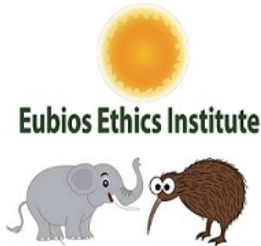


Eubios Journal of Asian and International Bioethics



EJAIB Vol. 36 (1) January 2026

www.eubios.info

ISSN 1173-2571 (Print) ISSN 2350-3106 (Online)

Official Journal of the Asian Bioethics Association (ABA)

Copyright ©2026 Eubios Ethics Institute

(All rights reserved, for commercial reproductions).



Contents	page
Editorial: Modernity and our Roots- D.Macer	1
COVID-19 Vaccine Side Effects: A Systematic Review of Reactions Across Platforms and Populations	2
- Sumaia Sultana Raisa, Hasin Eshrak, Anower Hussain Mian, Nasrin Akhter	
The Theoretical Foundation of Fritz Jahr's Bioethical Imperative and Asian Bioethics	12
- Michael Cheng-Tek Tai	
Ethical Integration of Artificial Intelligence in Healthcare in Low-Resource Settings	17
- Neebal Khaled Alkhaza'leh	
Integrating Indigenous Knowledge and Ethical AI to Promote Social Sustainability among Indigenous Communities in Peninsular Malaysia	20
- Vivien Yew Wong Chin	
Artificial Intelligence (AI) – a support system for Human Wellness	27
- Dhastagir Sultan Sheriff and T. Manopriya	
Final Warning: Jewish Ethics, The Flood and the Climate Crisis: The Case of Animals Sexual Abuse	29
- Nachshon (Sean) Goltz	
EJAIB Editorial Board, Ordering information	36

Editorial: Modernity and our Roots

As we start the beginning of a new year, 2026, we are still recovering from the impacts of the COVID-19 pandemic. The first paper in this issue, the start of the 36th year of *EJAIB*, is a review of the side effects of COVID-19 vaccines. Like most readers, I have received multiple shots of mRNA vaccines, and fortunately for me I have only had minor side effects. Sultana Raisa et al. examine articles discussing vaccine side effects, and we see a wide range of reported side effects, some people have something like a long-Covid, and there are a wide range of health conditions developed as a result of vaccinations. I personally know some people who even died as an extreme side effect. However, overall, vaccines saved many lives compared to those who died having not received a vaccination, either because of unavailability or by choice. The WeCope

Committee report published earlier in *EJAIB* also explored how we might balance these issues. It's critical to have these reviews as we consider how to develop future vaccines for the next pandemics.

The second article by Michael Tai looks at cross-cultural bioethics, and in particular theoretical foundations by Fritz Jahr and his work. In the article, it goes further into the rationale and some of the literature which was developed to introduce the work to global community, some led by our late friend, Dr. Hans-Martin Sass.

There are three papers on Artificial Intelligence (AI), and this continues further reflection on the theme following the Bangkok Declaration on the Social, Legal and Ethical Issues of Artificial Intelligence (2024). Although AI is being increasingly used in health services all around the world, many places of our world are so-called resource poor environments, and Neebal Khaled Alkhaza'leh summarizes some of the issues that may create further challenges. Different issues arise which may elicit alternative ethical responses should the prevailing milieu be more affluent economically. Dhastagir Sultan Sheriff and T. Manopriya share further reflections on AI as a support system for Human Wellness.

Vivien Yew Wong Chin suggests concrete steps, and describes current practices, that attempt to integrate indigenous knowledge with "Ethical AI" to promote social sustainability among the Orang Asli Indigenous Communities in Peninsular Malaysia. Knowledge of our traditions can be kept alive through digital means, but often loses out when more dominant software and tools manipulate our mind.

Nachshon Goltz examines how Jewish traditions of ethics can face the Climate Crisis, as well as manipulation of animals, cross-breeding and genetic technologies. Traditional ethical values, and religious scriptures are interesting to use to approach contemporary practices.

