

1 **Title:** Implementing One Health in Australia: A modified Delphi survey and analysis
2 of expert perspectives

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4 **Abstract**

5 **Background:** One Health (OH) is an interdisciplinary approach aiming to achieve
6 optimal health for humans, animals and their environments. Case reports and
7 systematic reviews of success are emerging, however discussion of barriers and
8 enablers of cross-sectoral collaboration are rare.

9 **Methods:** A four-phase mixed-method Delphi survey of Australian human and
10 animal health practitioners and policymakers (n=52) explored areas of consensus and
11 disagreement over: (i) the operational definition of OH; (ii) potential for cross-
12 sectoral collaboration; and (iii) key priorities for shaping the development of a OH
13 response to significantly elevated zoonotic disease risk.

14 **Findings:** Participants agreed OH is essential for effective infectious disease
15 prevention and control, and on key priorities for outbreak responses, but disagreed
16 over definitions and the relative priority of animal health and welfare and economic
17 considerations.

18 **Interpretation:** Strong support emerged among Australian experts for a OH
19 approach. There was also recognition of the need to ensure cross-sectoral differences
20 are addressed.

21

22

23 **Introduction**

24 Emerging and re-emerging infectious diseases [EIDs] are an unpredictable,
25 continuing threat to human, animal and ecological health. They are characterized by
26 complex causes, consequences and potential solutions that critically limit the
27 effectiveness of scientific and technocratic approaches to governance.^{1,2} EID crises
28 create major issues for distribution of scarce resources, access to health services and
29 global health security. Historically, EIDs have been managed in overlapping,
30 uncoordinated, disciplinary silos.³ However, since they are largely driven by human
31 behaviours and human structures in the context of human-animal interactions, the
32 effectiveness of traditional sectoral approaches has been limited.

33

34 “One Health” [OH] is the preferred approach to responding to EIDs. OH is based on
35 recognition of the interdependence of human, animal and ecological health and an
36 assumption that cross-sectoral integration of expertise, research methodologies and
37 public health infrastructure increases the capacity for anticipating disease risk and
38 effective intervention.^{4,5} The OH literature emphasises the benefits,^{3,6,7} but there has
39 been little attempt to identify and assess barriers to and enablers of cross-sectoral
40 collaboration.⁸⁻¹¹ Possibly this is because the need for an OH response seems obvious.

41

42 Against this background, OH advocates are concerned that early collaborations have
43 not included all relevant disciplines^{8,12} especially experts from social, ecological and
44 environment health sciences.^{13,14} Moreover, despite almost two decades of
45 interdisciplinary advocacy by international agencies and national governments, OH
46 still means different things to different people (Text Box 1).¹⁵ It remains an ‘umbrella
47 concept’ for a variety of expert perspectives and disciplinary agendas. This raises

48 concerns about the capacity and willingness of different professional groups to
49 collaborate^{5,16,17} and the extent to which various sectoral priorities can be aligned,
50 during EID response planning.¹⁸⁻²⁰

51 **Text Box 1: Current definitions of One Health**

One Health is ...

- "...a collaborative, international, cross-sectoral, multidisciplinary mechanism to address threats and reduce risks of detrimental infectious diseases at the animal-human-ecosystem interface." **Food and Agriculture Organization**
- "...a collaborative and all-encompassing way to address, when relevant, animal and public health globally." **World Organization for Animal Health [OIE]**
- "...the collaborative effort of multiple health science professions, together with their related disciplines and institutions – working locally, nationally, and globally – to attain optimal health for people, domestic animals, wildlife, plants, and our environment." **The One Health Commission**
- The One Health concept recognizes that the health of humans is connected to the health of animals and the environment. **US Centers for Disease Control and Prevention**
- "...a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals, and the environment" **The One Health Initiative**

52

53

54 The conceptual ambiguity of OH could actually diffuse political tensions between
55 competing sectoral agendas, allowing them to work together.¹⁷ Nevertheless, lack of
56 evidence about how different sectors understand OH, their roles and responsibilities
57 and how they pursue their priorities, could limit collaboration and its benefits.

58 Because resources are limited, prioritisation and resource allocation require political
59 decisions, based on ethical principles, about what is valued, what must be protected
60 and what is dispensable.

