Joint surveillance	2	2	2	1	1
Laboratory	3	3	3	3	2
Education and training	1	1	2	2	1
Human resources	2	3	2	2	1
Logistics	2	2	3	2	1

277

278 The third session starts with videos (S3 and S4 Videos) presenting the IHR and related assessment
 279 tools (SPAR and JEE) as well as the PVS Pathway (PVS Evaluation and PVS Gap Analysis). Participants
 280 are then asked to map the cards that they have selected in the previous session on a 5x3 meter
 281 matrix, built with the indicators of the SPAR/JEE and the PVS Pathway (Fig 1). This step allows
 282 participants to realize the amount of commonality between the two sectors and their respective
 283 frameworks. It also allows for a better visualization of the overall strengths and weaknesses of the
 284 collaboration with all priority diseases considered. The collective analysis of the results enables the
 285 identification of four or five technical groups for the next exercises to focus efforts on the key
 286 technical areas showing the most important gaps. To tackle a maximum of areas, newly-formed

287 groups often address two of the technical cards, such as ‘Surveillance’ and ‘Laboratory’ or ‘Response’
288 and ‘Outbreak Investigation’.

289 In the fourth session, each newly formed technical group opens the PVS Evaluation and SPAR or JEE
290 reports and extracts the key findings that are relevant for their area by completing Gap and
291 Recommendation cards.

292 In the fifth session, each group compiles all the information collected in sessions 2, 3 and 4 and starts
293 to brainstorm on SMART (specific, measurable, achievable, realistic and time-bound) joint activities
294 that should be conducted to fill the identified gaps and to improve the collaboration between the
295 two sectors in their technical area of focus. The NBW roadmap starts to take shape.

296 The sixth session is about structuring and going further into the description of the activities to make
297 them as operational as possible. Groups are given Activity cards that they must fill for each activity.
298 The card asks for a detailed description of the activity, who will be leading its implementation, what
299 will be the exact step-by-step implementation process and what is the desired achievement date. At
300 this stage, exchanges with the facilitating team to help organize, structure and detail the different
301 activities is essential. To facilitate future prioritization, the feasibility and impact of each activity is
302 assessed by participants on a three-level Likert scale. Finally, a world café exercise is organized: the
303 different groups rotate to consider the other groups’ boards and are given 15 minutes to provide
304 comments, suggestions or edits. This peer-reviewing process ensures that participants can contribute
305 to all technical areas while also improving the quality of the final road-map. A quick prioritization is
306 then conducted during which each participant must choose the 5 activities considered of highest
307 priority (either through an electronic vote using Google Forms or by posting stickers on the Activity
308 cards directly). At this stage, the roadmap is considered complete (Fig 2).

309

310

311 **Fig 2. Example of an extract from a NBW roadmap (Serbia, November 2019).** The full roadmap
312 contains 11 specific objectives and 27 activities.

313

314 The final session of the workshop is less standardized than the previous six ones, and aims for several
315 objective: (i) to obtain the buy-in of the roadmap by both sectors, (ii) to ensure that the country
316 takes ownership of the workshop's output, (iii) to discuss on how the roadmap will be implemented
317 and (iv) when possible, to anchor the roadmap in an existing mandated plan. Facilitators from WHO
318 and OIE withdraw themselves, allowing national/country staff to lead the session and determine next
319 steps for their context. The exact process depends on a country-by-country basis and is planned
320 ahead of the workshop through discussions with a few key national stakeholders. In Bhutan for
321 example, the session was used to inject the activities of the roadmap directly into the national five-
322 year One Health Strategic Plan which was in development. In Pakistan, a federal country, an
323 additional working group exercise was conducted with participants from the same province
324 discussing on how to translate the implementation of the national roadmap at the provincial level. In
325 Indonesia, the two sectors used this opportunity to jointly prepare for the upcoming JEE. In several
326 countries (Jordan, Pakistan, Morocco among others) the session was used to inject the NBW
327 activities into their National Action Plan for Health Security. In Nigeria, another half day was added to
328 extend this final session and use the NBW results to support the creation of a national One Health
329 platform.

330 The NBW method has been summarized in a video (S5 Video) available at www.bit.ly/NBWMethod.

331 The NBW material tool-kit (Fig 3) and matrix (Fig 1) exist in English, French, Russian and Spanish
332 versions.

333

334 **Fig 3. The NBW material tool-kit comprises posters, technical cards, fact sheets, stationary supplies**
335 **and a facilitator manual.** The tool-kit is provided by WHO and OIE headquarters. The participant
336 handbooks and assessment (SPAR/JEE, PVS) reports are printed locally.