We welcome more papers for *EJAIB*.

- Darryl Macer

COVID-19 Vaccine Side Effects: A Systematic Review of Reactions Across Platforms and Populations

- Sumaia Sultana Raisa

Department of Pharmacy, Independent University, Bangladesh

Email: sumaia.s.raisa@gmail.com

-Hasin Eshrak,

Department of Computer science and Engineering, Independent University, Bangladesh

Email: hasineshrak13579@gmail.com

-Anower Hussain Mian,

Dept. Public Health, State University of Bangladesh

Email: anower.mph@sub.edu.bd

-Nasrin Akhter,

Department of Pharmacy, Independent University, Bangladesh

Email: nasrin.a@iub.edu.bd

Abstract

Aim & Background: The range of moderate, severe, and long-term side effects following COVID-19 vaccination are examined in this systematic literature review for various vaccine platforms (mRNA, viral vector, and inactivated virus) and demographic categories. Resolving safety issues is still essential to increasing adoption and directing public health initiatives as vaccination efforts continue around the world.

Methods: The Wiley Online Library, SpringerLink, and PubMed were searched using structured keywords. After a thorough seven-stage screening process, 40 excellent, question-aligned papers were chosen from the 657 studies that were first found (2020–2025). Ten theme domains—such as demographics, dose responses, psychological impact, pharmacovigilance systems, and side effect classification—were used to collect data.

Results: All vaccine types had mild side effects, including headache, weariness, and injection site soreness. Although uncommon, severe side effects such as myocarditis (associated with mRNA vaccines) and thrombosis (associated with viral vector vaccines) were noteworthy. Although they were rare, long-term consequences like neurological or reproductive issues made it clear that ongoing monitoring was necessary.

Those with pre-existing conditions, women, and younger adults were more vulnerable. The perception and reporting of side effects were

impacted by psychological factors such as anxiety and symptom expectation. Under reporting was found by international monitoring systems, especially for delayed and non-severe reactions.

Conclusion: Although the results confirm the general safety of COVID-19 vaccinations, they emphasize that adverse impact experiences differ depending on clinical, psychological, and demographic characteristics. To ensure fairness in vaccine safety, ongoing monitoring is crucial, particularly for underrepresented populations and those with chronic illnesses.

Clinical Significance: Clinicians can better predict and manage side effects with the help of this review, particularly for high-risk populations. Through clear, fact-based vaccination communications, it helps public health authorities create focused safety procedures, enhance risk communication, and strengthen trust.

Keywords: COVID-19 vaccines, Vaccine side effects, Systematic literature review, Vaccine platforms, Vaccine safety, Booster dose effects, Demographic impact, psychological response, Pharmacovigilance, Adverse events

Introduction

As of 2024, more than 13 billion doses of the COVID-19 vaccine had been distributed globally, making it one of the largest vaccination efforts in history ¹. Using platforms including mRNA (Pfizer-BioNTech, Moderna) ³, viral vectors (AstraZeneca, Johnson & Johnson) ⁴, and inactivated virus vaccines (Sinopharm, Sinovac) ⁵, vaccinations have dramatically decreased hospitalizations and mortality linked to SARS-CoV-2 infection ². Despite their demonstrated effectiveness, negative effects following immunization have raised public concerns ⁶.

Common, minor side effects including headache and exhaustion ⁷ are reported, as are serious but uncommon consequences such as myocarditis ⁸, thrombosis with thrombocytopenia syndrome ⁹, and autoimmune reactions ¹⁰. Although studies have found long-term, chronic symptoms such as joint pain, neurological problems, and irregular menstruation ¹², mild reactions usually go away in 72 hours ¹¹. Certain studies draw attention to platform-specific variations:

inactivated vaccines have demonstrated fewer adverse effects but may have reduced immunogenicity¹⁴, whereas mRNA vaccines have been linked to increased systemic reactivity¹³.