61

62 In this paper we report the results of a modified Delphi survey from a larger study,
63 which aims to elicit the values underpinning OH and develop guidance for

64 practitioners and policymakers. We employed mixed methods to explore areas of
65 sectoral consensus or disagreement on: how OH should be defined; the potential for
66 cross-sectoral collaboration in Australia; and key priorities that should shape
67 development of an OH response to a zoonotic EID emergency, when knowledge of its
68 nature, scale and scope is absent or fluid.

69

70 **Methods**

71 *Participants*

72 A heterogeneous and geographically dispersed group of experts in human and
73 veterinary medicine, health law and wildlife ecology and representatives of
74 agricultural industries and animal welfare/protection organisations were invited to
75 participate in this survey. We defined ‘experts’ as individuals with knowledge and
76 experience of EID risks and outbreaks among humans and animals.²¹ Sampling was
77 purposive, to ensure representation of traditional OH stakeholders. Potential
78 participants were identified through institutional websites and researchers’
79 professional networks.

80

81 *Delphi processes*

82 The rationale of Delphi surveys is that group consensus about contentious issues is
83 more valid than individual opinions.²² Anonymous data are collected from
84 individuals, collated and then re-presented to the group to elicit further responses.²¹ In
85 this study we analysed data iteratively in parallel with data collection. Rather than
86 force consensus, we employed a modified technique that allows participants to
87 explain their views. Except for early discussions about OH definitions (Round [R]
88 2/Q1), consensus ‘cut offs’ (i.e. fixed levels of agreement) were not employed to limit

89 the choices available to survey participants. Otherwise, participants were asked to
90 judge and respond to the levels of consensus/disagreement that emerged from each
91 round to provide greater insight into the operational relevance of OH. Participants
92 who completed each round were invited to participate in the next, but were free to
93 withdraw at any time. We used an online survey platform [*Limesurvey*].

94

95 In R1, we asked participants about their understanding of OH and to respond to three
96 hypothetical scenarios, each describing a substantially elevated risk of a significant
97 EID event in Australia. Scenarios [available in online materials] were adapted, with
98 permission, from a similar study in Singapore (see acknowledgements). Responses
99 were analysed qualitatively and coded thematically by two authors (CD and JJ) using
100 framework analysis, a matrix-based method for ordering and synthesizing textual
101 data.²³ During rounds 2–4, participants' comments, key arguments and levels of
102 consensus from previous rounds, were presented as quotations, bar charts and
103 summaries of qualitative findings, taking care to weigh different opinions and
104 arguments equally. Individual comments were de-identified.

105

106 Additional data and comments were collected, using Likert scales and free text
107 responses. On completion of each round, participants' Likert scores were tabulated
108 and free text answers analysed qualitatively, as described. The final stage of analysis
109 during preparation of this report drew on the knowledge and professional experience
110 of the research team.

111

112 To aid analysis, each participant was allocated to a disciplinary/sectoral category –
113 animal or human health – based on their qualifications and current responsibilities.

114 Consistent with previous reports that ecologists and environmental scientists are
115 poorly represented in OH discourse,^{12,14} participants from these disciplines all
116 occupied positions within the animal health sector, and were allocated accordingly.
117 This study was approved by the [Blinded] Research Ethics Committee.

118

119 **Results**

120 Participants:

121 Email invitations were sent to 85 potential participants, of whom 52 (61%) from a
122 range of relevant OH roles, disciplines and geographic regions, responded [Table 1].
123 Invitations included an individualized link to the online survey, through which
124 participant consent was obtained.

125

126 As expected, the panel size gradually decreased as participants withdrew,²⁴ but the
127 balance between human and animal health sectors and characteristics of participants
128 remained substantially constant [Table 1]. The final round was run at the request of
129 participants who were keen to give further feedback on the findings.

130

131 Responses to questions on how OH should be defined:

132 Seven statements describing OH were compiled from participants' responses to
133 questions about the nature of OH. In R2, they were asked to indicate the extent to
134 which they agreed/disagreed with these statements [Supplementary materials]. To
135 focus discussion, we applied a cut off of >65% agreement. The three statements that
136 met or exceeded this threshold, were presented to participants in R3, namely:

137 1. The inter-relationship between human, animal and environmental health [A]

138 2. The integration of human, animal and environmental health [B]

139 3. Cross-disciplinary collaboration and communication between veterinary,
140 medical and ecological sciences and relevant government agencies [D]

141 Participants were asked to indicate, with reasons for their choice, which statement
142 best reflected their view of OH [Table 2].

