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RESEARCH ARTICLE

REVISED A survey on Open Science perceptions and experiences among One Health researchers in South Asia

[version 4; peer review: 1 approved, 1 approved with reservations, 4 not approved]

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Abstract

Background

Open Science aims at improving the quality of research, transparency, and data sharing through open-access platforms, data sharing, inclusion of citizen scientists, making research results accessible to both professionals and citizens. As science becomes increasingly data-driven, responsible open science practices enable collaboration, reduce barriers in multisectoral teams, and support integrative approaches such as One Health. In response to the rise of zoonotic diseases globally, many countries have adopted the One Health approach, fostering collaboration across the human–animal–environment interface. However, open practices such as data sharing within One Health is not always implemented.

Objective

To explore perceived barriers to engaging in Open Science practices in the One Health community in South Asia.

Methods

Open Peer Review

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An online survey was conducted among One Health stakeholders in South Asia, including academic researchers, healthcare professionals, veterinarians, and policymakers. A 22-item semi-structured questionnaire was distributed via the Nettskjema platform of the University of Oslo (UiO) using a snowball sampling technique. The study was preregistered in the Open Science Framework registry.

Results

We received 90 responses with the majority being from India (55.6%), followed by Pakistan (17.8%), Nepal and Sri Lanka (6.7% each), Afghanistan and Bangladesh (5.6% each), and Bhutan (1.1%). Levels of awareness and practices of Open Science were mixed: while 60% engaged in open-access publishing, 27.8% shared data, 23.3% supported citizen science, and 12.2% used preprints. Reported barriers included lack of awareness, inadequate government support, institutional restrictions, to name a few. Despite these, the participants highlighted major benefits in practicing Open Science.

Conclusion

The survey highlights key opportunities and challenges in engaging with Open Science for One Health in South Asia. Greater government and institutional support, improved data-sharing and infrastructure, inclusion of veterinary and environmental sectors, capacity-building, and international collaboration are essential to overcome barriers and strengthen One Health globally.

Plain Language summary

Open Science encourages practices such as open-access publishing, sharing data, and involving the public in research. These practices can improve collaboration and trust in science, especially in approaches like One Health, which brings together human, animal, and environmental health experts to address shared challenges of zoonotic diseases. In South Asia, many countries support the One Health approach, but Open Science practices are not widely adopted. This study explored what prevents the One Health community from adopting Open Science.

We conducted an online survey with 90 One Health stakeholders across South Asia. Most participants were from India, followed by Pakistan, Nepal, Sri Lanka, Afghanistan, Bangladesh, Bhutan and Maldives. The survey explored their awareness of Open Science, current practices, and perceived benefits and challenges. The results showed mixed levels of awareness and use of Open Science. While many participants supported open-access publishing, fewer shared research data, used preprints, or engaged in citizen science. Common barriers included limited awareness and training, lack of funding and government support, institutional restrictions, concerns about misuse of shared data, and the absence of clear platforms for data sharing.

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Any reports and responses or comments on the article can be found at the end of the article.

The participants also widely recognized the benefits of Open Science. They highlighted faster sharing of knowledge, better collaboration across sectors, greater equity, and improved public participation. Citizen science was seen as particularly useful for community involvement and outbreak response, although a small number of participants questioned its relevance to One Health research.

Overall, the study shows strong interest in Open Science within the One Health community in South Asia, but also significant structural and institutional barriers. Increasing awareness, building skills, improving data-sharing infrastructure, and strengthening policy and institutional support will be key to turning these positive attitudes into everyday practice. Addressing these issues can help Open Science play a stronger role in improving One Health activities, regionally and globally.

Keywords
Open Science, One Health, South Asia, ethics, data sharing, Citizen Science, research equity

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REVISED **Amendments from Version 3**

The manuscript has been further revised in response to the comments and suggestions provided by all reviewers. In particular, the open-ended responses from the survey, which were collected as part of the original study but were not included in the previous version of the manuscript, have now been incorporated into the revised manuscript. This qualitative component has been included in response to the strong recommendations of two reviewers to provide further contextual and qualitative insights alongside the quantitative findings. The corresponding dataset and extended data relating to the open-ended responses have also been provided to ensure transparency, accessibility, and reproducibility of the qualitative analysis.

In addition, the manuscript has been updated to include a word cloud figure (Figure 10.0) summarising key themes emerging from the open-ended responses. The relevant sections of the manuscript have been revised accordingly, and the reference list has been updated to incorporate the additional literature cited in the revised text and discussion.

All comments raised by the reviewers have now been addressed. These revisions primarily strengthen the presentation and interpretation of the study by integrating qualitative insights with the quantitative findings. Importantly, the inclusion of the open-ended responses does not involve any change to the original study design, sampling, or data collection procedures; rather, it provides an additional analysis of responses collected as part of the original survey. The revised manuscript therefore presents a more comprehensive account of the findings while maintaining the overall scope and objectives of the study.

Any further responses from the reviewers can be found at the end of the article

Introduction

According to UNESCO,[1] Open Science (OS) is defined as:

> *An inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society, and to open the processes of scientific knowledge creation, evaluation and communication to societal actors beyond the traditional scientific community. It comprises all scientific disciplines and aspects of scholarly practices, including basic and applied sciences, natural and social sciences and the humanities, and it builds on the following key pillars: open scientific knowledge, open science infrastructures, science communication, open engagement of societal actors and open dialogue with other knowledge systems.*[1]

OS practices such as depositing datasets in open repositories, sharing code through collaborative platforms, collaborating with citizen scientists, and disseminating results via preprints and open-access journals not only improve reproducibility but also expand opportunities for interdisciplinary collaboration. Through these practices, OS accelerates discovery and ensures that scientific knowledge can benefit policymakers, industry, and society at large.[1–3] International organizations, including UNESCO and the World Health Organization (WHO), increasingly promote these practices to improve reproducibility, improve knowledge exchange, and foster broader participation in research.[1,2] Yet, the engagement with OS practices remains uneven, due to differences in infrastructure, research incentives, and regulatory environments across the globe.[3] Researchers in low- and middle-income countries (LMICs) may face structural constraints that affect their ability to participate in OS, including limited research funding and infrastructure, inadequate technical capacity and training, restricted access to appropriate data-sharing platforms, and concerns regarding data governance and reuse. These challenges may be particularly relevant in the One Health (OH) context. The OH paradigm recognizes the interconnectedness of human, animal, and environmental health and demands interdisciplinary collaboration to address complex challenges such as the emerging zoonotic diseases, antimicrobial resistance, and climate-related health risks.[4] Since OH implementation depends on collaboration across sectors and borders, it particularly relies on timely and transparent sharing of data and expertise across disciplines. OS can therefore play a crucial role in strengthening OH research to its fullest.[1,5]

In the global context, several public health emergencies have demonstrated the benefits of OS practices, including rapid sharing of pathogen genomic data and pre-registration of protocols, while also exposing persistent challenges such as data silos, privacy concerns, and inequities in publications.[6,7] South Asia provides a relevant setting to examine this interface. The region's dense populations, expanding livestock production, and increasing human–animal interaction make it a hotspot for emerging zoonotic disease and antimicrobial resistance.[8] There has been an increase in the number of research, with universities and public health institutions rapidly engaged in OH activities.[9] However, fragmented data systems, limited interoperability between sectors, resource constraints, and uneven policy support hinder knowledge sharing.[9,10] Language diversity, inequities in access to open-access publishing, and concerns about data misuse further complicate the engagement with OS practices in low-and- middle-income countries.[11,16]

Despite the importance of both OH and OS in the region, little is known about how researchers perceive and experience OS practices in their research. Exploring this is essential for identifying opportunities, barriers, and context-specific needs that can guide the development of policies, infrastructure, and training to support OS in OH research.

Research question
What are the perceived barriers to engaging in OS practices among OH researchers in South Asia?

Aim
To explore perceived barriers to engaging in OS practices among OH researchers in South Asia.

Objectives
1. To identify the current level of awareness, familiarity, and self-reported engagement with OS practices among OH researchers in South Asia.

2. To explore the perceived institutional, technical, financial, and cultural barriers to engaging in OS practices in the OH community.

Methods
Study design: This study employed a cross-sectional online survey to explore perceptions, practices, and collaborative experiences related to OH and OS among professionals working in South Asia.

Study setting: The survey was carried out over five months (May–September 2025). The study was approved by Sikt – Norwegian Agency for Shared Services in Education and Research (ref no. 631691), and was carried out in strict adherence to the Declaration of Helsinki (2024). The questionnaire was distributed through Nettskjema platform[12]- a GDPR-compliant online survey tool developed and maintained by the University of Oslo (UiO), with all sensitive data securely stored in the Services for Sensitive Data (TSD), the UiO's dedicated infrastructure for secure handling of research data.[13]

Sample and sampling strategy
Target population: The target population included professionals engaged in OH activities in South Asian countries or international collaborations involving these countries. Eligible participants represented diverse disciplines contributing to the OH approach.

Inclusion criteria covered researchers, policymakers, veterinarians, epidemiologists, citizen scientists, and environmental scientists based on their memberships in world organisations and who have contributed to or participated in OH activities in South Asian countries. We also included participants who had been engaged in international collaborative OH projects or in OH activities involving South Asian countries.

Exclusion criteria applied to individuals who had neither collaborated nor taken part in any OH activities in South Asia.

Eligibility screening
We assessed eligibility through the information provided by respondents in the questionnaire, including their professional role, highest educational qualification, primary role in OH research, years of experience in OH, and involvement in OH activities. These questions enabled us to establish whether respondents had relevant OH experience or involvement and therefore met the predefined eligibility criteria. No respondents were excluded on the basis of OH eligibility. Of the 92 responses received, two were excluded because they were incomplete, resulting in 90 complete responses for the final analysis.

Sampling technique
A non-probability snowball sampling technique[14] was employed. Initially, we contacted global and regional organizations leading OH initiatives, including *Women for One Health*, *Women in Global Health*, WOAH (*World Organisation for Animal Health)*, *One Health World Happenings*, *OHASA (One Health Alliance of South Asia)*, and OHNSEA (*One Health Network Southeast Asia).* These organizations circulated the survey invitation to their members and professional mailing lists. Respondents were also encouraged to share the survey link with other eligible participants, thereby expanding participation through successive referrals (Figure 1.0).

Planned sample size: The sample size was calculated based on the standard formula for estimating a population proportion. Although a previous survey of OH perceptions and experiences in Europe,[15] reported that 62.6% of

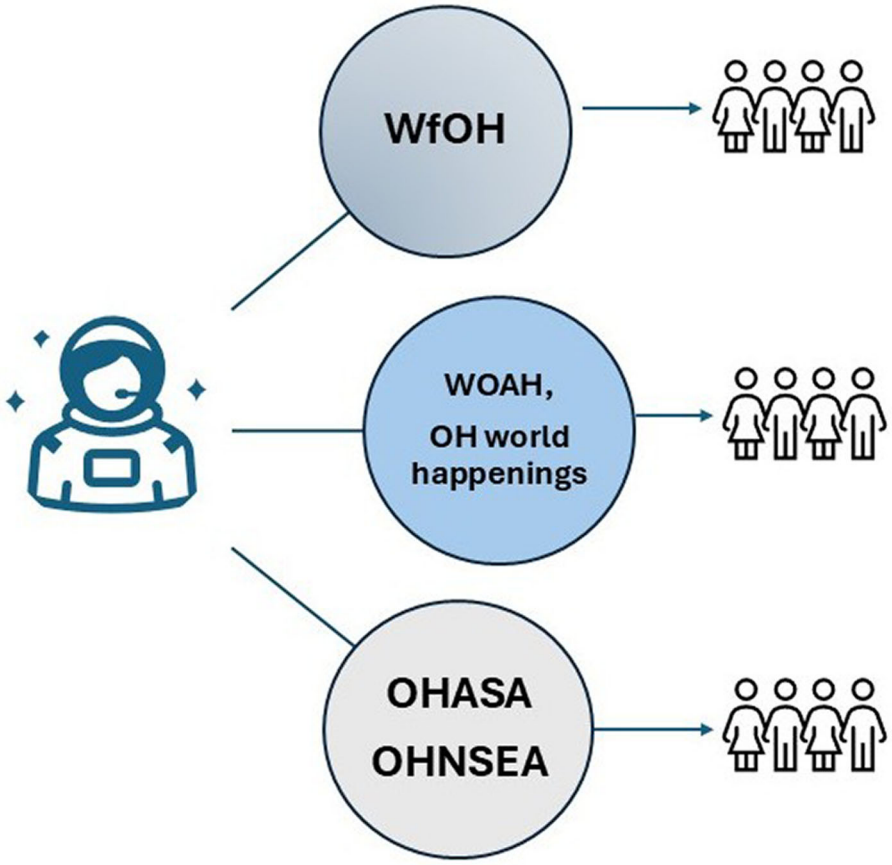

Figure 1.0. Snowball sampling.

respondents supported OH initiatives, there was no directly comparable estimate for the proportion of OH researchers in South Asia who engage with or report awareness of OS practices. Therefore, a conservative proportion of 50% (p = 0.50) was assumed. With a 95% confidence level (Z = 1.96), and a 10% margin of error, the resulting minimum sample size was 97 participants. A total of 92 responses were received, of which two were excluded because they were incomplete, resulting in 90 complete responses for the final analysis.

$$n = \frac{Z^2 1 - \frac{a}{2} \times p(1-p)}{E^2}$$

$$n = \frac{(1.96)^2 \times 0.50 \times (1-0.50)}{(0.10)^2}$$

$$\mathrm{n} = 96.04 \approx 97$$

Additional note

We also identified a 2016 survey[9] from South Asia ($n = 61$) that examined related aspects of OH perceptions. While that study had a smaller sample size than ours, it did not report the same binary 'in favour' outcome used in our sample-size calculation. Therefore, its findings are not directly comparable for re-estimating sample size.

Questionnaire: At the beginning of the questionnaire, participants were informed that the study explored their views and experiences of OS in the OH context. The survey introduction also provided a link to the Responsible Open Science in Europe (ROSiE) project website,[37] which provides information on OS, including its definition, principles, practices, and guidance for responsible implementation. However, the questionnaire did not reproduce a formal definition of OS immediately before the questions. Therefore, respondents may have answered these questions based on their prior understanding of OS and/or information obtained from the linked ROSiE resources. The survey comprised 22 questions

across five thematic areas-professional background, cross-sector collaboration, OS practices, policy awareness/data sharing, and perspectives on citizen science and equity. Respondents selected their primary roles, country of work, years of experience, and sectors of collaboration, while also rating collaboration strength and identifying institutional and national barriers. Furthermore, the questionnaire probed awareness and implementation of OS, data-sharing platforms, and policy alignment, including recommendations from participants. The questionnaire incorporated different response formats. Questions assessing demographic and professional characteristics and participant's awareness or practice of OS used categorical response options, including binary (Yes/No), three-category (Yes/No/Not sure), and single-choice questions. Several questions used multiple-response formats ("select all that apply") to capture the range of sectors with which participants collaborated, challenges experienced, OS practices used or perceived as challenging, data-sharing challenges and platforms, perceived benefits, and barriers or recommendations. For questions allowing additional responses, an "Other, please specify" free-text option was provided.