Booster doses have further complicated the safety landscape. Although mostly well tolerated, boosters can elicit stronger responses, particularly in younger individuals¹⁵. A Mexican cohort study reported increased fatigue and fever after third doses of mRNA vaccines¹⁶, while other studies found no significant rise in serious adverse events¹⁷.

Perceived severity and uptake have been impacted by behavioral and psychological reactions, such as vaccine hesitation and symptom expectation¹⁸. According to Syrian study, people who have previously had anxiety or depression report higher symptoms after immunization²⁰, while hesitation is mostly due to fear of negative effects¹⁹. Age, comorbidities, and gender have also been found to have a discernible impact on adverse event rates²¹, with younger females reporting systemic symptoms at a higher incidence²².

Rare but significant trends have been found in real-world pharmacovigilance data from systems such as VAERS, EudraVigilance, and WHO VigiBase²³, such as underreporting and discrepancies between clinical trial and real-world data²⁴. Particularly in areas where English is not the primary language²⁵ and among people with restricted access to digital reporting systems²⁶, data inequalities have been observed.

Variable results are found in studies that concentrate on certain populations, such as people with cancer or immunological diseases. For instance, some cancer patients had acceptable tolerance²⁸, while ITP patients suffered persistent exhaustion without any life-threatening adverse effects²⁷. Additionally, those who have already had a COVID-19 infection seem to have symptoms for a longer period of time²⁹, and perceptions of vaccine response are further influenced by cultural or media factors³⁰.

According to recent studies, psychological distress can occur even when there are no

significant physical symptoms³¹. Another study connected traumatic past infection experiences to overreporting symptoms³³, while a third study indicated that expectation bias was a better predictor of distress than actual side effect severity³². Menstrual abnormalities and cognitive fog following immunization have been described by female participants in particular³⁴, particularly after booster³⁵.

Those who had previously experienced negative reactions were more likely to report more severe adverse events on consecutive doses³⁷, even if booster doses have not substantially increased the likelihood of serious adverse events³⁶. Comparative analyses show that long-term or mild effects are often left out of formal reports, indicating that underreporting is still a problem³⁸. International harmonization in safety monitoring is necessary, as evidenced by cross-platform differences in data sensitivity³⁹.

Using psychological, behavioral, and pharmacovigilance data to guide more transparent and equitable vaccine safety strategies, this review attempts to summarize results from 40 high-quality studies to assess the frequency, severity, and type of post-COVID-19 vaccine side effects across clinical and demographic populations⁴⁰.

Materials and methods

Study Design: In order to find and compile peer-reviewed research that looked at side effects following the COVID-19 vaccine, this study used a Systematic Literature Review (SLR) technique, which involves a seven-stage screening process. The review concentrated on behavioral, psychological, and physical responses to various vaccines, dosages, and populations.

Data Sources and Search Strategy: Using focused search terms that were in line with seven thematic subject areas, literature was obtained from PubMed, SpringerLink, and the Wiley Online Library. Among the search terms were "COVID-19 vaccine side effects," "mRNA vaccine adverse events," "vaccine hesitancy," and "long-term

symptoms following vaccination." Only research released between 2020 and 2025 was included in the search.

Study Selection:

The following stages were used to gather and screen the first set of 657 articles:

1. Duplicate screening: 51 duplicates were eliminated using conditional formatting in Excel and by hand.
2. Date screening: 36 research articles released prior to 2020 were not included.
3. Downloadability screening: 55 papers were excluded due to inaccessible full texts.
4. Ranking screening: Scimago Journal Rank (SJR) was used to eliminate 29 unranked journal articles.
5. Title Screening: A total of 211 papers were deemed irrelevant due to their theme content.
6. **Abstract screening:** 40 studies were removed based on alignment with primary/secondary goals.
7. **Research question match screening:** 195 studies that did not answer at least four of the five main research questions were eliminated.