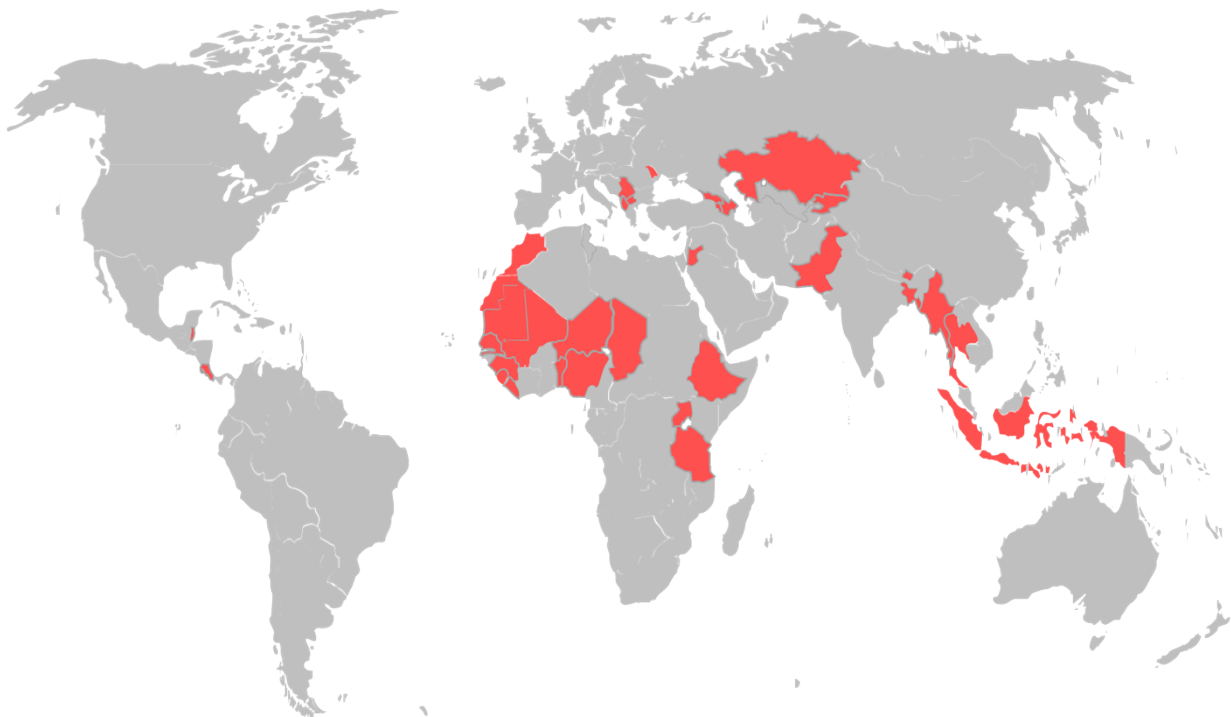
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338

339 **NBW roll-out**

340 After the six initial pilots conducted between 2013 and 2017 (phase one and two of development),
341 three additional NBWs were conducted in 2017, 11 in 2018, 11 in 2019 and 1 in 2020 (workshops
342 planned in 2020 were cancelled or postponed due to the COVID-19 pandemic), for a total of 32
343 countries across different regions and continents (Fig 4).

344



345 **Fig 4. Geographical distribution of NBWs.** A total of 32 countries have conducted a NBW (six pilots
346 between March 2013 and September 2017 followed by 26 workshops between October 2017 and
347 February 2020).

349

350 The number of participants ranged from 26 (Macedonia) to 85 (Indonesia) with an average of 61,
 351 making an aggregate of 1,962 persons who had the opportunity to be engaged in NBWs.

352 A total of 1,290 participant feedback forms were collected from 28 NBWs. Notably, results show a
 353 97.7% overall satisfaction rate among participants with a 3.5/4 average Likert score. 80.6% of
 354 participants declared that the workshop would have a 'Significant' or 'Very High' impact on the
 355 improvement of the collaboration between the two sectors in their country. Finally, 99.7% of
 356 participants responded that they would recommend this workshop to other countries (Table 4).