Two questions used 5-point response scales. Participants rated the level of collaboration between different sectors in OH research on a scale from 1 (very weak) to 5 (very strong). Familiarity with OS practices was assessed on a scale from 1 (not at all familiar) to 5 (very familiar). The questionnaire also included open-ended questions that allowed participants to provide narrative responses, including their views on the contribution of OS to equity and inclusivity, intellectual property management, factors influencing trust between scientists and local communities, and policy or practical recommendations.

The questionnaire included conditional branching. For example, participants who indicated that they practiced OS or were unsure were subsequently asked which OS components they practiced, whereas those who reported not practicing OS were asked which components they considered challenging or associated with barriers. The complete questionnaire, including the wording and response options for all questions, is provided as supplementary material.

Informed consent: Informed consent was obtained digitally from all participants via the Nettskjema form by providing the "click-to agree or disagree options". The information sheet explained the purpose of the study, confidentiality and anonymity of responses, and the right to withdraw at any time without consequences. Participants were informed of their data protection rights, including access, correction, and deletion of personal data.

Questionnaire development

The questionnaire was drafted based on the findings of the study, *Ethical Challenges and Opportunities at the Intersection of One Health and Open Science in India: A Scoping Review*.[5]

Pilot testing and validation

Face validity and content validity: The questionnaire was both face and content validated by two subject experts with experience in OH and OS.

Preliminary Pilot Testing: Conducted with four individuals to evaluate usability, time required, and comprehensibility.

Revisions: Based on pilot feedback, wordings were simplified, response options were refined for multiple-choice items, and the sections were adjusted for logical flow.

Recruitment and data collection

The survey link was disseminated through:

- Professional mailing lists and newsletters of participating organizations, for example: the newsletter of One Health Happenings.[17]
- Direct email invitations to relevant networks.

No personally identifiable information was collected unless voluntarily shared for follow-up communication.

Data management and analysis

Responses were automatically stored in TSD and later exported to Excel for data cleaning and coding. All identifying information were removed before analysis to maintain anonymity.

Given the small and unequal number of respondents across countries, the analysis was restricted to descriptive statistics, and no inferential comparisons between countries were undertaken. Therefore, descriptive statistics (frequencies and percentages) were used to summarize demographic characteristics and responses across themes. The survey included both structured quantitative questions and five open-ended questions. The present paper reports the quantitative findings. The qualitative findings will be reported separately to allow appropriate depth of analysis. The quantitative data were analyzed using IBM SPSS Statistics- Version 27.[18]

The open-ended responses were analyzed thematically using NVivo 15 through an inductive approach, following the principles by Braun and Clarke.[19] The responses were read repeatedly by NH for familiarization with the data. Initial codes were generated inductively by NH. NH and AC reviewed the codes to capture recurring ideas and patterns, refined, and grouped them into broader themes representing barriers and enablers in OS practices. Next, the themes were developed iteratively, with comparison across responses to ensure coherence and distinction between themes. Finally, the representative quotes were selected in order to illustrate each theme and to reflect the diversity of participant's perspectives. All codes and responses were reviewed by RB and UK.

Protocol and registration

The study protocol was registered in the Open Science Framework: https://osf.io/p8myb/overview.

Results

A total of 92 responses were received from OH stakeholders across South Asia. After data cleaning to remove incomplete and duplicate entries, 90 valid responses were included for analysis. The dataset represented a diverse group from Veterinary Science, Medicine, and Environmental Science. In particular, 73.3% (n = 66) of the respondents considered themselves as academic researchers, with lesser percentages of respondents identifying as healthcare workers (35.6%), veterinarians (14.4%), NGO representatives (8.9%), government officials (8.9%), policy makers (6.7%), and environmental scientists (5.6%).

Since OH research involves multidisciplinary collaboration, many respondents identified with more than one professional category (e.g. academic researchers who are also healthcare practitioners or government advisors). This overlap reflects the integrated nature of OH work. Therefore, multiple selections were allowed and analyzed as such, recognizing the interconnected roles rather than forcing a single selection. This approach provides a more realistic representation of the professional landscape within the OH community in South Asia.

I. Participant demographics

a. **Country-wise distribution of participants**

Most respondents were based in India (n = 50), followed by Pakistan (n = 16). Fewer respondents were from Nepal and Sri Lanka (n = 6 each), Bangladesh and Afghanistan (n = 5 each), with minimal representation from Bhutan and the Maldives (n = 1 each) (Figure 2.0).

b. **Highest educational qualification**

With regards to the highest educational qualification, most of the respondents had a master's degree (45.6%), then a PhD or equivalent (25.6%). A lower percentage has completed postdoctoral research (13.3%) or holds a bachelor's degree (15.6%). These findings suggest that the sample is mainly represented by a well-qualified population, and involved in research and academic work.

c. **Gender**

Regarding gender distribution, 60% of respondents are male, while 36.7% are female. Missing or unreported (3.3%) answers were a few (Table 1.0). This shows a sample that is male dominated.

d. **Years of experience in OH activities**

The respondents differed in terms of their experience in OH research, with the greatest proportion having 8 years or more of experience (36.7%, n = 33), followed by those with less than one year (25.6%, n = 23), 4–7 years (24.4%, n = 22), and 1–3 years (15.6%, n = 14). Percentages may not total 100% due to rounding.

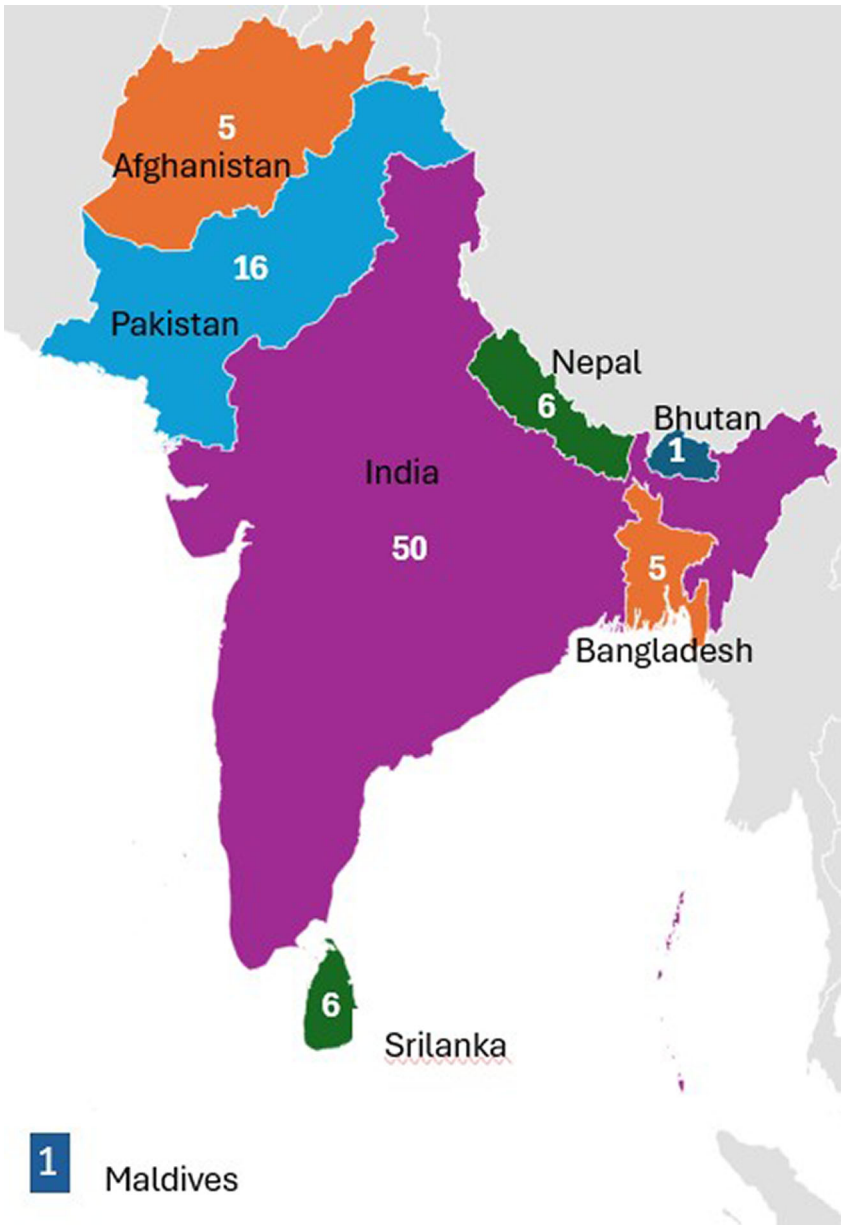

Figure 2.0. **Distribution of respondents by country.**

Table 1.0. **Gender-wise distribution of participants (country wise classification).**

Country	Male	Female
Afghanistan	4	1
Bangladesh	3	2
Bhutan	1	-
India	33	15
Nepal	3	3
Pakistan	10	5
Maldives	-	1
Srilanka	-	6

II. Cross-sectoral collaboration and challenges in its implementation in OH

a. **Sectors of collaboration in OH approach**

It was stated that collaboration in OH occurred in a variety of sectors, but the most prevalent area of collaboration was human health (86.7%, $n = 78$), followed by environmental science (33.3%, $n = 30$), animal health (28.9%, $n = 26$), public policy (27.8%, $n = 25$) and agriculture (12.2%, $n = 11$). Country-wise collaboration is listed in Table 2.1.

b. **Perceived level of cross-sectoral collaboration**

The mean score for sectoral collaboration in OH was 2.69 (SD = 1.08), indicating a low to moderate level of collaboration between sectors. Of the respondents, 35.6% ($n = 32$) gave a neutral rating (score 3), while 28.9% ($n = 26$) rated collaboration as weak (score 2) or very weak (score 1). Fewer participants gave a positive assessment: 15.6% ($n = 14$) described collaboration as strong (score 4), and only 5.6% ($n = 5$) rated it as very strong (score 5) (Table 2.2).

c. **Challenges in working across different sectors**

The participants described several significant challenges faced in cross-sectoral collaboration in OH research. Institutional barriers (72.2%, $n = 65$) were most often reported, and the next barriers were lack of funding (67.8%, $n = 61$), lack of communication (61.1%, $n = 55$), and various research priorities (55.6%, $n = 50$). Limited government support (53.3%, $n = 48$) was also seen as a big challenge by more than half the participants. A very low percentage (2.2, $n = 2$) of them stated that they did not have any significant challenges.

III. Awareness and practice of OS in OH

When asked about their familiarity with OS practices in OH research, the majority of respondents (35.6%, $n = 32$) reported being moderately familiar. Another 28.9% ($n = 26$) indicated they were only slightly familiar. Fewer participants described themselves as familiar (15.6%, $n = 14$) or very familiar (5.6%, $n = 5$), while 14.4% ($n = 13$) stated they weren't familiar at all (Table 3.0).

Table 2.1. Sectors involved in One Health collaboration by country.

Country	Human health	Animal health	Environmental science	Agriculture	Public policy
Afghanistan	5	1	2	1	2
Bangladesh	4	4	4	1	1
Bhutan	1	-	-	-	-
India	44	12	16	5	17
Nepal	5	3	3	1	2
Pakistan	12	4	4	2	2
Maldives	1	1	0	1	0
Srilanka	6	1	1	-	1
Total	78	26	30	11	25

(Note: Percentages do not sum to 100% as respondents could select multiple roles).

Table 2.2. Perceived level of cross-sector collaboration in South Asia.

	Very weak	Weak	Moderate	Strong	Very strong
Count	13	26	32	14	5
Percentage	14.4	28.9	35.6	15.6	5.6

Table 3.0. Overall awareness of OS.

	Not at all familiar	Slightly familiar	Moderately familiar	Familiar	Very familiar
Count	13	26	32	14	5
Percentage	14.4	28.9	35.6	15.6	5.6

a. **Respondents practicing OS**

Majority of the respondents (58.9%, $n = 53$) indicated that they practice OS. Nevertheless, a large minority stated that they do not engage in OS (20.0%, $n = 18$) or they do not know (21.1%, $n = 19$).

b. **Commonly practiced OS components**

Open access publishing was the most common OS practice, with 60% of respondents making their publications freely available. About one-third reported participation in open peer review and open methodology, while public data sharing and citizen science engagement were less common. Fewer than one-fifth of respondents reported practices such as preregistration, open collaboration, sharing code or preprints, or contributing to open educational resources (Figure 3.0).

c. **Challenges in the practice of OS among non-practicing respondents**

Among respondents who indicated that they did not practice OS, the questionnaire asked which specific OS components they found difficult to practice. The most frequently reported challenges were related to data sharing (12.2%) and open access publishing (8.9%). Other areas reported as difficult included citizen science and sharing codes (6.7% each), followed by open peer review and open educational resources (5.6% each). A smaller proportion of respondents identified preprint publishing (2.2%) and pre-registration and open methodology (1.1% each) as difficult to practice (Figure 3.1).

d. **Training in OS**

Among the respondents, a small proportion (15.6%) reported having received formal training in OS practices.

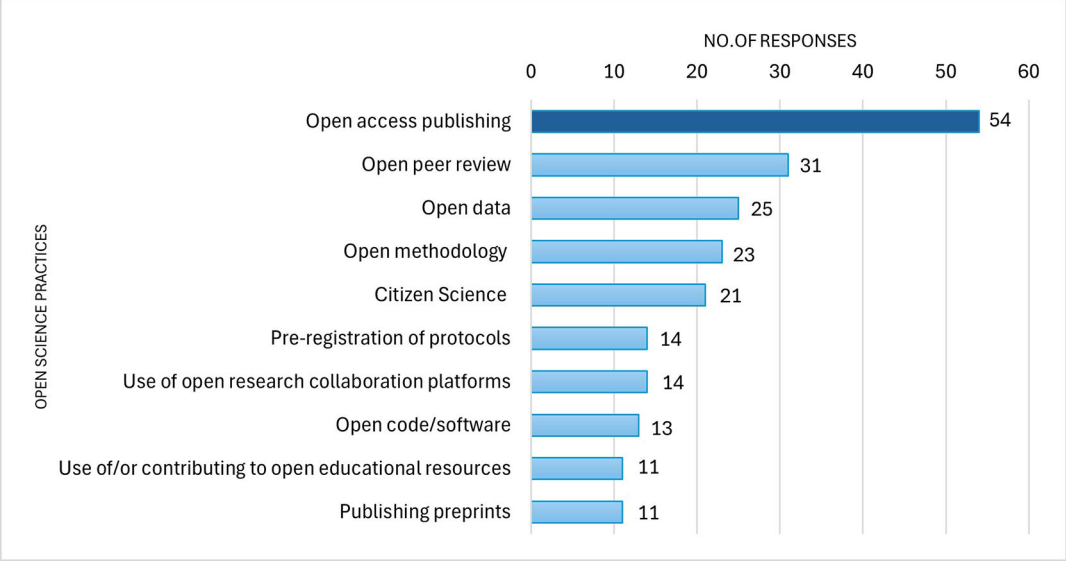

Figure 3.0. Distribution of the types of OS practices.