143

144 Key differences (as revealed in comments) were the extent to which participants
145 considered OH to be: a concept for understanding linkages between human, animal
146 and environmental health (statement 1); an emerging integrative discipline (statement
147 2); or a political initiative to promote cross-disciplinary collaboration (statement 3).

148 Several participants regarded none of these statements as satisfactory, citing the
149 limited importance given to the environment in current discourse. One participant
150 commented:

151 *DP #26 - The problem at the moment with the way many people in the*
152 *veterinary and human health fields use the term 'One Health' is that it*
153 *focuses on human and terrestrial animal health i.e. zoonoses, and excludes*
154 *the other organisms (plants, fish) and their interactions with the*
155 *environment. ... If we are serious about a concept of 'One Health' then it*
156 *needs to be used to describe the interactions and interrelationships across all*
157 *organisms and the environment otherwise it's not 'One Health'*

158

159 In R4, participants were shown a representative sample of comments and given the
160 opportunity to change their position. Table 2 shows that support (in relative terms)
161 drifted from statement 2 to statement 3. Participants who still preferred statement 2 in
162 R4 were all aligned with the animal health sector. Otherwise, disciplinary background
163 appeared not to influence how participants defined OH.

164

165 These results revealed the difficulty of arriving at a consensus definition of OH,
166 despite considerable cross-disciplinary agreement. Substantively, the three statements
167 are very similar; the key tension is whether OH is a means to reach an holistic
168 understanding of EID threats or a road map for effective cross-sectoral responses.
169 Comments from R3 and R4 (Table S1 Supplementary data) suggested that
170 participants who preferred statement 1 were resistant to disciplinary integration or
171 specific outcomes, whereas those who preferred statement 3 were more pragmatic and
172 focused on cross-sectoral collaboration as the key driver of a successful OH approach.

173

174 *Responses to questions on cross-sectoral collaboration*

175 In R2 we asked participants to indicate on a Likert Scale their (dis)agreement with the
176 statement in Text box 2.

Text Box 2

When faced with possible multiple unexpected animal-to-human disease transmissions in Australia, Federal and State Departments [Health, Primary Industries, and the Environment], The Australian Health Protection Principal Committee, The Office of Health Protection, The Communicable Diseases Network Australia, Animal Health and Public Health Laboratories, and Biosecurity Agencies would rapidly be in communication and would collectively develop a plan to limit the impact of such a zoonosis.

177 Just over two-thirds of participants agreed; the statement was most strongly endorsed
178 by human health sector participants. Those from the animal health sector were more
179 pessimistic or unsure about the immediate prospects for cross-sectoral collaboration
180 (Figure 1).

181 *Insert Figure 1*

182 To explore these positions we constructed a list of potential barriers to OH
183 approaches, from participants' responses to R1 scenarios. Figure 2 shows the extent to
184 which R2 participants agreed or disagreed with each.

185 Although participants were generally optimistic that different sectors would work
186 together during a significant EID outbreak, we were surprised by how strongly they
187 believed that most barriers were likely to impede an OH response.

188 *Insert Figure 2*

189 A comment from one participant [R3] illustrates this:

190 *DP #46 - ... there are quite a number of issues preventing an optimal*
191 *response to a major zoonotic disease outbreak. It will require additional*
192 *resources and plenty of planning and training (including a merging of*
193 *cultures) to provide the sort of response we should expect. ... This does NOT*
194 *mean we should abandon the process of One Health but serves to illustrate*
195 *the many difficulties to overcome.*

196 A general theme of the comments was the need for inter-agency consultation,
197 relationship building, planning and funding allocation, to deal with cross-sectoral
198 differences before threats occur. Participants' responses were analysed according

199 disciplinary background. Applying Fisher's exact test (comparing agree vs. disagree
200 and excluding the neither agree/disagree group),²⁵ the only significant ($p < 0.05$)
201 difference was that participants from the animal health sector were more likely to see
202 a focus on human, rather than animal or environmental health, as a barrier to an OH
203 response.