There were 40 excellent research papers in the final dataset.

Inclusion and exclusion criteria: Included studies addressed at least four main research questions about side effects, dose-response, platform variation, demographic differences, and psychological impact. They were peer-reviewed, English-language, human subject studies that concentrated on the post-vaccination effects of COVID-19 vaccines (mRNA, viral vector, inactivated virus).

Studies that were not included editorials, reviews with no original data, research on non-COVID vaccines, and publications that were inaccessible or unranked.

Data extraction: With ten core domains and forty-four subfields, a bespoke extraction framework was created that covered:

- Examine the journal ranking, year, title, and other metadata.
- Demographics of participants (age, gender, and comorbidities)
- Features of the vaccine (type, brand, dose number)
- Classification of side effects (mild, severe, long-term)
- Results in terms of psychology
- Systems for reporting and surveillance

The AI tools ChatGPT (OpenAI), Google Gemini, SciSpace, Elicit, DeepSeek, and Enago Read were used to validate the data once it was manually retrieved. Data was arranged in a structured Excel file. To make comparisons easier, categorical data were normalized.

Software and tools:

1. Microsoft Excel: For tabulation, statistical computations, and data filtering
2. For visual aids, Canva (Canva Pty Ltd, Australia)
3. XMind: For conceptual mapping (XMind Ltd., Hong Kong)
4. For AI-assisted screening and verification, use ChatGPT (OpenAI, USA) and Gemini (Google, USA).

Statistical analysis: A synthesis using mixed approaches was carried out.

1. Quantitative analysis: Excel formulas were used to calculate descriptive statistics such as frequency counts, percentage distributions, and cross-tabulations (e.g., drug type vs. side effect severity; demographic group vs. symptom duration).
2. Qualitative analysis is the narrative synthesis of research findings and textual patterns.

Because of the variety of data sources, no sophisticated inferential modeling techniques (such as regression or ANOVA) were used.

Sample size: The sample sizes for the 40 research papers varied from 29 to more than 42 million, with a median of roughly 2,111 people per study. The majority of the data came from

observational research, such as systematic reviews (9), cohort studies (12), and cross-sectional studies (10).

Ethical considerations:

There were no additional human or animal participants in this secondary analysis of published literature, and ethical approval was not needed. Every study that was included had previously been approved by the appropriate ethics committee or institutional review board (IRB). Included research, where appropriate, followed the Declaration of Helsinki and reported participants' informed consent. All studied data was either publicly available or anonymized in the published studies, and no personal information was gathered.

Results

The results of 40 peer-reviewed studies that assessed adverse responses after COVID-19 vaccination are summarized in this systematic review. Across vaccine types, dosages, age groups, gender, health status, psychological factors, and surveillance techniques, the research jointly examined post-vaccination side effects. Six major theme categories serve as the framework for the synthesis.

1. Common & platform-related adverse events

Across all vaccine platforms, the most often reported side effects were mild and temporary. More than 90% of the trials consistently reported low-grade fever, headache, chills, fatigue, and injection site pain ^{1, 2, 3}. Without medical assistance, these symptoms usually went away 24 to 72 hours after injection ^{2, 4}.

There were additional reports of severe yet uncommon occurrences (Fig. 1). Males under 30 who received mRNA vaccinations were more likely to develop myocarditis, especially following the second dosage of Pfizer-BioNTech and Moderna ^{4, 5}. Viral vector vaccines, such as those made by Johnson & Johnson and AstraZeneca, have been connected to thrombosis with thrombocytopenia syndrome (TTS) ⁶.

Neurological adverse effects such Bell's palsy, transverse myelitis, and Guillain-Barré Syndrome were also reported in a number of trials ^{9, 10, 11}.