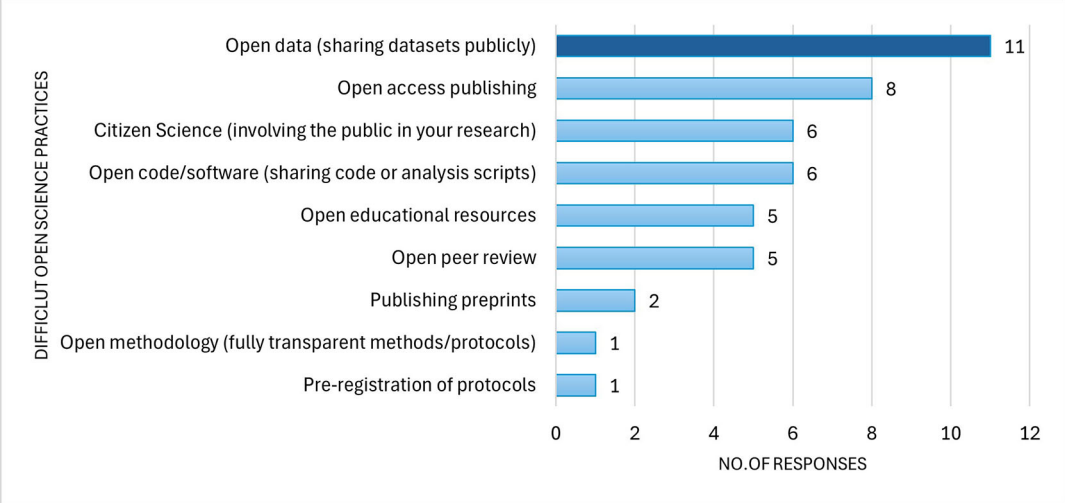

Figure 3.1. Perceived barriers to adopting OS practices among those who reported not practicing OS.

IV. Awareness of national OH policies and its alignment with OS

In this case, the data show that slightly more than half of the individuals (53.3%) said they were aware of OH policies or initiatives in their country. Nevertheless, a significant number, 30%, claimed to be unaware of the existence of such policies, and 16.7% were not sure whether such policies existed.

Alignment of National OH policies with OS

Of all respondents who knew about the existence of OH policies or initiatives in their country, 25.6% reported that these policies partially adhere to the OS principles of data sharing, transparency and inclusiveness. A smaller percentage, 13.3%, believed that there was full compliance in the policies with OS, with 7.8% reporting that the policies do not fit at all. Also, 6.7% of the respondents did not know whether there was an alignment.

V. Challenges in data sharing among OH stakeholders

The results show that there are a number of important issues related to data sharing among OH stakeholders. The most importantly stated barrier was the absence of standardised platforms (73.3%), followed by institutional restrictions (63.3%), which shows the presence of structural and infrastructural gaps to facilitate a smooth exchange of data. More than half of the respondents expressed the issue about data misuse (52.2%) and legal or ethical restrictions (50%) as an important hindrance. Also, another barrier to effective data sharing was identified as funding constraints (44.4%) (Figure 4.0).

VI. Digital platforms or tools used for data sharing

The most frequent way in which respondents shared their data with the public was by using open-access journals (51.1%), which indicates that publications should be utilised as a main medium of avenue of sharing research. Subsequently, cloud-based sharing services, including Google Drive or Dropbox (41.1%) and institutional repositories (37.8%) were also used and contributed to data exchange. There was lower use of government databases (25.6%), but 15.6% of the respondents claimed that they had not shared data on any platform or tool (Figure 5.0).

VII. Benefits associated with OS practices in OH

The participants outlined some of the most important benefits of OS in OH. The most popular benefit was enhanced cooperation (72.2%), and the next was accelerating the speed of knowledge spread (67.8%) and enhancing fairness in research (62.2%). Increased public engagement (53.3%), which depicts the possible strength of OS to enhance community involvement and engagement, was also emphasized as a benefit by more than half. Only a minority (4.4%) thought that there were no great advantages (Figure 6.0).

VIII. Perceptions of how citizen science can contribute to OH

The responses show that Citizen Science is seen as a highly appreciated addition to OH research to a considerable degree. Its ability to close gaps between the official research and local knowledge (85.6%), and to improve the involvement of the

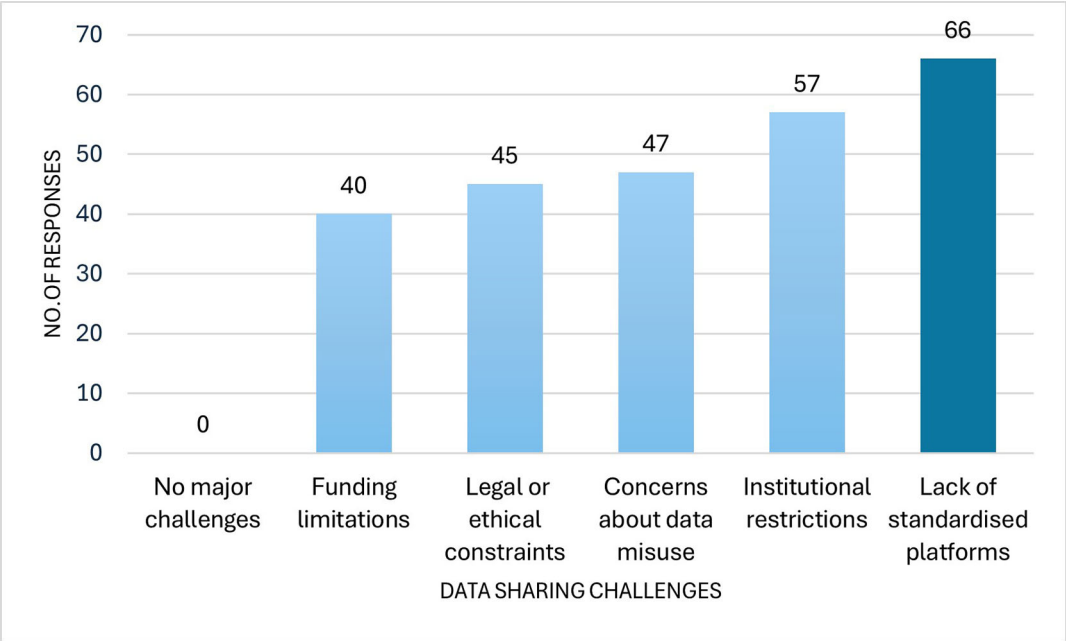

Figure 4.0. **Perceived challenges in data sharing among OH stakeholders in South Asia.**

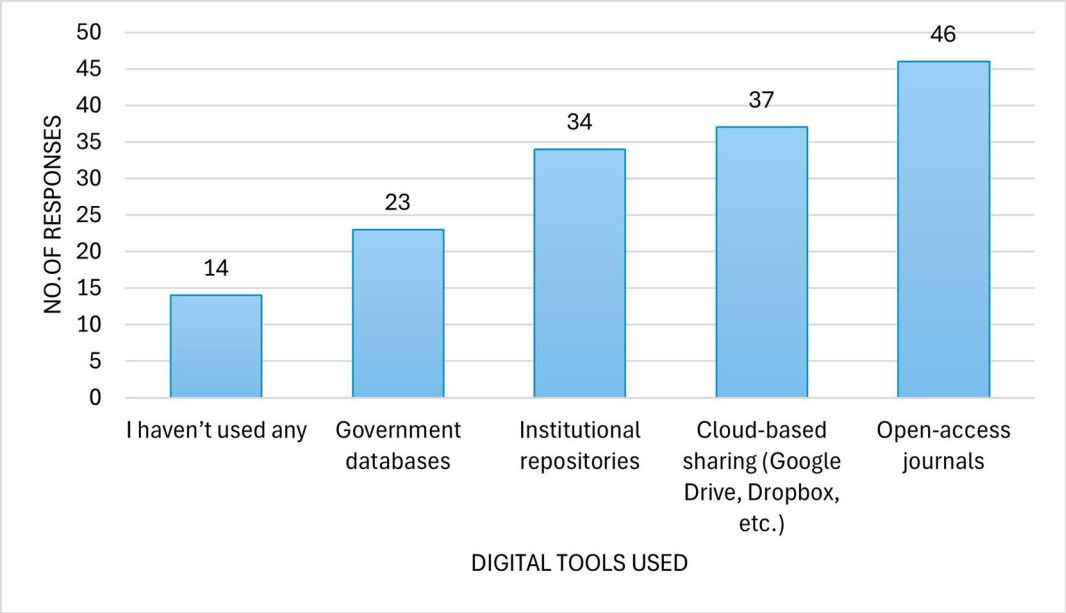

Figure 5.0. **Overall perception of digital platforms or tools used for data sharing.**

population (66.7%) was the most frequent advantage observed. It is also useful in response and surveillance, as over half (56.7%) of the respondents identified its value in assisting in data collection during disease outbreaks. A very small percentage (4.4%) opined that Citizen Science is not useful in OH (Figure 7.0).

IX. Barriers to implementing OS in OH

The findings here point to several barriers to the implementation of OS and Citizen Science in OH. Lack of awareness (77.8%) was the most salient challenge that was noted, and it is possible that some of the stakeholders are not aware of or were not exposed to these practices. A significant barrier was also the institutional restrictions (63.3%), which refers to the

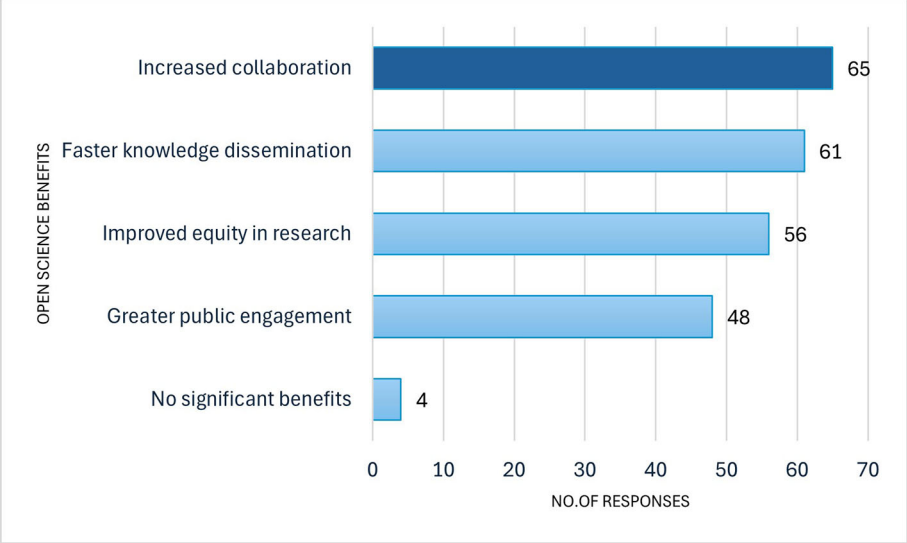

Figure 6.0. **Perception of benefits associated with OS practices in OH.**

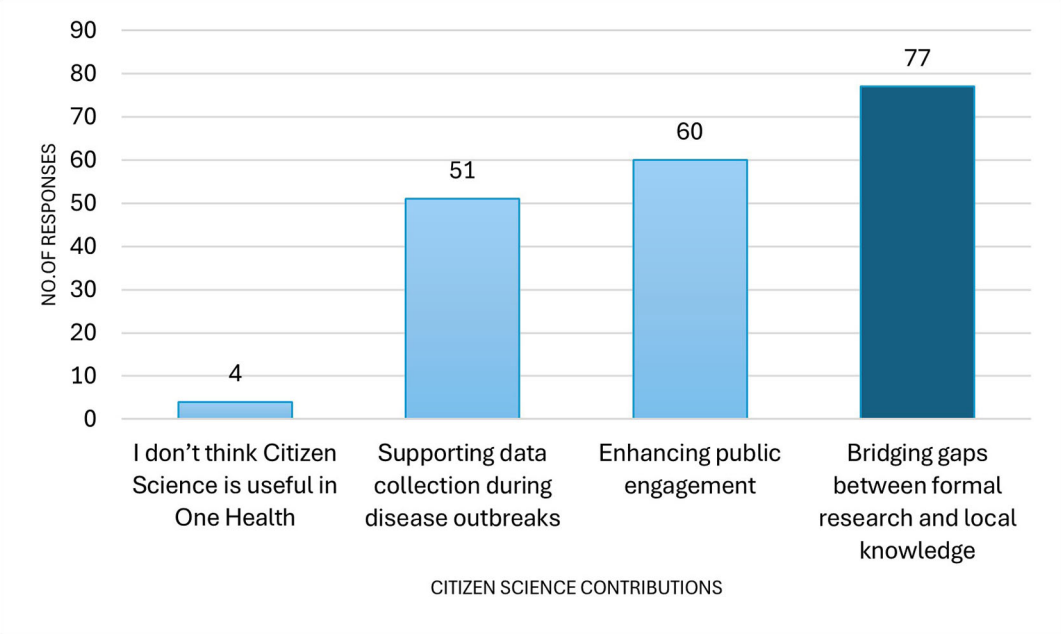

Figure 7.0. **Perceived contributions of Citizen Science to OH.**

structural or policy-related restrictions within organisations. More than half of the participants mentioned small funding (53.3%) and data security (51.1%) as other barriers. A very small minority (2.2%) said that there were no significant barriers (Figure 8.0).

X. Policy recommendations to improve OS in OH

Our study respondents also provided practical suggestions that can be made to enhance OS in OH. The popular recommendation was improved researcher training (76.7%), there being a high demand to develop capacity and skills in OS practices. It was succeeded by an appeal to closer international partnerships (71.1%), greater policy backing (66.7%), both demonstrating the significance of policy support and international partnerships. The necessity to have more accessible data-sharing platforms (64.4%) to break the technical barriers was also highlighted by many, and the campaigns aimed at the general population (55.6%) to expand the scope of interaction as well as knowledge of OS principles (Figure 9.0).