357

358 **Table 4. Summary of results from 1,290 participant feedback forms.**

Satisfaction assessment		
	Satisfied or Very Satisfied	Average score (Likert scale 1-4)
Overall rating	97.7%	3.5
Content (Quality, relevance)	97.4%	3.5
Structure (Method, material, activities)	96.4%	3.5
Facilitators (Communication skills, technical expertise)	97.7%	3.6
Organization (Logistics, venue)	88.5%	3.4
Impact assessment		
	'Significant' or 'Very High' Impact	Average score (Likert scale 1-4)
Impact on participant's technical knowledge	94%	3.2
Impact on work of department	90.1%	3.3
Impact on AHI collaboration	80.6%	3.1
Recommendation		
Would you recommend this workshop to other countries?		99.7% Yes

359

360 The NBW calendar, along with roll-out status by country, and publicly-available NBW reports and
361 roadmaps are available at the following link: [https://extranet.who.int/sph/ihr-pvs-bridging-](https://extranet.who.int/sph/ihr-pvs-bridging-workshop)
362 [workshop](https://extranet.who.int/sph/ihr-pvs-bridging-workshop).

363

364 **Discussion**

365 Our experience in conducting these workshops has shown us that the One Health approach is
366 generally accepted and desired in most countries, but the bottleneck is often in finding out how to
367 adjust the existing systems and habits to concretely operationalize it across both sectors. Because
368 collaboration takes time and energy, it was quickly determined that if One Health efforts could
369 support sector-specific goals and mandates, as shown with IHR (2005) and PVS, they could facilitate
370 the alignment of ongoing activities and a more efficient use of limited resources. In fact, despite the
371 fact that NBW remains a novel tool and that it requires a significant commitment from both sectors
372 (taking 50-to-90 national experts away from their duty for three full days, many of which have to
373 travel long distances to reach the venue), 32 countries, involving a total of 1,962 actors, have already
374 reached out to WHO and OIE to conduct a NBW. This illustrates the strong appetite for One Health
375 and for tools that support its implementation at country level.

376 In many of those events, officials told us this was the first time that so many stakeholders from the
377 two sectors were meeting to discuss and work specifically on their collaboration. In addition, because
378 the NBWs evolved to include both national and subnational levels, the workshop provided a rare
379 opportunity to amplify the voices at all levels of the human and animal health systems. It was
380 observed that as the discussions unfolded, so did their interest. Participants kept asking for extra
381 time, more sessions and more discussions. For this reason, the overall length of the NBW gradually
382 increased: 1.5 day (Azerbaijan), 2 days (Thailand), 2.5 days (Costa Rica) before reaching its final

383 length of 3 days (Pakistan and all onward workshops). Even with a 3-day process, the most frequent
384 suggestion in the post-workshop surveys was still to increase yet again the duration of the event.

385 The fact that the 32 workshops had varying levels of success (as judged either from the post-
386 workshop survey or from our own impression) provided essential clues on key success factors to
387 consider: (i) high-level engagement and country ownership, (ii) participant representation, (iii)
388 interactive and participatory approach with robust facilitation and (iv) linkages with IHR and PVS
389 sector-specific goals.

390 Political will and leadership with sturdy government support and sustainable funding mechanisms
391 are essential for the institutionalization of One Health in countries (22, 34, 35). The fact that
392 Ministries reach out to WHO and OIE for a NBW and are ready to commit a significant portion of
393 their staff for this three-day event is already a good indication of political commitment. The
394 workshops which we felt were more successful and promising were the ones self-funded by the
395 countries themselves (such as Indonesia or Morocco), perhaps signaling an intention of serious
396 commitment. It is important to clarify the objective and the role that participants are expected to
397 play from the very start of the workshop, and to clearly stress that the NBW is neither a training, nor
398 an external evaluation. Evidence shows that when it comes to operationalizing One Health, there is
399 no one-size fits all approach, and the differences between countries, their health systems, their
400 organizations and their cultures forbid any top-down prescription of measures (14). The aim is to
401 bring a robust and tested methodology that creates a conducive environment for national staff to
402 identify and discuss their needs themselves (not based on any standards or universal scale of
403 progress) and to derive bespoke solutions, tailored to the country's structure and challenges.