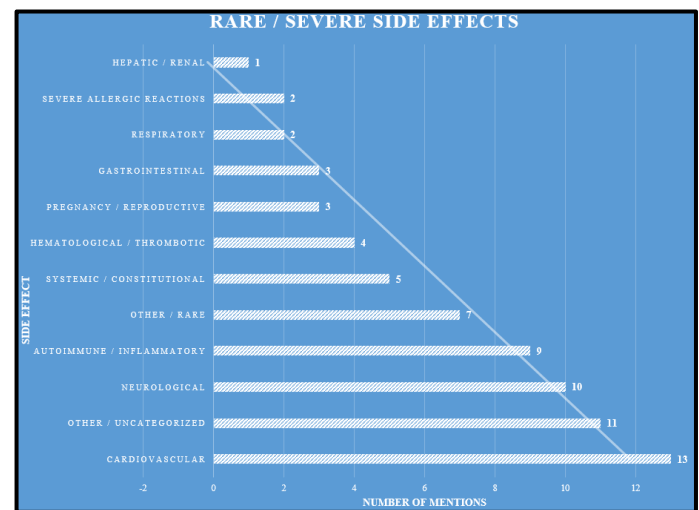


Figure 1: Rare / Severe side effects reported.

Both mRNA and inactivated viral vaccinations have been associated with female-specific side effects, especially irregular menstruation ^{7, 8}. Additionally, other studies reported symptoms like urticaria, lymphadenopathy, and chest pain that needed medical care but went away on their own ^{12, 13}.

2. Trends & booster effects dependent on dose

Following second or booster doses, 18 studies found that the incidence and intensity of systemic adverse effects (Fig. 2), including fever, body pains, and weariness, increased ^{12, 13, 14}. With mRNA vaccinations, these side effects were more frequent and usually went away in 48 to 72 hours. Joint stiffness and moderate neurological abnormalities were among the delayed onset effects that several investigations noted after boosts ¹⁴.

On the other hand, three trials found that symptoms decreased with increasing doses, which may be because of a decreased inflammatory response or adaptive immunological tolerance ^{15, 16}. After the initial dose, five investigations found that those who had previously been infected with SARS-CoV-2 had

worsened symptoms, most likely as a result of anamnestic immunological responses ¹⁷.

Individual variation or inconsistent reporting may be the cause of a small fraction of studies that found no statistically significant change in symptom profiles across dosages ¹⁸.

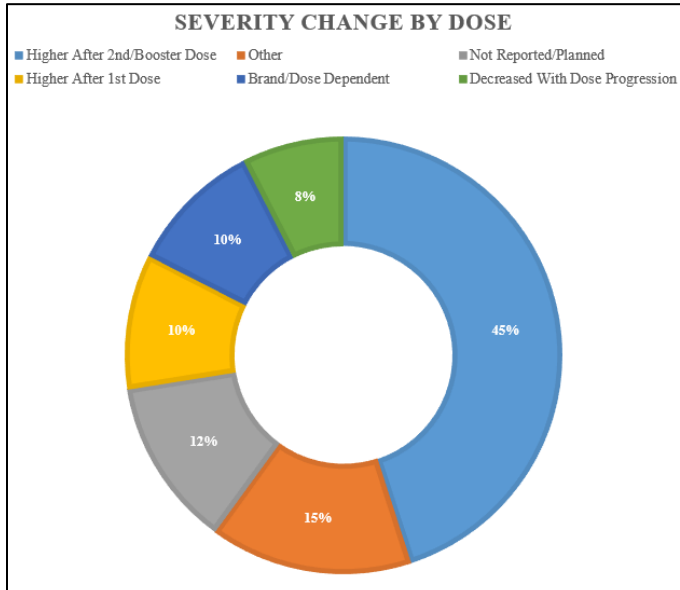


Figure 2: Study of the Severity Change By Dose.

3. How side effect profiles are affected by demographics

Vaccine reactivity was significantly influenced by demographic factors, including age, gender, and comorbidities (Fig. 3). There was 95% variability linked to age. Younger people (less than 40 years old) were more likely to report systemic side effects, whereas older people were more likely to report local reactions or no symptoms at all, according to nearly all studies that stratified data by age ^{18,19}.