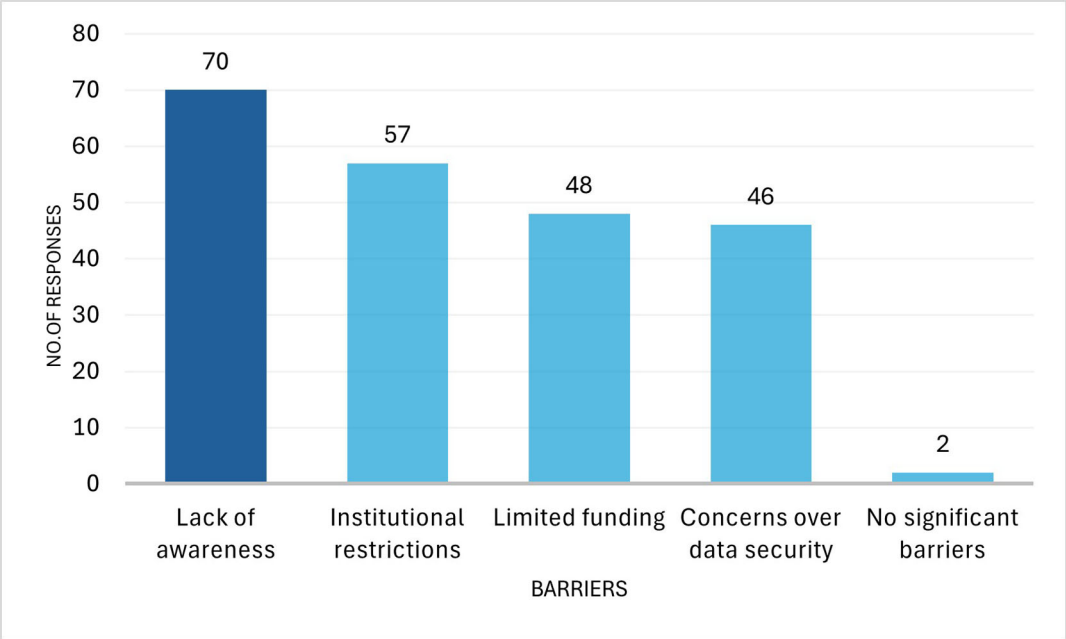

Figure 8.0. **Perception of the barriers in the implementation of OS in OH in South Asia.**

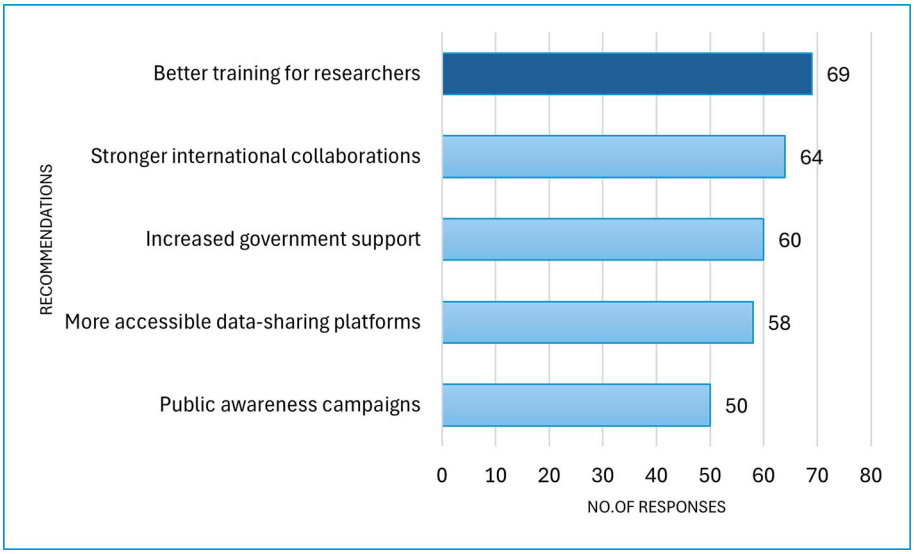

Figure. 9.0. **Recommendations by respondents to improve OS in OH.**

Thematic analysis of open-ended responses

Data analysis of 89 open-ended responses based on thematic analysis revealed six overarching themes indicative of the barriers to engagement with OS within the OH framework. These included challenges in the implementation of OH, as well as challenges in the implementation of OS and Citizen Science (CS) in OH, data sharing, equity and inclusivity, intellectual property rights management, and trust between scientists and communities. These themes show the links between bureaucratic rigidity, institutional fragmentation, cultural hierarchies, political disinterest, and lack of funding.

I. Structural and institutional barriers to OH implementation

Financial constraints

A dominant theme across responses was the lack of adequate funding, which significantly limits individual engagement in research and implementation activities. Participants frequently identified funding as the primary barrier, with one

respondent stating, *"Funding is the major challenge."* Others highlighted the need to self-finance their work, noting that *"I didn't get funds from government, so I did research on my own budget which is very difficult."* Concerns were also raised about inequitable allocation of funds, particularly the marginalization of the animal health sector, described as having *"lesser or no funds for animal health."*

Data access and data sharing barriers

Restricted access to data and limited data-sharing practices emerged as a major obstacle. Participants reported *"inhibition in sharing of data"* and *"difficulty accessing data from government sectors."* The absence of integrated data systems and poor data management further complicate research efforts. As one respondent noted, *"Data access from different organisations"* remains a persistent challenge, limiting cross-sectoral collaboration and evidence-based decision-making.

Bureaucratic and administrative challenges

Bureaucratic hurdles were frequently cited as barriers to progress. Respondents referred to *"red tapes in obtaining approvals," "bureaucratic conflicts,"* and administrative delays that slow down research and collaboration. One participant explained that even when common goals are identified, *"the barriers of bureaucrats in all the institutes keep the boundaries intact."* These challenges create inefficiencies and discourage continuous engagement.

Limited awareness and conceptual understanding

Limited understanding of the OH approach among stakeholders, including decision-makers, was another recurring theme. Some participants reported *"no knowledge at all"* regarding OH, while others highlighted that awareness remains superficial. One respondent captured this gap as: *"One Health thinking is there, but feeling is not there."* This disconnect affects prioritization, policy support, and practical implementation.

Challenges in interdisciplinary collaboration and trust

Participants described difficulties in establishing effective interdisciplinary collaborations. Moreover, identifying suitable collaborators across sectors, especially in environmental sciences, was often challenging. Deficits and professional hierarchies further complicate engagement. For example, one participant stated that *"human health stakeholders often viewed themselves as superior to animal health,"* leading to reluctance in joint activities. Others noted a *"lack of trust on cross discipline"* and a preference for working within their disciplinary boundaries.

Lack of institutional frameworks and support

The absence of formal structures and clear institutional mechanisms for OH implementation was widely reported. Participants expressed uncertainty about roles, responsibilities, and reporting lines. One respondent explained that the lack of an organized structure *"affects role definition, limits effective collaboration, and creates confusion about responsibilities."* Limited government support and exclusion of certain sectors, such as private organizations and NGOs, further exacerbate these challenges.

Capacity and resource limitations

Several participants highlighted constraints related to infrastructure, training, and technical capacity. These included *"poor infrastructure,"* limited access to advanced research tools, and insufficient opportunities for capacity building. In addition, they also reported difficulty in keeping up with methodologies from other disciplines, reflecting the demands of interdisciplinary work within OH.

Communication gaps

Ineffective communication across sectors and institutions was identified as a barrier to collaboration. Participants reported *"lack of proper communication,"* absence of feedback mechanisms, and challenges in engaging with stakeholders. These gaps contribute to misunderstandings, duplication of efforts, and reduced efficiency among disciplines or team members.

Low priority and motivation

A number of responses indicated that OH is not prioritized within institutional or policy frameworks. Participants cited *"lack of political will"* and limited institutional interest as key barriers. Some of them also pointed motivational challenges, stating that *"people are primarily motivated by personal economic or academic gain,"* which undermines collaborative efforts.

Issues of inclusion and recognition

Finally, participants highlighted concerns about exclusion and lack of recognition of certain sectors and professions. Veterinarians, for instance, reported that *"society doesn't recognize their role in safeguarding public health"*. Similarly, private sector actors and NGOs expressed difficulties in being included in broader initiatives. This lack of inclusiveness limits the diversity and effectiveness of OH collaborations.

II. Challenges in the implementation of OS and CS in OH

Data ownership and control

A key barrier identified is the issue of data ownership and control. One participant explicitly stated that *"scientists need to own the data,"* reflecting a traditional mindset that prioritizes ownership over openness. This perspective can directly conflict with the principles of OS, which emphasize shared access and collaborative use of data. Such attitudes may limit transparency and restrict broader participation.

Engagement and relationship building

Another prominent theme is the lack of time and investment in relationship-building. Participants emphasized that meaningful engagement with communities requires sustained effort, which is often not adequately supported. One response noted *"inadequate time allocated to building positive relations and trust,"* highlighting that CS, in particular, depends heavily on long-term trust and interaction elements that are frequently overlooked in project design and funding structures.

Inclusivity and participation

Closely related is the issue of limited inclusivity and lack of genuine engagement with non-academic stakeholders, where a respondent pointed to the *"lack of genuine interest in including/involving non-academics,"* suggesting that participation is sometimes superficial rather than meaningful. This reflects a broader challenge in shifting from traditional top-down research approaches to more participatory and inclusive models.

III. Institutional and governance barriers to data sharing in OH

The responses highlight that data sharing among OH stakeholders is constrained by a combination of institutional, cultural, and policy-related barriers. Although the number of responses is limited, clear patterns emerge that reflect deeper systemic issues.

A prominent challenge relates to institutional resistance and lack of integration mechanisms. Participants noted that existing systems are not designed to accommodate diverse data sources, particularly non-traditional ones such as citizen science. One respondent pointed out *"institutional resistance to incorporating citizen science data into official datasets,"* indicating a gap between formal data systems and emerging participatory approaches. This resistance limits the inclusiveness of the OH data ecosystems.

Policy and governance gaps

Closely linked to this is the issue of policy fragmentation and lack of unified frameworks. In the Indian context, while policies such as the *National Data Sharing and Accessibility Policy,*[20] exist, participants emphasized that *"a comprehensive framework for Open Science is still evolving."* Furthermore, inconsistent implementation across sectors such as health, agriculture, environment, and science and technology creates barriers to integration. As one participant said, *"different ministries have different data-sharing rules,"* which restricts cross-sectoral collaboration.

Cultural and behavioral barriers

Cultural and behavioral barriers also play a significant role. Issues such as *"personal egos"* and a broader *"culture of non-sharing"* were identified as impediments to collaboration. These factors reflect underlying trust deficits and professional silos, where stakeholders may be reluctant to share data due to concerns about ownership and recognition.

Data sensitivity and security

Another critical concern involves data sovereignty, security, and ethical considerations. Participants highlighted reluctance to share sensitive data, such as genomic, environmental, or public health information, due to fears of misuse, biosecurity risks, and intellectual property rights (IPR) issues. These concerns are particularly relevant in international collaborations, where governance mechanisms may be unclear or uneven.

IV. Equity and inclusivity in OS

Access and democratization

The majority of participants expressed a positive perception of OS as a key enabler of equity and inclusivity within the OH framework (Figure 10). A central theme emerging from the responses is the role of OS in democratizing access to knowledge, data, and scientific resources. Participants emphasized that open access to research outputs allows individuals from diverse geographical and economic backgrounds to engage meaningfully in OH initiatives. As one respondent noted, OS *"makes scientific research freely available to everyone … including communities in low-resource settings,"* thereby reducing disparities in access to information.



Figure 10. Equity and inclusivity in OS- word cloud.

Collaboration and integration

Another prominent theme is the enhancement of collaboration and interdisciplinary engagement. Many respondents highlighted that OS facilitates *"collaboration, cooperation and communication across sectors"* and creates *"a common platform for different stakeholders."* By enabling data sharing and transparency, it supports integration across human, animal, and environmental health domains. Additionally, participants noted that it helps *"avoid duplication of research projects,"* thereby, improving efficiency.

Knowledge sharing and capacity building

Participants also underscored the importance of OS in bridging knowledge gaps and empowering communities. Several responses pointed out that it enables stakeholders to *"analyze specific situations,"* learn from others, and adapt strategies accordingly. It also supports the inclusion of local and indigenous knowledge, ensuring that solutions are contextually relevant. One participant emphasized that it *"bridges the existing research and local knowledge gaps,"* while another noted that it *"amplifies marginalized voices."*

Transparency and trust

The role of OS in fostering transparency, trust, and accountability was also widely acknowledged. Respondents indicated that open access to data and methodologies enhances trust among stakeholders and promotes evidence-based decision-making. However, some participants cautioned that this requires mechanisms to ensure quality and accountability, with one noting that *"there should also be accountability in terms of high-quality research."*

Despite the overwhelmingly positive perceptions, several respondents highlighted limitations and conditional effectiveness. A recurring concern is that the principles of OS are not always fully implemented in practice. One participant critically observed that it is sometimes used as *"window dressing rather than actually involving communities."* Others emphasized the need for genuine engagement through co-design and co-implementation processes.

Global equity dimensions

In addition, concerns about global inequities were also raised, particularly the dominance of the Global North in setting research agendas. While OS has the potential to empower researchers in low- and middle-income countries, participants noted that this potential is contingent on addressing structural inequalities in funding and decision-making. As one respondent stated, *"The Global North primarily determines the OH research agenda … Open Science may empower researchers in the Global South."*[21]

Awareness gaps

Additionally, some participants reported limited awareness or uncertainty about OS, with responses such as *"Not sure," "No idea,"* and *"Not aware."* This indicates that while the concept is generally viewed positively, there remains a need for greater awareness and capacity building.

V. Intellectual property management in OS

Open licensing approaches

Participant's responses reflect a nuanced understanding of intellectual property (IP) management within OS, emphasizing the need to balance openness with protection of rights. The most prominent theme is the use of open licensing frameworks as a practical and widely accepted solution. Many respondents highlighted mechanisms such as Creative Commons and open-source licenses as tools that allow sharing while ensuring proper attribution. As one participant noted, *"use open licenses … to allow sharing while giving proper credit,"* underscoring the importance of structured openness.

Attribution and recognition

Similar to open licensing, is the emphasis on attribution, recognition, and ethical use. Participants frequently stressed the need to *"give credits and acknowledgement"* and ensure proper citation practices. This reflects concerns about academic recognition and fairness, particularly in collaborative and interdisciplinary environments like OH. Some respondents also highlighted issues of inequity in publishing systems, noting that high publication costs can disadvantage certain researchers and affect recognition.

Governance and agreements

Another key theme is the importance of clear agreements and governance mechanisms in collaborative settings. Respondents suggested tools such as Memoranda of Understanding (MoUs), data-sharing agreements, and confidentiality agreements to define ownership and usage rights. One participant emphasized that *"clear guidance is required,"* especially when contributors come from outside traditional academic institutions. These mechanisms are seen as essential for avoiding conflicts and ensuring transparency in multi-stakeholder projects.