404 The buy-in and sense of ownership of the resulting road-map is also critical for the improvement of
405 the collaboration at medium and long-terms and a few select focal points from both sectors, involved
406 very early in the preparation process, are often instrumental for this purpose. Despite the fact the
407 workshop follows a specific methodology, some adjustments to better fit the local context and

408 culture are often made. The national focal points for the NBW organization are also engaged in the
409 design of the simulation scenarios for session two, and often play the role of moderators in the
410 working groups. Whenever possible, they also act as chairperson during the workshop, alternating
411 between the two sectors through the different sessions. The seventh and last session is usually
412 entirely led by the country's national focal points, with OIE and WHO facilitators standing back as
413 discussions are held on the way forward and on the ownership and future implementation of the
414 roadmap. Finally, another important point for the uptake of the roadmap is to make sure, whenever
415 possible, to anchor it into another already mandated plan benefiting for a strong political will and
416 sturdy momentum. For example, in Jordan and Pakistan among others, the activities of the NBW
417 roadmap were injected into the National Action Plan for Health Security, and in Bhutan, Kazakhstan
418 or Nigeria, the joint activities identified during the NBW were anchored into their One Health
419 Strategic Plan.

420 Because of the very active role that they play throughout the workshop, the selection of participants
421 is a critical factor for success. By experience, the ideal audience size is around 60 participants, with
422 about half from each sector as well as a few representatives of other relevant sectors (wildlife,
423 environment, law enforcement, etc.).

424 Besides the number, the distribution of participants is also essential. As we know that challenges of
425 One Health operationalization are often found at the local or subnational level (36), it is important
426 that the representatives from each sector originate from the different levels of administration:
427 mainly national, sub-national and local levels. This mixed distribution of sectors and levels is critical,
428 not only for the overall participation, but also for each working group in the different exercises as it
429 allows a diversity of point-of-views throughout the chain of command and throughout the territory.
430 Without this, there is a risk that the identification of gaps and the planned measures in the roadmap
431 remain very superficial and conceptual.

432 The One Health approach is often visualized with three key actors: human health, animal health and
433 environmental health (15, 18, 20-23, 34, 35). Several reasons can explain why the latter is not more
434 significantly represented in NBWs: (i) there is no regulatory framework similar to the IHR or the OIE's
435 Terrestrial Animal Health Code upon which to base the workshop; (ii) there is no assessment tool
436 that could be used during the process similar to WHO's SPAR/JEE or to OIE's PVS Evaluation; and (iii)
437 evaluating gaps and identifying ways to improve the collaboration between three separate entities
438 becomes complicated, as was experienced in one workshop where we attempted a NBW with equal
439 number of participants from the three sectors.

440 In addition to these upstream factors, some downstream efforts are also made to ensure adequate
441 and sustainable follow-up of this initiative in countries. Firstly, the Tripartite - WHO, OIE and FAO -
442 provides implementation guidance (37) and operational tools (38) to support countries in
443 concretizing One Health principles. Secondly, the Tripartite has initiated in 2020 the *NBW Follow-up*
444 *Program* which includes the recruitment of nationally-hired focal points called *NBW Sherpas*. Their
445 tasks will include, among others, (i) keeping the momentum alive after the NBW by maintaining the
446 liaison between the two sectors; (ii) monitoring, promoting and catalyzing the implementation of the
447 roadmap activities; (iii) providing technical support; and (iv) serving as a relay for other Tripartite One
448 Health tools and activities in countries. The first NBW Sherpas are due to be hired in January 2021.

449

450 **Conclusion**

451 In an increasingly complex and globalized world, with competing priorities, the One Health approach
452 is becoming more and more relevant. As national governments seek to strengthen their capacity for
453 zoonotic disease prevention, detection and response, they need tools to both diagnose needs and
454 existing gaps, as well as develop action plans to support collaboration across sectors. The NBW
455 process, as developed through a series of pilots, supports countries to link their inter-sectoral goals

456 to existing international standards and assessments such as the OIE PVS Pathway and the WHO
457 SPAR/JEE. The ability to collaborate while supporting sector-specific needs provides added incentives
458 for ongoing and sustainable collaborations at the human-animal interface.

459

460 **Supporting Information**

461 **S1 Appendix. NBW Participant Handbook.**

462 **S2 Appendix. NBW Facilitator Manual.**

463 **S3 Appendix. NBW Facilitator's Checklist-kit.**

464 **S4 Appendix. NBW Fact sheet.**

465 **S1 Video. NBW Method overview.**

466

467

468

469 **Acknowledgments**

470 We would like to sincerely thank all national stakeholders from the 32 countries who have
471 contributed to the planification, organization and running of their NBW, as well as staff in the WHO
472 regional and country offices who have been instrumental in the organization of those workshops.