204

205 By R4 only 2 of 24 participants did not agree with the original statement [text box 2];
206 most believed that, despite differences or mutual cynicism, different sectors would set
207 aside conflicting interests to mount an effective response to a significant zoonotic
208 threat. However, many were convinced that a response could not be implemented
209 rapidly and seamlessly, unless overall responsibility for infectious disease control and
210 prevention in humans and animals were located within a single agency.

211

212 *Key Priorities in Developing a Plan of Action*

213 Previous studies have shown that different priorities create tensions between OH
214 stakeholder groups.^{10,17} In R2 we asked panel members to rank 19 issues for
215 developing an action plan in response to an unexpected threat. Because our aim was
216 to understand the key concerns and types of evidence needed to formulate a response
217 at times of uncertainty, participants were asked to rank the issues, without contextual
218 information, such as the nature or source of the pathogen or size of the outbreak.
219 Rankings were determined by assigning a score equivalent to reverse rank (e.g. a
220 score of 19 to items rated 1st); scores were multiplied by the number of participants
221 who gave each rank and the overall ranking was determined by adding scores for each
222 item. Table 3 shows the final rankings, which were presented to participants in R3 for
223 comment.

224

225 The panel gave a strong endorsement to the top six items; at least 40% of participants
226 ranked them in the top 5 and 70% in the top 10. Responses were a mix of ideal and
227 pragmatic – burden of disease, costs of implementation and maintenance of services
228 were key issues. In R3 participants’ comments on rankings indicated general
229 agreement that human health, food security, resource availability and communication
230 are appropriate primary concerns. Lower-ranked items were more evenly distributed,
231 indicating more varied views about their importance. Several participants from both
232 sectors expressed surprise at the relatively low rankings of social considerations,
233 animal health and welfare and environmental health. Some were surprised at how
234 high economic impacts and costs were ranked, commenting that it was not their role
235 to prioritise according to economic factors. However, in subsequent rounds, it was
236 suggested this was naïve; in the words of one participant: “*Economic considerations*
237 *come into everything that is done in health*” (DP #33). Most agreed with the
238 importance of proportionality such that economic factors were *a* consideration, but
239 not the *key* consideration, in decision making. The plurality of views caused one
240 participant to note:

241 *DP #5 - It depends on the particular situation: that's why we have, and need,*
242 *consultative committees with broad representation to consider each*
243 *situation.*

244

245 Table S2 (supplementary data) provides a breakdown, by sector, of priorities and
246 preferences from R3. While there was broad agreement on the top six priorities, there
247 were some differences between sectors. Where there is a lack of evidence, animal
248 health sector participants generally gave greater priority to economic and animal
249 health concerns; whereas those from the human health sector were more likely to rank
250 the effect on the emotional wellbeing and privacy of individuals and the risks of
251 stigmatisation of those affected more highly.

252

253 Several participants made the case that different situations would require different
254 priorities; for example:

255 *DP #22 - Outbreak of rabies, Australian Bat Lyssa Virus (ABVL) or Japanese*
256 *Encephalitis (JE) would have a localised impact in which the 'top six' may be*
257 *less important and issues 7 - 11 assume a higher importance. It is unlikely*
258 *that rabies, ABLV or JE would impact on food supply or major economic*
259 *impact yet the emotional psychological stress on individuals could be really*
260 *significant.*

261

262 A common theme was that participants needed more information in order to make
263 decisions about priorities. Of this one participant noted:

264 *DP # 52 – While I agree with the sentiments expressed, it is not always*
265 *possible to answer all these questions quickly enough, and actions may*
266 *usually need to be undertaken before all the questions can be answered --*
267 *especially how big is it and how big will it get, which may not be known*
268 *until well into the outbreak.*

269

270 Given that there may be little existing evidence or experience when new threats – like
271 SARS or bovine spongiform encephalitis (BSE) – emerge, key findings of this survey
272 include the critical role of context in EID response-planning and policy decision-
273 making. Participants hoped that sectoral differences over second-order priorities
274 would not interfere with these key goals; rather, that they be points of consultation to
275 ensure that responses encompass different stakeholder perspectives.