Balancing openness and protection

Participants also pointed to the need for balancing openness with protection, particularly in cases involving sensitive data or commercially viable innovations. Strategies such as *"patenting before publishing,"* selective data sharing, and pre-publication IP review were suggested. This indicates an awareness that while openness is desirable, certain types of data, such as health or genomic information, require careful handling to address privacy, security, and ethical concerns.

Policy and legal frameworks

A number of responses emphasized the role of policy frameworks and institutional support, including adherence to national and international IP regulations and alignment with broader principles such as the UNESCO recommendation on Open Science.[1] At the same time, some participants highlighted variability in legal systems, noting that IP management must consider *"local legislation as it differs between countries."*

Capacity building and awareness

Capacity building and awareness also emerged as important factors. Participants suggested training researchers on IP rights, open access practices, and responsible data sharing. This reflects the recognition that effective IP management in OS requires not only policies but also informed stakeholders. Interestingly, a minority of responses reflected tensions to IP in OS, while some argued that *"there should be no IP-related issues at all"* or that *"property is secondary to sharing knowledge."* Others pointed to cultural and ethical dimensions, suggesting that successful IP management may depend on *"personal ethics"* and trust among stakeholders.

Finally, a small number of participants expressed uncertainty or lack of awareness, indicating that IP in OS remains a complex and not fully understood area for some stakeholders. Overall, the findings suggest that the "best way" to manage IP in OS is not a single approach, but a balanced, multi-layered strategy combining open licensing, clear agreements, ethical practices, and contextual policy alignment.

VI. Trust between Scientists and communities

Clear, transparent and accessible communication

The most dominant theme across responses is the importance of clear, transparent, and accessible communication. Participants repeatedly emphasized that trust depends on how effectively scientists communicate with communities, particularly by avoiding technical jargon and using locally understandable language. As one respondent noted, *"better communication … to simplify their research for common people,"* while another stressed the need for *"transparent and respectful two-way communication."* The importance of openness-*"not to hide anything from the community"* was also highlighted as critical for building credibility.

Community engagement and participatory research

Closely linked to communication is the theme of genuine community engagement and participation. Many participants emphasized that trust is built when communities are not treated as passive subjects but as active partners in the research process. This includes involving them from the planning stage through implementation and dissemination. One respondent stated that communities should be *"involved from the very beginning … as beneficiaries, not just participants,"* while another highlighted that trust grows when scientists *"co-create solutions rather than just extract data."*

Another key factor is the relevance and tangible benefits of research. Participants consistently noted that communities are more likely to trust scientific efforts when they see real-world impact. As one response explained, *"local communities …*

want real change at ground level," and trust develops when research outcomes address immediate and practical concerns. Demonstrating usefulness and providing feedback to communities were identified as essential components of this process.

Respect for local knowledge and cultural sensitivity

The role of respect for local knowledge and cultural sensitivity also emerged strongly. Respondents emphasized that scientists must acknowledge and value indigenous and experiential knowledge systems. Trust is strengthened when communities feel heard and respected, as reflected in responses highlighting *"valuing local knowledge and priorities"* and maintaining *"cultural sensibility and respect."*

Transparency, ethics, and accountability were identified as foundational elements of trust-building. Participants pointed to the importance of informed consent, confidentiality, and ethical research practices. One respondent highlighted the need for *"maintaining privacy and confidentiality throughout the study,"* while others emphasized regular feedback and accountability, noting that trust grows when scientists *"report back on concrete use of their data."*

Building long-term relationships

Another important theme is the need for long-term relationships and sustained presence. Trust is not built through one-time interactions but through consistent engagement over time. Participants noted that *"spending time with communities"* and maintaining ongoing dialogue are crucial for establishing credibility and rapport. Additionally, some responses highlighted the role of institutional credibility and external factors, such as trust in organizations versus governments. For example, one participant observed that during the COVID-19 pandemic, a university-led initiative was trusted more than government communication due to transparency and consistency. A smaller but notable set of responses pointed to barriers to trust, including past negative experiences, hierarchical distance between scientists and communities, and lack of platforms for engagement. These factors reinforce the need for more inclusive and participatory approaches.

Overall, the findings suggest that trust is not built through a single intervention but through a combination of communication, participation, relevance, ethics, and sustained relationships, all rooted in mutual respect and shared benefit.

Recommendations from participants

The participants of this study also offered insightful recommendations that emphasize the need for cultural, behavioral, and capacity-oriented changes to strengthen OS in OH.

Shift in scientific culture and incentives

A central theme emerging from the responses is the need for a shift in scientific culture and incentives. One participant highlighted that *"scientists need to see their role as contributors, rather than hunt for fame,"* pointing to the influence of academic reward systems that prioritize individual recognition over collaboration and openness. This suggests that fostering a culture of shared responsibility and collective impact is critical for advancing OS practices.

Community engagement Programs

Another key recommendation focuses on building trust through effective community engagement. Participants emphasized that researchers and policymakers should actively engage with communities in a respectful and transparent manner. As one respondent noted, trust can be built by *"talking to them genuinely and politely … and explaining everything in simple words."* This underscores the importance of communication, accessibility, and inclusivity in translating OS principles into practice. Additionally, involving both researchers and policymakers in community engagement activities was seen as essential for bridging gaps between science and society.

The importance of capacity building and training also emerged as a significant theme. Participants recommended training in areas such as cultural sensitivity and addressing biases in scientific approaches, particularly those rooted in Western paradigms. This reflects an awareness of the need to make OS more inclusive and context-sensitive, especially in diverse socio-cultural settings. One response explicitly called for *"training in cultural sensitivity and biases in Western approaches to scientific research."*

Participant's additional reflections provide deeper insights into the practical realities, aspirations, and persistent gaps in implementing OH, OS, and CS. These responses reinforce earlier findings while also introducing broader perspectives on awareness, integration, and future directions.

Accessible and open knowledge

A key theme emerging from the responses is the need for greater accessibility and openness of scientific knowledge. Participants emphasized that *"scientific evidence should be open access,"* along with calls for government support to ensure equitable access to research outputs. This highlights ongoing concerns about paywalls and restricted access, which limit the reach and impact of scientific knowledge, particularly in low-resource settings.

Another recurring issue is the gap between policy-level discussions and ground-level implementation. Respondents noted that OH is often discussed during crises but lacks sustained engagement otherwise. One participant observed that *"stakeholders prefer to stay in their comfort zone"* when there are no immediate threats. Similarly, there were calls for more practical, field-level collaboration, with one response emphasizing that OH activities should not be *"limited to conferences and policies"* but instead implemented at the community level.

Participants also highlighted the importance of interdisciplinary and cross-sectoral collaboration, particularly in operationalizing OH. While the conceptual value of integration is widely recognized, practical coordination remains limited. The need for equitable funding distribution across sectors was also noted, reflecting ongoing structural imbalances.

Training and capacity building in Citizen Science

A significant theme relates to awareness, training, and capacity building. Several respondents acknowledged limited personal experience with OS and CS but expressed strong interest in learning and applying these approaches. Statements such as *"I am genuinely interested in learning more"* and *"it will be good to train us"* indicate both awareness gaps and a willingness to engage. Participants also suggested integrating OH concepts into educational curricula, including at the school level.

The potential of CS and OS to transform OH was widely recognized. Participants described these approaches as tools to enhance transparency, inclusivity, and community engagement. One respondent noted that they can *"empower communities to contribute data and insights"* and support evidence-based, equitable solutions. However, practical challenges remain, including limited integration of citizen-generated data into formal systems and insufficient funding for large-scale initiatives.

Several responses highlighted the importance of community engagement and respect for local knowledge systems, particularly in CS initiatives. At the same time, participants pointed to barriers such as lack of trust, insufficient time for relationship-building, and institutional resistance to bottom-up approaches. One detailed response emphasized that official systems often rely on *"command and control strategies"* and are hesitant to adopt participatory models.

North-South Collaboration

The issue of global inequities also emerged, particularly the need for stronger collaboration between the Global North and Global South. Participants emphasized the importance of capacity building, funding, and South–South cooperation to ensure more equitable participation in OH research and practice. Additionally, participants identified practical constraints such as limited time, funding, and institutional support. While some noted that funding is not always the primary issue, others emphasized the need for more accessible and researcher-friendly funding mechanisms. Time constraints, particularly for building relationships and conducting interdisciplinary work, were also highlighted as significant barriers. Finally, a number of responses reflected optimism and commitment toward advancing OH and OS. Participants expressed willingness to continue contributing, engage in academic and community initiatives, and explore new approaches despite existing challenges.

These reflections underscore that while the principles of OH, OS, and CS are widely supported, their effective implementation requires greater accessibility, sustained engagement, capacity building, institutional support, and a shift toward more inclusive and participatory approaches.

Discussion

This study explored perceived barriers to engaging in OS practices among the OH community in South Asia. The findings reveal a complex interplay between structural, institutional, and individual-level factors that shape researcher's engagement with open data, open access, and collaborative approaches. Most of our respondents expressed strong support for OS but reported limited practical implementation due to infrastructural and policy-related challenges. Institutional compartmentalization both structural and cultural was identified as a pervasive challenge, echoing longstanding critiques that siloed sectoral mandates impede the integrated action required for effective OH implementation.[22,23] This finding is consistent with evidence from other LMIC contexts, particularly in Africa, where researchers have reported interest in OS alongside challenges related to infrastructure, technical capacity, funding, institutional policies, and incentives.[24–27] Previous studies by Bezuidenhout L et al[24] and Pennington et al[25] suggest that awareness or willingness to engage with OS does not necessarily translate into routine practice when researchers face resource and institutional constraints.[24,25] Given the limited empirical evidence on OS, engagement and practices among OH researchers in South Asia, these findings provide preliminary insights into an understudied regional context.

I. Participant demographics

Country-wise distribution of participants

The survey mainly represents perspectives from India (n = 50), followed by Pakistan (n = 16), with contributions from other South Asian countries, including Nepal (n = 6), Sri Lanka (n = 6), Bangladesh (n = 5), Afghanistan (n = 5), Bhutan (n = 1), and the Maldives (n = 1) (Figure 2.0). The prominence of India in our survey likely reflects not only increased professional engagement but also a national structural leap in the Department of Biotechnology-led OH consortium (originally 27 centres linking veterinary, medical and environmental institutions).[28,29]

This level of coordination linking multiple states, human & animal health research institutes and surveillance networks has increased the visibility and reach of OH actors in India, thereby increasing survey participation and awareness. At the same time, India's recently launched *One Nation One Subscription* initiative, providing nearly 13,000 international journal subscriptions to roughly 1.8 crore students, faculty and researchers via a single national-license scheme, has improved OS infrastructure and data visibility.[30] The combined effect of institutional scale, OS policy and increasing research outputs means that practitioners in India are more numerous, connected and accessible. However, higher representation in our survey does not necessarily mean deeper or more effective OH and OS practice. Rather, it reflects enhanced visibility and networking.

Role in OH research

Most of the respondents are academicians (n = 66) who experience structural and institutional challenges concerning research publication. Nevertheless, the presence of healthcare (n = 32), government (n = 8), NGO (n = 8), veterinary (n = 13), policy-makers (n = 6), and environmental scientists (n = 5) makes the dataset comprehensive and makes it possible to obtain insights into the manner in which OS practices are viewed across various sectors within the OH framework. The presence of policy makers and environmental scientists who are relatively underrepresented might imply that their distinct obstacles might not be so apparent in the results, yet their point of view is still essential to comprehend cross-sectoral issues of implementing OS.[31]

Experience in OH research

The survey also includes a substantial sample of experienced researchers (8+ years; n = 33), which implies that the data represents the experience of people who may be exposed to systemic and institutional constraints on OS in the long-term. Simultaneously, the presence of early-career researchers (out of which, over 40% have 3 years or less of experience) underscores the point of view of those who might encounter other unique issues, including the lack of resources, training, or support of open practices in the institution. The ratio of senior to junior researchers shows how challenges to OS differ depending on one's career stage in the OH community in South Asia.[32]

II. Cross-sectoral collaboration and challenges in its implementation

Sectors of collaboration in OH approach

This study found that human health partnerships are highly prevalent (86.7%), highlighting the strong focus on medical and public health aspects in OH research in South Asia. This emphasis may limit balanced involvement from the environmental (33.3%), animal (28.9%), public policy (27.8%), and agricultural (12.2%) sectors (Table 2.1). Reduced partnerships within the agricultural and policy sectors can be one of the obstacles to the successful implementation of

OS, because open practices frequently imply the sharing of data across multiple sectors and the collaborative resolution of problems. Gongal[29] argues that effective implementation of the OH approach demands engagement well beyond the human health sector and must include animal health and ecosystem (including agriculture and livestock).[29] The comparatively low participation of environmental and policy partnerships identifies the gaps that may limit the cross-sectoral approach that is envisioned in the framework of OH, and indirectly, the scale of OS implementation in the region.

Level of collaboration between different sectors in OH

Regarding the extent of collaboration between sectors in OH research within the researcher's country, the majority of respondents indicated a moderate level ($n = 32$; mean = 2.69; SD = 1.08) on the scale. These results indicate that sectoral cooperation in OH research in South Asia can be said to be widely seen as low with most of the respondents tending towards the weak to moderate areas of cooperation. This indicates that cross-sectoral integration, a key aspect of the OH approach, has not been fully achieved in practice. In terms of OS engagement, weak collaboration could act as a barrier as it would restrict data sharing, interdisciplinary communication, and coordinated activities, which are essential to promoting OS practices in the region.

According to the *United Nations ESCAP Policy Brief on Accelerating OH in Asia and the Pacific of 2022*, the OH approach emphasizes collaboration that extends across multiple sectors rather than restricted to a single domain. This cross-sectoral engagement is essential because the challenges it seeks to address are interconnected and cannot be effectively managed in isolation.[33]

Challenges in working across different sectors

Cultural barriers and trust deficits

Consistent with earlier studies, disciplinary hierarchies, particularly the dominance of human health over animal and environmental health, were perceived as key cultural barriers.[34,35] These findings reinforce long-standing concerns that power imbalances undermine collaborative equity, impede trust-building, and reduce participation from key stakeholders such as veterinarians and environmental scientists. Trust issues further erode willingness to share data and engage in co-creation, which are foundational to OS.[24] The persistence of siloed professional identities underscores the need for relational approaches that prioritize shared ownership, mutual respect, and continuous engagement. These results indicate that structural and systemic constraints, especially institutional barriers ($n = 65$), financial limitations ($n = 61$), lack of intersectoral communication ($n = 55$), and limited government support ($n = 48$) are the most urgent impediments to successful OH collaboration in South Asia. Asaaga et al[23] in 2021 also identified similar barriers to implementing the OH approach in India.[23] The open-ended responses show that bureaucratic rigidity and administrative delays limit the establishment of shared priorities and obstruct timely research collaboration. Similar obstacles have been documented globally, where institutional inertia and unclear mandates weaken OH governance, particularly in low- and middle-income countries.[36] Participant's concerns about limited funding, inadequate infrastructure, and weak leadership support align with previous critiques that OH initiatives often lack sustained investment and political will.[22,23] These constraints collectively impair the integration of OS practices, which require institutional commitment to transparency, data sharing, and capacity building.