473 This work has been supported by many funders including the United States Defense Threat
474 Reduction Agency (US-DTRA), the Global Partnership Program (GPP), the EU Commission's
475 Directorate-General for International Cooperation and Development (DG DEVCO), the Russian
476 Federation and the World Bank, among others.

477

478

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- 559

JOINT EXTERNAL EVALUATION (JEE)

		PVS PATHWAY																																						
		Human, physical & financial resources											Technical authority & capability				Interaction with stakeholders			Access to market																				
		I.1. Professional and technical staffing of the Veterinary Services	I.2. Competencies of veterinarians & veterinary para-professionals	I.3. Continuing education	I.4. Technical independence	I.5. Stability of structures and sustainability of policies	I.6. Coordination capability of the Veterinary Services	I.7. Physical resources	I.8. Operational funding	I.9. Emergency funding	I.10. Capital investment	I.11. Management of resources and operations	II.1. Veterinary laboratory diagnosis	II.2. Laboratory quality assurance	II.3. Risk analysis	II.4. Quarantine and border security	II.5. Epidemiological surveillance and early detection	II.6. Emergency response	II.7. Disease prevention, control and eradication	II.8. Food safety	II.9. Veterinary medicines and biologicals	II.10. Residue testing	II.11. Animal feed safety	II.12. Identification and traceability	II.13. Animal welfare	III.1. Communication	III.2. Consultation with interested parties	III.3. Official representation	III.4. Accreditation / authorization / delegation	III.5. Veterinary Statutory Body	III.6. Participation of producers & interested parties in joint programs	IV.1. Preparation of legislation and regulations	IV.2. Implementation of legislation and regulations and compliance	IV.3. International harmonization	IV.4. International certification	IV.5. Equivalence and other types of sanitary agreements	IV.6. Transparency	IV.7. Zoning	IV.8. Compartmentalization	
Prevent	National Legislation, Policy & Financing																																							
	IHR Coordination, Communication & Advocacy																																							
	Antimicrobial Resistance (AMR)																																							
	Zoonotic Disease																																							
	Food Safety																																							
	Biosafety & Biosecurity																																							
Detect	Immunization																																							
	National Laboratory System																																							
	Surveillance																																							
	Reporting																																							
Respond	Workforce Development / Human Resources																																							
	Preparedness / Emergency Preparedness																																							
	Emergency Response Operations																																							
	Linking Public Health & Security Authorities																																							
	Medical Countermeasures & Personnel Deployment																																							
Other	Risk Communication																																							
	Points of Entry (PoE)																																							
	Chemical Events																																							
Radiation Emergencies																																								

Figure 1

Action	Timeline	Difficulty (1-3 scale)	Impact (1-3 scale)	Responsibility	Process
JOINT RISK ASSESSMENT & JOINT SURVEILLANCE					
Objective 1: Build capacities to strengthen the surveillance system and sharing of information between both sectors					
1.1 Establish a joint surveillance working (sub-)group (JSWG) at national (ministerial) and institutional levels	June 2020	++	+++	Joint Working Group on Zoonoses (JWGZ), Department for Public Health of MoH (DPH), Department for Animal Health of MoA (DAH)	<ol style="list-style-type: none"> 1) Establish joint surveillance working groups at national and institutional levels 2) Develop ToR for JSWGs at all levels 3) Develop working plans for JSWGs at all levels 4) Nominate members of JSWGs (six experts including chairman at the national level)
1.2 Develop an electronic surveillance system for the public health sector and integrate it with existing electronic surveillance system for the animal health sector at all health care levels	April 2021	+++	+++	JSWG, DPH, DAH	<ol style="list-style-type: none"> 1) The integrated electronic surveillance system should ensure routine sharing of data related to priority zoonoses 2) National JSWG to agree on the type and format of data to be shared between the sectors 3) National JSWG to develop technical specifications including databases, interface, incorporation of GIS, etc. 4) Tender an IT company 5) Develop and test the electronic system 6) Legitimize and implement 7) Train relevant personnel at all levels
Objective 2: Harmonize national surveillance system					
2.1 Identify priority zoonotic diseases of joint concern	2021	+	++	JSWG, DPH, DAH	<ol style="list-style-type: none"> 1) Develop concept note 2) Develop/adapt methodology (encountering results of strategic risk assessment (activity 4.3)) 3) Conduct a joint workshop on prioritization of zoonotic diseases 4) Prepare workshop report and approve by both sectors
2.2 Revise the operational framework for evidence-based surveillance in both sectors	April 2020	+	++	JSWG, DPH, DAH, Veterinary Institutes Belgrade, IPHS Batut	<ol style="list-style-type: none"> 1) To prepare a draft version of an operational framework conduct a meeting with six representatives, three from each sector: <ol style="list-style-type: none"> a. one representative from each ministry, MoH and MoA, b. two representatives from the epizootiology units from Veterinary Institutes Belgrade and c. two epidemiologists from IPHS Batut 2) Clearly define an operational framework with terms of reference that will be applicable in both sectors