276

277 **DISCUSSION**

278 Our findings indicate high levels of support among Australian policy-makers and
279 practitioners for an OH approach to zoonotic disease control and prevention, despite
280 several points of disagreement. One key difference was whether OH should be
281 defined as a means to integrate disciplinary practices or as a framework to understand
282 linkages between separate disciplines. Proponents of both positions were found in
283 both the main sectors, suggesting that the tension between integrationists and those
284 who want to maintain disciplinary integrity is a personal rather than sectoral
285 preference. Focussing on differences in the definition of OH may miss the point, but
286 the complexities of EID control and prevention probably mean that an effective
287 response requires genuine cross-sectoral integration and re-sectoring of some
288 institutional and professional responsibilities.⁶ The results of this survey suggest that
289 any such efforts are likely to meet with resistance within and across the relevant
290 sectors.

291

292 It is notable that not all of the barriers to the effective implementation of an inter-
293 agency plan identified by Delphi participants (Figure 2) were addressed by key
294 priorities for action (Table 3). This is likely to be because some of the barriers

295 identified simply don't have a practical action that can easily be included in a plan of
296 action. That there is substantial overlap between the two lists in this study is actually
297 positive sign that there are many practical and collaborative actions that can be taken
298 in the event of an EID outbreak. Sectoral differences in participants' responses tended
299 to coalesce around the relative importance of each of the groups' professional roles
300 and responsibilities. The animal health sector, which traditionally works to maximise
301 the value, utility and welfare of animals, emphasised economic and animal health
302 considerations. Those working in the human health sector thought that ethical
303 considerations and factors that affect epidemiological investigations should have
304 higher priority. Differences in the goals and values of different sectors are not
305 unexpected, but are likely to complicate cross-sectoral co-operation. Past experience
306 with BSE and pandemic influenza H₁N₁ indicate that, in the face of scientific
307 uncertainty and ethical ambiguity, these differences will be amplified. Consequently,
308 sectoral interests and short-term political considerations will threaten efforts to devise
309 effective long-term interventions.^{26,27}

310

311 There is some urgency to address disagreements revealed by this survey because calls
312 for increased inter-sectoral co-operation, by public health practitioners and policy-
313 makers in Australia,^{28,29} and elsewhere, are not new.³⁰ Unfortunately, past experience
314 suggests that attempts to promote a cross-sectoral approach rarely move beyond
315 rhetoric, even when driven by the best intentions and supported by substantial
316 resources. The problem is that arguments focus on the likely benefits of collaboration
317 rather than what needs to be done, organisationally and politically, to achieve the
318 desired outcomes.²⁹ Established 'sectors' have genealogies and rationalities shaped by
319 social, political and administrative processes; as institutions, they are inherently and

320 structurally resistant to measures that divert resources and re-orient practices away
321 from their own sectoral priorities. Consequently, even with commitment to
322 information-sharing, through collaborative working groups and interdepartmental
323 committees, inter-sectoral co-operation has rarely delivered the outcomes promised.
324 Many recognise that integrationist reforms are likely to promote more effective cross-
325 sectoral collaboration,^{9,13} and OH opinion leaders are now advocating for the
326 establishment of a supporting OH infrastructure comprised of:

327 *complex, polycentric organizational structures ... [that] rely on multiple,*
328 *strong connections and coordinated activities across sectors.*³⁰

329 Against this background, there is evidence that enthusiasm for OH in Australia is
330 genuine rather than symbolic, as governments in recent years have moved towards
331 aggregating responsibility for agriculture and environmental health under
332 ‘biosecurity’. Initiatives such as the *Australian Antimicrobial Resistance Strategy* and
333 *Hendra Virus Interagency Technical Working Group* are significant attempts to
334 achieve collaboration between human and animal health sectors. This survey showed
335 that there is considerable agreement among human and animal health practitioners
336 and policymakers, including about the nature and scale of barriers to effective OH
337 collaboration and the need for further work to explore their potential impacts. This
338 suggests that implementation of an OH strategy, based on inter-sectoral co-operation,
339 is eminently feasible.