As the practice of OS is largely dependent on institutional backing, effective communication, sufficient budgetary allocation and goal orientation, these obstacles will directly impede the implementation of OS. The insignificant percentage of the respondents who said that there were no problems ($n = 2$) is a reminder of how widespread and deeply rooted these problems are throughout the region.

III. Awareness and practice of OS in OH

The average familiarity level with OS practices was 2.72 (SD = 1.13) (Table 3.0) on a five-point scale, which indicates that the level of awareness about OS practices among OH scientists is moderate to low. It is an indication that a substantial number of respondents are not well acquainted with OS principles, indicating that more training and exposure are necessary to begin to better understand and apply it in the region.

This distribution also implies that although there is some knowledge of OS, most OH researchers in South Asia are at an early or intermediate level of knowledge. The comparatively low percentages of the higher familiarity categories demonstrate that there is a major gap in knowledge. Lack of exposure and training in OS principles may hinder the capacity of researchers to participate in activities like data sharing, open access publishing, and open research communication.

Respondents practicing OS

More than half of our respondents (58.9%) revealed that they practiced OS. This indicates that even though a larger percentage of the OH stakeholders in South Asia reported engaging in OS practices, there is still a significant number of researchers who either are not currently involved or are not yet clear about what OS is about. The large proportion of not-sure responses (21.1%) indicates a possible gap in conceptual and definitional terms, as the researchers might not be sure whether the activities they undertake are compatible with the OS principles. This ambiguity and the 20% of those who do not engage in OS highlight the necessity to increase awareness-building, training, and institutional encouragement of its uptake in the region.

Commonly practiced OS components

In general, the concept of open access publishing (60%) is widely practiced, but other forms of OS, such as open peer review, sharing datasets publicly, open methodology (25.6%), code sharing, pre-registration, and public engagement were reported less frequently (Figure 3.0). Among respondents who did not practice open science, data sharing (12.2%) and open access publishing (8.9%) were the most commonly identified challenges (Figure 3.1). This may indicate that although awareness of OS is increasing, significant barriers such as limited knowledge and government support continue to hinder better participation.

Training in OS

The results indicate that there is a huge gap in training, as it may seem that OS is gaining more and more recognition, whereas the majority of researchers are not trained (84.4%) to understand its principles and practices or are not systematically educated on this matter.

On the other hand, capacity-building programs such as the OPEN-ASIA project[37] and the UNESCO Asia-Pacific training initiative[38] on OS provide concrete opportunities to overcome these barriers by equipping researchers with the skills required to engage in OS practices. Such training might offer a pathway to strengthen the OH approach in the region.

IV. Awareness of national OH policies and its alignment with OS

The findings indicate that while awareness of OH policies and initiatives is relatively high (53.3%), a substantial proportion of respondents remain either unaware (30%) or uncertain (16.7%) about such efforts in their country. This indicates that, although most people are aware of OH initiatives, there is still a significant knowledge and understanding gap, which indicates that more communication, dissemination, and visibility of OH policies are needed at the national level.

Alignment of National OH policies with OS

The findings reveal varying perceptions regarding the alignment of national OH policies or initiatives with OS principles. While 25.6% respondents believed that these policies partially adhere to the principles of data sharing, transparency, and inclusiveness, relatively few (13.3%) perceived full compliance, and 6.7% were not sure. These results indicate that even though the components of OS have some appreciation in OH policy, the majority of the respondents tend to believe that the integration is not complete, and possible improvements to enhance the implementation of OS principles in policies are still present.

V. Challenges in data sharing among OH stakeholders

The results highlight several barriers that hinder effective data sharing among OH stakeholders (Figure 4.0). The absence of standardized data-sharing platforms (73.3%) and institutional restrictions (63.3%) emerged as the most significant challenges, indicating substantial structural and infrastructural limitations that impede seamless information exchange. Concerns about data misuse (52.2%) and legal or ethical restrictions (50%) were also prevalent, reflecting persistent issues related to data governance, ownership, and trust among collaborating institutions. In addition, funding constraints further exacerbate these challenges by limiting the development and maintenance of data-sharing systems. Difficulties accessing government data due to bureaucratic restrictions and inconsistent policies reinforce concerns that LMICs face greater obstacles in building open data ecosystems.[39] The reported absence of standardized data-sharing procedures further limits transparency, reproducibility, and evidence-based decision-making. Addressing these barriers will require coordinated efforts to establish secure platforms, develop clear data-sharing policies, and allocate sustainable funding to support open and transparent collaboration within the OH concept.[5,23]

VI. Digital platforms or tools used for data sharing

The findings reveal that the most frequently reported means of data sharing with the public was through open-access journals (51.1%). This suggests that many researchers perceive publication venues as a primary mechanism for disseminating research data, likely because datasets become visible and accessible to readers through supplementary materials or data availability statements. However, it is important to note that journals themselves do not typically function as data storage platforms; rather, they act as intermediaries that increase the visibility of data hosted elsewhere. The high reporting of journals as data-sharing platforms therefore reflects respondent's perceptions of data dissemination rather than strict data archiving practices.[40,41]

Similarly, cloud-based sharing services such as Google Drive or Dropbox were reported by 41.1% of respondents, followed by institutional repositories (37.8%). While institutional repositories are widely recognised as formal mechanisms for open data sharing, the use of cloud-based services does not necessarily constitute OS practice, particularly when access is restricted to members of a research group. The relatively high use of cloud services may indicate a pragmatic understanding of "data sharing" among researchers, where ease of access and collaboration are prioritised over openness and long-term preservation.

The lower use of government databases (25.6%) suggests limited engagement with more formal or policy-driven data infrastructures. Additionally, 15.6% of respondents indicated that they had not shared data using any platform or tool. Overall, these findings highlight a gap between researcher's perceptions of data sharing and formal definitions of OS practices, underscoring the need for clearer guidance and training on what constitutes open, reusable, and sustainable data sharing. Moreover, the fact that a notable proportion of respondents had not shared data on any platform (15.6%) underscores ongoing barriers such as data ownership concerns, technical limitations, or inadequate incentives that hinder broader participation in open data practices (Figure 5.0). Strengthening institutional and national infrastructures, while promoting awareness of secure and standardized data sharing strategies, could enhance openness and collaboration across OH research networks.

VII. Benefits associated with OS practices in OH

The findings demonstrate strong recognition among participants of the potential benefits that OS can bring to the OH framework. Enhanced cooperation (72.2%) was identified as the most significant advantage, reflecting the importance of collaborative efforts across disciplines and sectors in addressing complex health challenges. The perceived benefits of accelerating knowledge dissemination (67.8%) and promoting fairness in research (62.2%) further underscore the value of OS in fostering transparency, inclusiveness, and equitable access to scientific outputs. Moreover, the emphasis on increased public engagement (53.3%) highlights the potential of OS to bridge the gap between science and society by promoting community participation and trust in research processes. The very small proportion (4.4%) of respondents who perceived no major advantages suggest a positive attitude toward OS principles (Figure 6.0). Overall, the results highlight that the researchers are much more likely to connect OS with improvement of collaboration, faster knowledge sharing, and the provision of equality and inclusiveness in OH initiatives.[42,43]

VIII. Perceptions of how citizen science can contribute to OH

The findings indicate that Citizen Science is widely accepted as a valuable component of the OH approach. Its perceived strengths in bridging the gap between formal research and local knowledge (85.6%), as well as enhancing public involvement (66.7%), highlight its potential to foster more inclusive and context-sensitive research. The recognition of its role in disease surveillance and outbreak response (56.7%) further underscores its practical relevance in supporting data collection and early detection efforts. The minimal proportion of respondents (4.4%) who viewed Citizen Science as not useful suggests broad acceptance of its benefits, pointing to opportunities for greater integration of community participation within OH initiatives (Figure 7.0). Additionally, participant's skepticism about the authenticity and uptake of CS initiatives echoes broader critiques that such projects often become tokenistic unless built on genuine co-creation and shared ownership.[44] The observation that citizen-generated COVID-19 data were frequently ignored by authorities highlights a disconnect between community-driven knowledge production and formal decision-making systems. This gap points to the need for institutional frameworks that legitimize and integrate community-generated evidence into OH surveillance and policy. Moreover, it gives better local relevance, lived experiences, and community insights as stated by Alsaqqa et al.[45]

IX. Barriers to implementing OS in OH

The findings highlight several challenges hindering the effective implementation of the OS-OH framework. The major barrier identified a lack of awareness (77.8%), suggesting that many stakeholders may not be sufficiently trained in these approaches, limiting their ability to engage effectively. Institutional restrictions (63.3%) further point to structural and policy-related constraints that can inhibit collaboration and data sharing across sectors. Moreover, limited funding

(53.3%) and concerns over data security (51.1%) remain as persistent obstacles, reflecting broader systemic issues that affect openness and participation in research.

Global inequities and structural power asymmetries

The study also highlights persistent disparities between the Global North and South in research funding, agenda-setting, and infrastructure, an issue widely examined in global health and open science scholarship.[46,47] Participants account that LMICs "play catch-up" align with findings that high-income countries disproportionately control the resources, networks, and publishing platforms shaping global scientific narratives. While OS has been proposed as a mechanism to democratize access and participation,[48] the findings underscore that without capacity investments and equitable partnerships, structural inequities are likely to persist. However, the very small proportion of respondents (2.2%) who perceived no barriers indicate that such challenges are widespread and need to be addressed through targeted capacity-building, and policy support to foster an enabling environment for OS in OH (Figure 8.0). In general, the results indicate that knowledge gaps and systemic barriers will have to be considered when implementing OS, as open research data should be "as open as possible, as closed as necessary" as stated by UNESCO.[1]

X. Policy recommendations suggested by respondents to improve OS in OH

Improved researcher training emerged as the top recommendation (76.7%), highlighting the need to build capacity and enhance technical and methodological skills related to OS practices. The call for stronger international partnerships (71.1%) and greater policy support (66.7%) further highlights the importance of global collaboration and enabling governance structures in sustaining open and integrated research efforts. Respondents also stressed the value of creating more accessible data-sharing platforms (64.4%) to address technical and infrastructural barriers that currently limit information exchange. In addition, campaigns targeting the general public (55.6%) were viewed as essential for fostering broader engagement and awareness of OS principles (Figure 9.0). In general, the results indicate that enhancing OS in OH should be a multi-faceted effort, which includes training of researchers, favourable policies, international relationships, technology, and awareness at the community level.

Interest in receiving OS training

A large majority of the respondents (93.3%) indicated that they were interested in being trained in OS practices, with only a very small proportion (4.4%) indicating otherwise. This result firmly supports the training gap identified above, as most researchers currently do not get formal training despite a high level of demand and readiness to participate in capacity-building programs associated with OS.

Trust, inclusivity, ethical engagement, and institutional support

In contrast to the barriers, participants identified several enablers that reinforce the potential of OS as a transformative mechanism within OH. First, open access to scientific evidence was viewed as a critical factor for equitable decision-making, supporting findings that transparency improves responsiveness and accountability across health systems.[49] Second, participants emphasized that OS and intellectual property protection are not mutually exclusive, and this calls for flexible, equity-oriented IP models.[47]

Community engagement, trust-building, and culturally sensitive research practices emerged as foundational enablers. These reflect principles of participatory and decolonial research, which highlight that scientific legitimacy is enhanced when communities act as co-creators rather than passive data sources.[39] Participant's emphasis on long-term relationships aligns with evidence demonstrating that trust is built through continuity, reciprocity, and responsiveness not through one-off project engagements.[50] This reflects international recommendations that OH capacity-building efforts integrate technical, ethical, and communication competencies.[51] Finally, strong institutional and governmental support including leadership commitment, policy guidance, and resourcing were seen as critical for embedding OS practices in OH systems.

The findings also reveal that the operationalization of OS is constrained by a complex interplay of bureaucratic rigidity, institutional fragmentation, cultural hierarchies, political inconsistency, and limited access to data and resources. These challenges not only hinder interdisciplinary collaboration but also reinforce existing inequities in knowledge production and participation. On the other hand, the study highlights that OS holds significant transformative potential for advancing OH by fostering transparency, inclusivity, and cross-sectoral collaboration. Enablers such as equitable access to knowledge, trust-building with communities, culturally sensitive engagement, and institutional commitment demonstrate that meaningful progress is possible when OS principles are embedded within supportive systems. Importantly, the

findings underscore that OS is not merely a technical solution but a socio-institutional process that requires shifts in governance, power dynamics, and research culture.

Overall, this paper demonstrates that although significant structural and cultural barriers impede the full realization of OH, OS offers a promising pathway to enhance collaboration, transparency, and equity. The findings reaffirm the conceptual argument that OS can operationalize OH by providing concrete mechanisms such as open data, inclusive participation, shared governance, and equitable knowledge exchange that transform interdisciplinary aspirations into sustained action.[47] Achieving this potential, however, requires systemic reforms, long-term relationship-building, and strategic investment in capacity and infrastructure. Finally, institutions that normalize collaboration, allocate resources, and establish clear governance structures are better positioned to sustain cross-sectoral engagement.

Conclusion

This study offers a regional perspective on the current level of awareness, familiarity, and self-reported engagement with OS among OH researchers in South Asia. While participants recognized OS as an essential driver for collaboration, rapid dissemination of results, and equitable access to citizens, its practical uptake remains limited. The findings underscore that awareness, training deficits, restricted funding, lack of institutional incentives, and the absence of standardized frameworks for data sharing are persistent barriers preventing its progress.

Despite these constraints, the positive perceptions reported particularly regarding open-access publishing, data sharing, and citizen science show a growing readiness within the community to adopt transparency and inclusivity in OH. Investing in strengthening government and institutional support, enhancing infrastructure, and incorporating OS principles into academia may be critical for achieving a sustainable culture of openness across disciplines.

Limitations

The high percentage of participants from India and Pakistan could influence the overall results because the impediments to OS expressed in these two nations could prevail over the findings. In the meantime, the few responses of Bhutan and the Maldives indicate that views of the smaller South Asian countries are underrepresented. This uneven geographical representation, together with the use of snowball sampling, limits generalisability of the findings to the wider population of OH researchers across South Asia. However, given that OH remains an emerging field and the population of researchers with relevant expertise is relatively limited, snowball sampling provided a practical approach for reaching participants with appropriate knowledge and experience. Therefore, the findings should be interpreted primarily as exploratory evidence of the barriers to OS practices among OH researchers rather than as statistically representative of the entire South Asian region. This implies the need to further subsequent research to allow a balanced regional perspective of the barriers to OS engagement. Additionally, the survey captured whether participants reported practising OS and which specific OS components they used, but it did not assess the frequency, consistency, or extent of engagement with each practice. Finally, the findings of the open-ended responses are based on self-reported responses and may reflect subjective interpretations. Some responses were brief or unclear, and smaller sample sizes in certain questions limit generalisability. Thus, the findings should not be interpreted as indicating the intensity or routine engagement of individual OS practices.