Figure 2



Figure 3

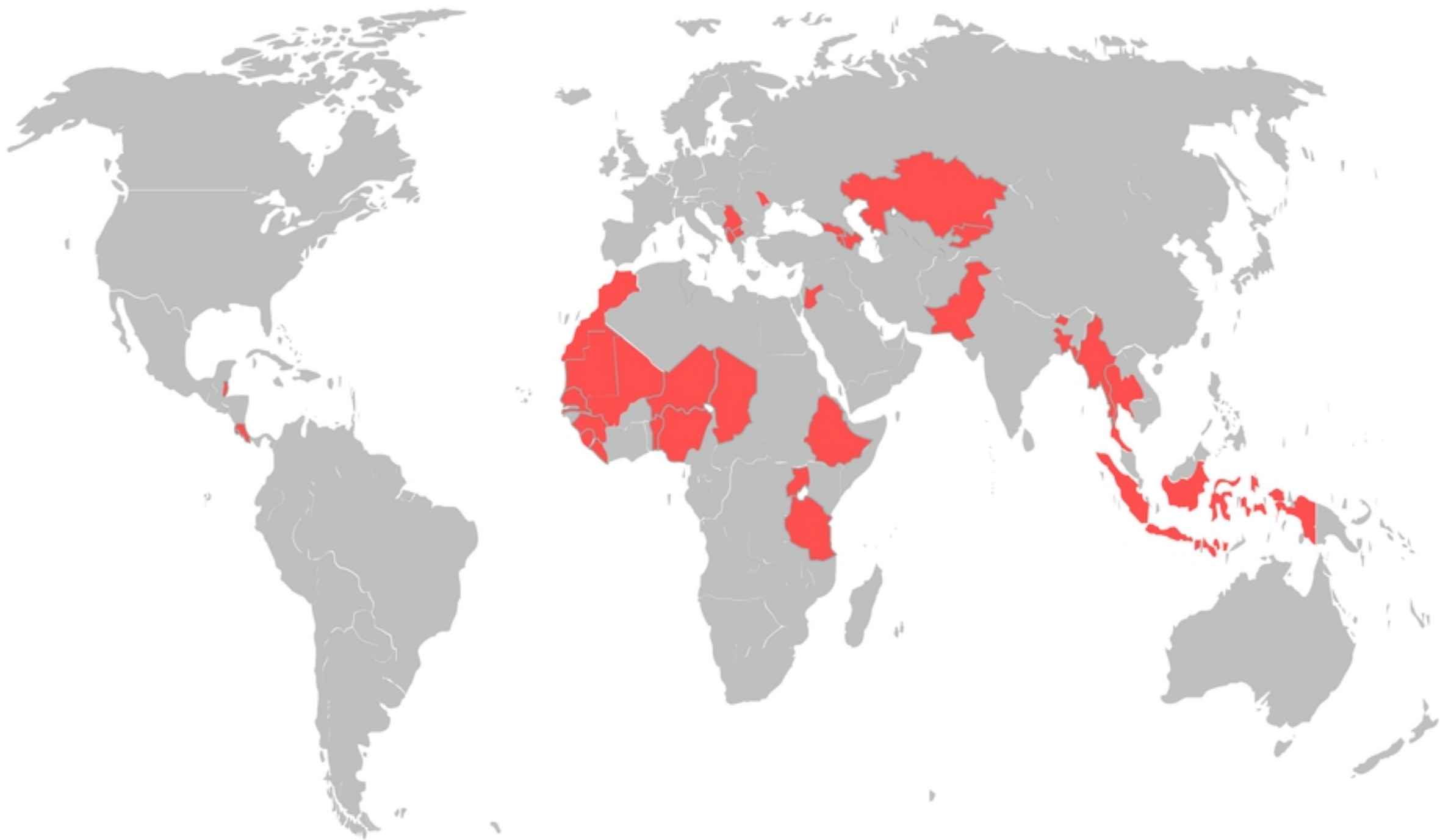


Figure 4