340

341 *Strengths and Limitations*

342 The initial response to participant invitations was moderate, which was gratifying,
343 given that our invitation was unsolicited. Retention of participants over successive

344 rounds was also moderate and the balance between members of different sectors
345 remained constant. Because participation across different sectoral roles and
346 jurisdictions remained relatively heterogeneous throughout the survey (Table 1), we
347 believe the risk of selection bias due to participant withdrawal is minimal. Moreover,
348 allowing participants to express their views and comment on each other's
349 interpretation, via open-ended free text questions, over multiple survey rounds
350 increased the reliability of the study and improved the validity of the results. A
351 limitation was the lack of a clearly identifiable environmental sector, which is likely
352 to be an artefact of how the management of infectious disease risk in Australia is
353 currently organised.

354

355 *Word count*

356 3,859

357

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442

443

444

Table 1: Professional/employment characteristics and geographic locations of panel participants

	Round 1	Round 2	Round 3	Round 4
	n=52	n=40	n=34	n=24
Response rate	62%	77%	85%	71%
Employment setting				
Federal government	7 (0.135)*	6 (0.15)	5 (0.147)	4 (0.167)
Provincial governments	17 (0.323)	14 (0.35)	11 (0.323)	9 (0.375)
Regional / Local health authorities	7 (0.135)	4 (0.1)	4 (0.117)	2 (0.083)
NGO / Industry	6 (0.115)	5 (0.125)	4 (0.117)	1 (0.042)
University	15 (0.288)	11 (0.275)	10 (0.294)	8 (0.333)
Geographic area				
Federal / National	12 (0.231)	11 (0.275)	8 (0.235)	5 (0.208)
NSW	13 (0.25)	10 (0.25)	9 (0.265)	7 (0.292)
Victoria	8 (0.154)	5 (0.125)	5 (0.147)	4 (0.167)
Queensland	6 (0.115)	3 (0.075)	3 (0.088)	3 (0.125)
Western Australia	5 (0.096)	4 (0.1)	3 (0.088)	0
Northern Territory	3 (0.057)	3 (0.075)	2 (0.059)	2 (0.083)
South Australia	2 (0.038)	2 (0.05)	2 (0.059)	1 (0.042)
ACT	2 (0.038)	1 (0.025)	1 (0.029)	1 (0.042)
Tasmania	1 (0.019)	1 (0.025)	1 (0.029)	1 (0.042)
Primary role / responsibility				
Chief Medical / Veterinary Officers	6 (0.115)	4 (0.01)	3 (0.088)	2 (0.083)
Directors of Health / Biosecurity agencies	11 (0.212)	10 (0.25)	9 (0.265)	7 (0.292)
Public Health / Veterinary Officers	9 (0.173)	5 (0.125)	4 (0.117)	3 (0.125)

Senior Policy Officer / Research Scientist	12 (0.231)	10 (0.25)	8 (0.235)	5 (0.208)
Academic Clinician / Researcher	14 (0.269)	11 (0.275)	10 (0.294)	7 (0.292)
Disciplinary / sectoral background				
Human Health	24 (0.462)	20 (0.50)	17 (0.5)	11 (0.458)
Animal Health	28 (0.538)	20 (0.50)	17 (0.5)	13 (0.542)

445 * Data in brackets are proportions of total in each category

446

447 **Table 2:** Level of support for different definitions of One Health.

448 Data from rounds 3 & 4

449

Statement	Delphi Round 3			Delphi Round 4		
	Human health sector (n=17)	Animal health sector (n=17)	Round 3 Total (n=34)	Human health sector (n=11)	Animal health sector (n=13)	Round 4 Total (n=24)
1 [A]	9 (0.52)	8 (0.46)	17 (0.50)	5 (0.45)	7 (0.54)	12 (0.50)
2 [B]	4 (0.24)	3 (0.18)	7 (0.21)	0	3 (0.23)	3 (0.13)
3 [D]	4 (0.24)	6 (0.36)	10 (0.29)	6 (0.55)	3 (0.23)	9 (0.37)

450 * Data in brackets are proportions of total in each category

451

Table 3: Key priorities when developing a plan of action ranked from most to least important. Data collected in round 2 (n=40).