Future directions

Given the exploratory nature of the present study, subsequent research could also employ mixed-methods designs, combining quantitative surveys with qualitative interviews or focus group discussions to provide deeper insights into the contextual, institutional, and individual factors influencing OS adoption. Furthermore, future surveys could also assess the frequency, consistency, extent, and level of engagement with OS practices. Additionally, the following actions might help in the advancement of the implementation of OS in South Asia's OH ecosystem and in similar LMICs:

a. Conduct a comprehensive review of India's *One Nation, One Subscription (ONOS)* Policy to assess its role in promoting equitable access to scholarly publications across South Asia and beyond. Such initiatives, if aligned with OS principles, could serve as a regional model for democratizing research access and reducing publication barriers.

b. The findings also underscore the urgency of embedding OS principles into national and institutional research agendas. Governments should prioritize the development of coordinated OS initiatives, supported by sustainable funding, shared digital infrastructures, and open data mandates. Regional collaboration mechanisms, such as aligning with India's ONOS initiative and expanding access through cross-border agreements, can enhance inclusivity and reduce knowledge asymmetries. By integrating OS into the OH framework, South Asian countries can also improve pandemic preparedness and promote equitable access to knowledge for the sake of global health security.

Ethics and consent

The study was approved by Sikt (Norwegian agency for shared services in education and research) reference no. 631691 Informed consent was obtained digitally from all participants via the Nettskjema form by providing the "click-to agree or disagree options".

Data availability

The dataset is available in the Zenodo repository. Qualitative responses are not included in this dataset and will be made available upon publication of the qualitative analysis paper.

Zenodo: A survey on Open Science perceptions and experiences among One Health researchers in South Asia. https://doi.org/10.5281/zenodo.21847646[52] and https://doi.org/10.5281/zenodo.21804863[53]

Dataset:

- Questionnaire
- Frequency output
- SPSS Data
- Anonymized data
- Anonymised Excel dataset containing open-ended responses
- NVivo project file
- Codebook

Extended data: https://doi.org/10.5281/zenodo.22657752

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

Statement on the use of Artificial Intelligence (AI): The authors confirm that no AI tools were used in the preparation of this manuscript.

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Open Peer Review

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Version 3

Reviewer Report 07 October 2026

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For a general audience with a standard 95% confidence level and a 5% margin of error, you need about 385 responses, regardless of how large your total population. The authors have stablished a margin of error of 10% that diminish the number of reponses neccesary to be significant, however they even do not reach the 96 responses.
The authors wrote they use IBM SPSS Statistics- Version 27, but practically they have not performed any statistical análisis of the results except counts of the number of answers, percentages and mean values and SD. They should have estimated Cronbach's alpha tests internal consistency to measure how closely related a set of survey items (such as Likert-scale questions) are as a group.
The following open-ended questions where not analysed or mentioned within the text:
7. What challenges have you encountered at the individual level?
16. Does Open Science contribute to equity and inclusivity in One Health?
18. What is the biggest factor in building trust between scientists and local communities?
But in a response to one of the reviewers the answered "*they are being analysed separately and will be reported separately, allowing a more in-depth exploration of the contextual factors influencing Open Science practices*" . This analysis probably could have been the most interestinfg issue of the work, but splitting it into two separate works does not help to understand the whole purpose of the survey

Is the work clearly and accurately presented and does it cite the current literature?
No

Is the study design appropriate and does the work have academic merit?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
No

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Open science, authors rights, open access,

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Reviewer Report 21 September 2026

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The authors have addressed a substantial proportion of the previous comments, and the manuscript has improved in clarity and methodological transparency. In particular, the research question and objectives are now framed around perceived barriers and self-reported engagement rather than solely around adoption; the UNESCO definition of Open Science has been added; the Introduction provides a clearer discussion of the specific structural challenges facing Open Science in South Asia; the Discussion now engages empirical literature from other LMIC contexts; and the geographical imbalance of the sample is explicitly acknowledged in the limitations.

A few issues nevertheless remain before the previous concerns can be considered fully addressed:

The adoption/engagement distinction is still inconsistent. Although the research question and objectives have been appropriately revised, the Discussion still states that the study examines “barriers influencing the adoption of OS practices,” and later claims that respondents “have adopted OS.” These formulations continue to imply behavioral adoption beyond what the self-reported measures support.

The sample-size section contains an important internal contradiction. The revised text correctly states that the authors now assume p=0.50p=0.50, yielding a minimum sample size of 97. However, the equation immediately below still uses p=0.626p=0.626 and 0.3740.374, producing N=90N=90, and the subsequent note still states that the European survey remains the most appropriate basis for the calculation. These elements need to be updated to match the revised rationale.

The Open Science definition has only partly addressed the original concern. The UNESCO definition is now clearly provided in the Introduction, which is helpful. However, the Methods do not indicate whether respondents were given a definition of OS before answering questions about familiarity and whether they "practice OS." Given that 21.1% were unsure whether they practiced OS, the authors should clarify whether a definition was presented in the questionnaire. If it was not, this should be acknowledged explicitly as a measurement limitation

Eligibility screening could still be clearer in the manuscript itself. The response to the reviewer explains how respondents' OH involvement was assessed, but the Methods mainly state the inclusion/exclusion criteria and recruitment strategy without clearly describing the operational screening procedure. The Results report removal of incomplete/duplicate responses, but not screening based on OH eligibility. The authors should add one or two sentences explaining exactly how eligibility was verified and stating explicitly that no respondents were excluded on this basis.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 19 Oct 2026

NAHEEDA HAMZA

We sincerely thank the reviewer for their valuable suggestions. We have carefully addressed all the concerns raised and revised the manuscript accordingly. We have clarified the distinction between OS adoption and engagement, corrected the sample-size calculation and its accompanying rationale, clarified the definition of OS provided to respondents and acknowledged the relevant measurement limitations, and strengthened the description of the eligibility-screening procedure in the Methods section. Furthermore, the manuscript has been revised in response to the comments and suggestions provided by all reviewers. In particular, the open-ended responses from the survey, which were collected as part of the original study but were not included in the previous version of the manuscript, have now been incorporated into the revised manuscript. This qualitative component has been added in response to the strong recommendations of two reviewers to provide further contextual and qualitative insights alongside the quantitative findings. The corresponding dataset and extended data relating to the open-ended responses have also been provided. All the suggested revisions have been incorporated into the latest version of the manuscript, which has now been published. We are grateful for the reviewer's insightful feedback, which has helped us improve the manuscript. We kindly request the reviewer to assess the revised version and let us know whether it is approved. We sincerely appreciate the time and effort

invested in reviewing our work and hope that the revisions satisfactorily address all the concerns raised. Thank you once again

Competing Interests: None

Reviewer Report 14 September 2026

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John Willinsky
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This is a modest but still valuable survey study of open science attitudes and practices among South Asia researchers involved in One Health initiatives. While its relatively low sample size and geographic distribution constricts its findings, there is still something to be learned from the participants' limited engagement with open science practices and their identification of the barriers to open science. The study adds to the impetus to address, for example, the reported lack of support for data sharing, which might well be combined with its important finding of participants' encouraging level of interest in receiving open science training. So while not as forceful as a larger-scale study might have been, this study can serve as one indication of the need for explicit efforts to connect open science practices to One Health initiatives as a path for improved science.

I would add that the authors appear to have addressed a number of the concern expressed around clarity and detail in the first round of reviews.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and does the work have academic merit?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Scholarly publishing and historical sociology of knowledge

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 17 August 2026

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Edona Elshan
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Summary
The paper reports a cross-sectional online survey (N=90) exploring awareness of and attitudes toward Open Science (OS) among One Health (OH) researchers and practitioners in South Asia. The topic is relevant, the regional focus is underexplored, and the data reveal meaningful patterns — particularly the gap between expressed support for OS and limited practical implementation. However, the paper has a persistent internal inconsistency that runs from the research question through to the discussion: it frames the study around "adoption" but measures awareness, familiarity, and attitudes. This, combined with sampling problems that make the "South Asia" framing only partially credible, several undefined key terms, and a discussion that does not adequately engage prior literature, means the paper needs revision before its conclusions can be trusted.

Major comments

1. Misfit between research question, objectives, and measures. The stated research question asks about "barriers hindering the adoption of OS practices," and the opening of the discussion claims the study explored "adoption." But the instruments measure awareness, familiarity ratings, and self-reported attitudes. Adoption — defined as actual uptake and integration of OS practices into research workflows — is a behavioral outcome that requires a different operationalization (e.g., documented use of specific repositories, data publication records, pre-registration counts). The study can legitimately claim to examine perceptions and self-reported familiarity, but it cannot claim to study adoption. This misfit

also affects the objectives: Objective 1 targets "awareness and engagement" while Objective 2 targets "barriers to adoption" — these are not the same construct and need to be aligned. I recommend the authors either reframe the RQ around perceptions/awareness (which is what the data support) or substantially redesign the instrument to actually measure adoption behavior.

2. OS is never defined. Despite being the central construct of the paper, Open Science is never formally defined. This matters because the paper itself reveals that respondents were uncertain what OS means — 21.1% said they "do not know" whether they practice it, and a substantial number appear to conflate publishing in open-access journals with OS in its broader sense. Without a working definition the familiarity scores, the 58.9% who report "practicing OS," and the barrier analysis are all uninterpretable. Please provide an explicit definition of OS (e.g., aligning with UNESCO's 2021 Recommendation on Open Science) and embed it clearly in both the methods and the questionnaire.
3. Sample size justification is methodologically problematic. The authors derive their minimum N=90 from a proportion (p=0.626) taken from a European survey of support for OH initiatives. The arithmetic is correct — $(1.96)^2 \times 0.626 \times 0.374 / (0.10)^2 \approx 90$ — but the rationale for borrowing this particular proportion is not. The European survey measured "support for OH initiatives," a different construct in a different population from "OS awareness/adoption in South Asia." Using it as the basis for power planning is circular: the authors are essentially assuming the prevalence they want to find. The standard conservative choice when no prior estimate is available or applicable is p=0.50, which would yield a minimum N of 97 — and even then, a $\pm$10% margin of error is quite wide, meaning that a proportion of 60% really lies somewhere between 50% and 70%, which limits what can be said confidently. The paper achieved exactly N=90, the bare minimum. Please either justify the borrowed proportion substantively or restate the sample size rationale using p=0.50 and acknowledge the resulting inferential limitations.
4. Geographic concentration undermines the South Asia framing. India accounts for 55.6% of respondents (n=50); together India and Pakistan account for 73.3% (n=66). Bhutan and Maldives contribute one respondent each. South Asia spans highly heterogeneous political economies, research cultures, institutional landscapes, and languages, and there is no reason to assume OS attitudes and barriers are homogeneous across them. The paper currently treats the sample as a coherent "South Asian" data point, which it is not. The India-heavy skew is not just a limitation; it actively distorts the findings: the prominent role of India's ONOS initiative and the DBT-led OH consortium are India-specific structural factors that do not apply to Nepal, Sri Lanka, or Afghanistan. Please either (a) reframe the paper as primarily an India-focused study with exploratory signals from neighboring countries, (b) present country-stratified findings and discuss inter-country variation explicitly, or (c) add substantial caveats throughout that regional claims are proxies for Indian data.
5. Introduction presents only the case for South Asia, not the analytical problem. The introduction enumerates why South Asia is a relevant setting for OH research — zoonotic disease burden, expanding livestock production, dense populations — but does not ask why South Asia would present distinctive challenges or opportunities for OS adoption specifically, nor what would make it a less-than-ideal case. A stronger introduction would acknowledge the tensions: what features of South Asia might hinder OS relative to other LMIC regions, and what prior evidence exists about OS adoption in comparable contexts? This would sharpen the contribution and move the framing from descriptive motivation to analytical positioning.
6. Sampling and recruitment create a selection problem. The exclusion criterion excludes

"individuals who had neither collaborated nor taken part in any OH activities in South Asia" — but from the description of recruitment (surveys distributed to organizations and mailing lists rather than targeted individual selection), individuals with no OH experience may have received and completed the survey anyway. This is more than a minor limitation; if non-OH practitioners are in the sample, the barrier data are uninterpretable. Please clarify how OH participation was actually verified for each respondent, and report how many responses were screened out and why.

7. Discussion does not engage prior literature on OS adoption in LMICs. The discussion opens with a summary of the findings and draws on a few high-level policy documents but does not situate the results in the existing empirical literature on OS adoption in low- and middle-income country contexts. There is a growing body of work on OS barriers in Africa, Southeast Asia, and Latin America (e.g., Bezuidenhout et al. on OS in Africa; Chan et al. on knowledge inequity) that would allow the authors to confirm, contrast, or extend prior findings. "Similar patterns may be observed in other LMICs" is speculative; referencing actual comparable studies would make this claim evidential rather than rhetorical. The discussion should also grapple with the awareness-adoption gap more theoretically: why do researchers who express strong support for OS still not practice it? Attribution theory, capacity constraints, and institutional incentive structures from the OS literature are directly relevant here and currently absent.

Minor comments

- "There is an increase in the number of research" (Introduction) — grammatically incomplete.
- The data sharing question (Section VI) does not specify between whom data is being shared — within research teams (which is not OS), with the public, or with other institutions. Open-access journals "hosting" data is a common misconception the paper flags but then still reports without clarification; this needs a cleaner distinction in the instrument.
- The claim that "none of the respondents mentioned significant challenges" in Section V is contradicted by the immediately preceding sentence listing major barriers cited by 50–73% of respondents — this appears to be a cut-and-paste error; revise.
- Collaboration area distribution (human health 86.7%) is as much a function of who was sampled (predominantly academic researchers) as of actual OH practice in the region. The paper should acknowledge this confound explicitly rather than treating it as an OH-sector finding.
- The future directions section reads as a general policy wishlist rather than directions arising directly from the study's findings. Tighten these to recommendations that follow specifically from what was learned.