	Overall ranking	Rating score	Rankings in 1st Quartile	Rankings in 2nd Quartile	Rankings in 3rd Quartile	Rankings in 4th Quartile
Impacts on human health	1	718	97.5%	0.0%	0.0%	2.5%
Availability of human and health resources for plan implementation	2	602	65.0%	27.5%	2.5%	5.0%
Continuity of food supply and maintenance of essential services	3	571	57.5%	30.0%	5.0%	7.5%
Public education about the risks faced by individuals and communities	4	545	50.0%	30.0%	17.5%	2.5%
Economic impacts on individuals, businesses and governments	5	521	42.5%	37.5%	17.5%	2.5%
The financial cost of implementing the plan	6	493	40.0%	30.0%	20.0%	10.0%
Potential public reaction - including concerns about stigmatisation	7	428	10.0%	57.0%	30.0%	3.0%
Ease of tracking exposed persons	8	419	27.5%	27.5%	30.0%	12.5%
Welfare and health of animals	9	405	27.5%	27.5%	22.5%	12.5%
Emotional/psychological stress on individuals	10	376	10.0%	37.5%	42.5%	10.0%
The interests of other jurisdictions – [WHO, neighbouring states... etc.]	11	373	27.5%	35.0%	10.0%	27.5%

Confidentiality of those who are ill, being traced, or involved in decision making	12	355	10.0%	40.0%	32.5%	7.5%
Impacts on the environment	13	313	12.5%	17.5%	37.5%	42.5%
Australia's reputation	14	311	12.5%	22.5%	37.5%	32.5%
The potential for research to generate valuable new knowledge	15	302	10.0%	25.0%	30.0%	35.0%
Impacts on the freedom of individuals	16	284	0.0%	25.0%	50.0%	25.0%
Impacts on tourism and travel	17	215	0.0%	12.5%	45.0%	47.5%
Impacts on family cohesion	18	209	2.5%	10.0%	37.5%	50.0%
Impacts on public transport	19	158	0.0%	10.0%	32.5%	37.5%

Figures

Fig 1.

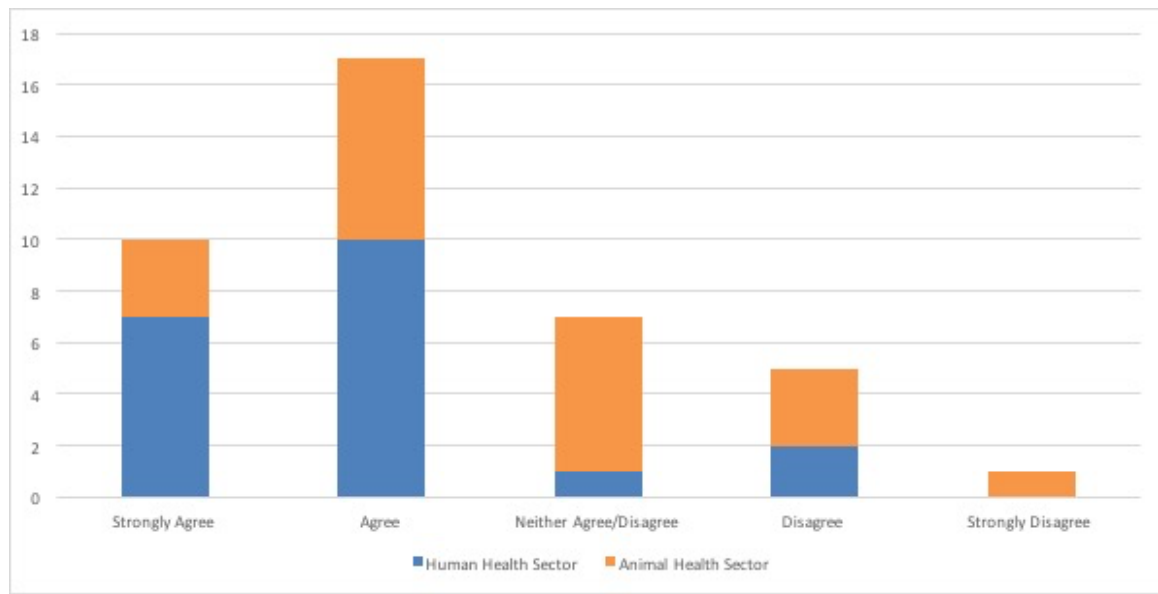


Fig 2.