Is the work clearly and accurately presented and does it cite the current literature?
Partly

Is the study design appropriate and does the work have academic merit?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
No

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?
Partly

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Information systems; open science; knowledge management.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Author Response 26 Aug 2026

NAHEEDA HAMZA

We thank the reviewer for taking the time to carefully evaluate our manuscript and for providing valuable and constructive comments. We respond to each comment below:

1. We agree that the term “adoption” could imply a level of behavioural uptake that was not directly measured by our questionnaire. We have therefore revised the research question, objectives, and relevant statements throughout the manuscript for better clarity
2. We have added the UNESCO Open Science definition in the Introduction
3. We have revised the sample size rationale accordingly and used the more conservative assumption of **p = 0.50**, which gives a minimum sample size of **97 participants** at a 95% confidence level and 10% margin of error. We obtained 92 responses, of which 90 were complete and included in the final analysis. We have therefore acknowledged this in the Limitations. The findings are consequently interpreted as descriptive of the participating sample rather than as precise population estimates for One Health researchers across South Asia.
4. We acknowledge that India and Pakistan contributed a substantial proportion of the respondents, while some countries had very few participants. This reflects, in part, the nascent and uneven development of One Health research capacity across South Asia and the relatively limited pool of researchers working explicitly within a One Health framework. We have therefore retained the South Asian framing of the study but have strengthened the discussion of the geographical imbalance and its implications. Importantly, our analysis was **descriptive**, and we did not conduct inferential comparisons between countries because the number of respondents from several countries was too small to support meaningful statistical comparison. We have clarified that the findings should not be interpreted as representative estimates for individual South Asian countries or as evidence of homogeneous patterns across the region. Rather, they provide descriptive insights into the experiences and perceptions reported by the participating One Health researchers across the included

South Asian countries.

5. We have revised the Introduction to discuss the potential opportunities and challenges for engaging in Open Science within the South Asian context.
6. Eligibility was assessed through the information provided by respondents in the questionnaire, including their professional role, highest educational qualification, primary role in One Health research, years of experience in One Health research, and their involvement in cross-sectoral One Health research activities. These questions enabled us to establish that respondents had relevant One Health research experience or involvement. A total of 92 responses were received. Two responses were excluded because they were incomplete, resulting in 90 complete responses included in the final analysis. No additional respondents were excluded specifically on the basis of their One Health involvement. We have clarified the eligibility assessment and screening process in the Methods section and have revised the description of the sampling procedure.
7. We have revised and expanded the Discussion to situate our findings within existing evidence from LMIC settings, particularly studies from Africa and other resource-constrained research environments. Please note that our study was descriptive and was not designed to directly test attribution theory or other theoretical models of OS adoption. Therefore, we use these perspectives cautiously to help interpret the observed awareness–adoption gap.
8. *We have incorporated all minor comments, we have also revised the Conclusion and the section on Future Directions, accordingly.*

We thank you once again for your time, patience, and constructive feedback, which have greatly helped us improve the manuscript.

Competing Interests: None

Reviewer Report 17 August 2026

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Lisa Spitzer
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Summary:
This manuscript summarizes a survey regarding the perception and uptake of various open science practices in the One Health community in South Asia.

Major points:
- The sample size in the present study is rather small and was recruited with a snowball sampling

technique. This limits the generalizability of the results and should be considered and discussed clearly.
- The authors share the used questionnaire as supplementary material, but I still recommend providing more information about it (e.g., the scales, open text input vs. rating items) in the article to facilitate interpretability of the results.
- I am not able to open the preregistration on the OSF. In addition, the document published on Zenodo is also no detailed study protocol, but instead a short overview of the project. In addition, this project proposal was also recently updated (with a new version), for which changes from the original proposal are not clear.
- The results cannot be interpreted clearly and are somewhat mixed up, e.g., in the section "Challenges in working across different sectors", barriers are described in the text, but the table is labeled "perceived level of cross-sector collaboration"; the figures 3.0-3.3 are not displayed in the right order, etc.
- Were there any incomplete datasets, or were only full datasets considered (this should also be mentioned somewhere for interpretability).
- In general, I find it a bit problematic that engagement with open science was only measured with a dichotomous measure, which reduces the information about participants' participation in these practices dramatically. What does "to practice something" mean? For example, for preregistration, this could entail both "has tried one time but never again", but also "preregisters all studies all the time".
- I think that analyzing only the quantitative result without the qualitative analyses decreases the applicability of the results further. Since only a few response options were provided, e.g., for barriers, this highly influenced the range of barriers actually identified in this study.

Minor points:
- Abstract/Background: The definition of the aims of open science is, in my opinion, not exhaustive enough. For example, open science also includes practices such as preregistration, sharing of materials, code etc. In addition, saying it "aims at improving ... data sharing through ... data sharing" is circular. I propose revising this slightly.
- "Open science (OS) practices such as depositing datasets in open repositories, sharing code through collaborative platforms, collaborating with citizen scientists, and disseminating results via preprints and open-access journals not only improve reproducibility but also expand opportunities for interdisciplinary collaboration" - I recommend providing references that empirically (or theoretically) show support for this statement; or making more clear that the references provided after the next sentence also refer back to this statement
- Reporting of statistical parameters is not formatted correctly (e.g., "n" should be italic).

In general, I think that endeavors such as this study are important to establish a deeper understanding of how open science is currently perceived and used (in general and in specific contexts), which is important for its further development. However, I think the study contains multiple limitations (as outlined above) that should be discussed clearly in the manuscript. In addition, I suggest including both quantitative and qualitative analyses in one paper, since the quantitative analyses only provide a limited insight, especially because of the small sample size.

Is the work clearly and accurately presented and does it cite the current literature?
No

Is the study design appropriate and does the work have academic merit?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Partly

Are the conclusions drawn adequately supported by the results?
No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: open science, meta-research, preregistration

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Author Response 26 Aug 2026

NAHEEDA HAMZA

We sincerely thank the reviewer for taking the time to carefully evaluate our manuscript and for providing valuable and constructive comments. We respond to each comment below:

1. We agree that the relatively small sample size limits the generalisability of our findings. We have revised the Limitations section to acknowledge this and clarify that the findings are descriptive of the participating sample rather than representative of all One Health researchers in South Asia. We have also clarified that snowball sampling was used because One Health remains an emerging field in the region, making it difficult to establish a comprehensive sampling frame.
2. We agree that additional information about the questionnaire improves interpretability. We have therefore added details to the Methods regarding the response formats, including categorical, binary, multiple-response, rating-scale, and open-text questions, as well as the 5-point scales. The complete questionnaire remains available as supplementary material.
3. Open Science practices: The protocol registration link https://osf.io/p8myb/overview has been updated and is now publicly accessible. Data and study materials: The file formats of the dataset deposited in Zenodo- https://doi.org/10.5281/zenodo.21847646, have been updated to improve accessibility and reusability.
4. We have corrected the table titles, aligned them with the corresponding text, reorganised the figures in the correct order, and made the necessary revisions throughout the Results section to improve clarity and consistency.
5. A total of 92 responses were received, of which two were excluded because they were

incomplete. The final analysis therefore included 90 complete responses. This has been clarified in the manuscript.

6. We agree that the Yes/No/Not sure question on whether participants practiced Open Science provides only a broad measure of engagement and does not capture the frequency, consistency, or extent of individual practices. We have clarified this limitation in the Methods.
7. The present manuscript focuses on the quantitative analysis. The substantial qualitative data collected through the open-ended questions are being analysed separately and will be reported separately, allowing a more in-depth exploration of the contextual factors influencing Open Science practices.
8. We have revised the definition of Open Science and standardised the reporting and formatting of statistical parameters throughout the manuscript. We once again thank the reviewer for the constructive comments, which have helped us improve the clarity and presentation of the manuscript.

Competing Interests: None

Reviewer Report 07 August 2026

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Katherine S. Corker
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[2] ASAPbio, San Francisco, CA, USA

This paper reports the results of a small survey of researchers in South Asia (predominantly India). I summarize questions and concerns here:
1. The main claims in the paper concern the frequency of various open science knowledge and attitudes, but the sample is small and was obtained by convenience. This makes it difficult to generalize the results to any sort of broader population. On the other hand, it is perhaps useful to have information about regions like South Asia that are not as well studied as other regions. I would advise that the authors should go out of their way to emphasize that the results might be sample specific.
2. Open science practices:
   - The paper provides a link to a study protocol shared at the Open Science Framework, but the provided link was not public, and the contents could not be evaluated.
   - The paper also provides a link to Zenodo, where a summary of the project was shared. Not provided in the paper, but instead linked within Zenodo and shared in the Data Availability Statement, is a repository of data and study materials: https://zenodo.org/records/18492041 Although the materials in this repository are

accessible, they could be shared in better formats to enhance their reusability. .csv and .txt are accessible file formats that will be more durable than the proprietary formats shared here.

3. Graphics: The paper features many simple charts/graphs. I wondered how much these graphics really added to the paper. I especially wondered whether Figure 1.2 and 3.0 were needed.
4. I had a hard time understanding section 3.C. If participants stated that they don't practice open science, how is it that 12.2% of them share data and 8.9% publish open access? Does this suggest that respondents didn't understand the questions or take the questions seriously? How do you interpret these results?
5. Minor points:
   - The section labeled "sample size" describes a sort of precision planning. The label is misleading and should be corrected. Perhaps "planned sample size" could be used instead.
   - I was confused by the figure numbering and found it hard to follow.

Is the work clearly and accurately presented and does it cite the current literature?
Partly

Is the study design appropriate and does the work have academic merit?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Not applicable

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Social and personality psychology; open science; survey research

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Author Response 17 Aug 2026

NAHEEDA HAMZA

We sincerely thank the reviewer for taking the time to carefully evaluate our manuscript and for providing valuable and constructive comments. We respond to each comment below:

1. We agree that the relatively small sample size and the use of snowball sampling limit the generalisability of our findings to the wider population of One Health researchers across South Asia. We have therefore revised the Limitations section to explicitly acknowledge this issue and to clarify that the findings should be interpreted as descriptive of the participating sample rather than as representative estimates for all OH researchers in South Asia. The choice of snowball sampling was primarily driven by the emerging nature of One Health research in South Asia. One Health remains a relatively nascent field in the region, and the number of researchers with relevant expertise is comparatively limited. Consequently, identifying and reaching an adequately defined sampling frame of OH researchers was challenging. Snowball sampling therefore provided a practical approach for reaching participants with appropriate knowledge and experience.
2. Open Science practices: The protocol registration link https://osf.io/p8myb/overview

has been updated and is now publicly accessible. Data and study materials: The file formats of the dataset deposited in Zenodo- https://doi.org/10.5281/zenodo.21847646, have been updated to improve accessibility and reusability.

1. Graphics: We agree that some of the figures were not essential for communicating the main findings. Accordingly, Figures 1.1 (submission frequency), 3.0 (pie chart), and 3.1 (country-wise distribution of OS practices) have been removed.
2. Clarification on Section III (C): The discrepancy that arose in section III (C) is because the questions assessed different aspects of open science practices. Among respondents who indicated that they did not practice OS, the questionnaire asked which specific OS components they found difficult to practice. The most frequently reported challenges were related to data sharing (12.2%) and open access publishing (8.9%). Other areas reported as difficult included citizen science and sharing codes (6.7% each), followed by open peer review and open educational resources (5.6% each). A smaller proportion of respondents identified preprint publishing (2.2%) and pre-registration and open methodology (1.1% each) as difficult to practice (fig. 3.1). We have now revised Section III(c) to explain this distinction more clearly
3. We have revised the terminology ``sample size``to "planned sample size". Since One Health research is still at a relatively nascent stage in South Asia and the number of researchers working in this area is limited, recruitment was challenging. Responses increased primarily after reminder invitations were circulated every alternate month, which explains the peaks that were previously visible in the submission-frequency graph. In total, 92 responses were received, of which two were excluded because of incomplete data, resulting in a final sample of 90 participants. This final sample was consistent with the calculated and approved planned sample size.

Overall, the revisions are primarily intended to improve clarity, accessibility, transparency, and presentation. No major changes have been made to the study design, dataset, statistical analysis, or overall findings. We again thank the reviewer for the constructive comments, which have helped us improve the clarity and presentation of the manuscript.

Competing Interests: No competing interests were disclosed.

Reviewer Report 30 July 2026

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Daniël Lakens
[1] Eindhoven University of Technology, Eindhoven, The Netherlands
[2] Eindhoven University of Technology, Eindhoven, The Netherlands

This paper aims to summarize a small survey about open science practices among a non-representative snowball sample of people in south-east Asia. I tried to provide a comprehensive review, but several serious issues prevented me from doing so. Specifically, the OSF link to the pre-registration is closed, and the zenodo link created in 2023 is not a detailed pre-registration. Finally, the data is not shared, so I could not check the results. The submission frequency graph is not informative, and I do not see how it can be based on real data. The waves are too regular, and the increase in September would have meant that stopping when the researchers did was a bad decision as a lot of data was coming in. I would need to see the data, and a reproducible manuscript, to evaluate these results. Until such information is provided, I can't review this work, nor recommend it for indexation.

Minor

There is no need for the pie chart – that can be a sentence. Due to the small sample size, the split per country is not informative either. For binary questions, you only need to provide one of the 2 percentages in a sentence as the results indicate that a very small percentage (15.6%) of participants had formal training on OS practices, and the overwhelming majority (84.4%) stated that they had never received such training. Add confidence intervals to all estimates (unless this is not meant to generalize beyond the sample).

Is the work clearly and accurately presented and does it cite the current literature?
No

Is the study design appropriate and does the work have academic merit?
No

Are sufficient details of methods and analysis provided to allow replication by others?
No

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
No source data required

Are the conclusions drawn adequately supported by the results?
No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: open science

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Author Response 01 Aug 2026

NAHEEDA HAMZA

Dear Prof. Daniël Lakens,
Thank you very much for your constructive comments on our manuscript. We sincerely appreciate the time and effort you have taken to review our work.

First, we would like to clarify that our study focuses on South Asia, rather than Southeast Asia. We also apologize for the OSF preregistration link being inaccessible. This issue has now been resolved, and the project is now publicly accessible. As the Zenodo repository did not contain the complete project proposal, we have uploaded the full proposal to OSF. It is available here: https://osf.io/p8myb/overview.

Regarding the data availability, the anonymized dataset has already been shared, and the corresponding link is provided in the **Data Availability Statement** at the end of the manuscript. With respect to the submission frequency graph, we appreciate your observation.

Since One Health research is still at a relatively nascent stage in South Asia and the number of researchers working in this area is limited, participant recruitment was challenging. We observed that responses increased primarily after reminder invitations were circulated every alternate month, which explains the peaks in the submission frequency graph. In total, we received 92 responses, of which two were excluded due to incomplete data, resulting in a final sample of 90 participants, consistent with our calculated and approved sample size. To avoid any confusion for readers, we are happy to remove the submission frequency graph from the revised manuscript if you believe this would improve its clarity. We would greatly appreciate your opinion on this.

We are also grateful for your minor comments and suggestions. This will help us improve the manuscript. We will incorporate all your comments in the manuscript before submitting the revised version. Thank you once again for your valuable feedback, patience, and time in reviewing our work. We look forward to any further comments you may have.

Competing Interests: No competing interests were disclosed.