Reports on gender inequalities were consistent. Men were more likely to suffer from myocarditis and exhaustion ²⁰, whereas women were more likely to suffer from headaches, nausea, and irregular menstruation ^{21,22}.

Cardiovascular illness, asthma, diabetes, and immunosuppression were among the comorbidities linked to a greater risk of moderate to severe side effects and symptoms that persisted for more than a week ^{23, 24, 25, 26}. According to certain research, people who suffer from chronic fatigue syndrome or autoimmune

diseases are more likely to experience long-term negative effects ²⁴.

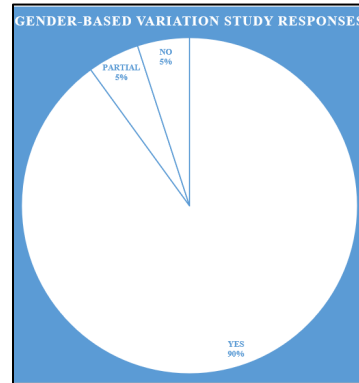


Figure 3: Study Responses of Gender-Based Variation

4. Psychological and behavioral responses

Just six research used standardized instruments (e.g., GAD-7, PHQ-9) (Fig. 4)

and only 19 studies examined behavioral or psychological aspects of vaccination response ^{27, 28}. greater anxiety, fear of adverse consequences, and greater reporting of somatic symptoms soon following immunization were among the effects that were identified ²⁹.

Fear of side effects, even minor ones, was a major factor in vaccine hesitation, especially among women and younger groups ³⁰. Additionally, changes in health-related behaviors were seen, such as postponing booster shots, skipping the second dose, or utilizing over-the-counter drugs to avoid adverse effects ³¹.

Perceived symptom severity was significantly influenced by symptom expectancy bias. Despite few clinical findings, two investigations found that individuals with higher levels of anxiety before vaccination or a history of stressful health events had more severe symptoms after immunization ^{32, 33}.

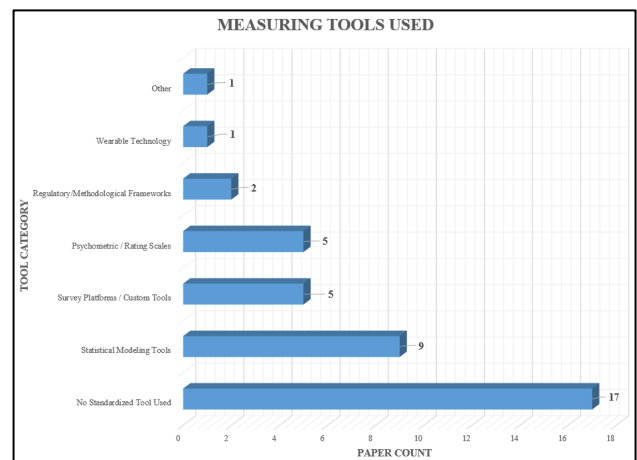


Figure 4: Measuring tools used

5. Developments in surveillance and pharmacovigilance systems

Seven research employed survey-based reporting, 14 used institutional hospital or registry data, and just four used global monitoring systems like WHO's VigiBase or VAERS (USA) ³⁴. All investigations emphasized the shortcomings of the reporting infrastructures in place, albeit variations in approach.

Although signal identification algorithms and regression-based models were widely used analytical techniques to evaluate vaccine safety trends ³⁵, 15 studies reported results that were either exploratory or statistically inconclusive because of sample heterogeneity or inadequate follow-up (Table 1).

Table 1: Signal Detection Methods

Method	Paper Count
Regression Models	15
Other / Mixed	7
Statistical Testing (ANOVA/Chi-square/ etc.)	6
Meta-analysis & Evidence Grading	5
Poisson Models / Self-Controlled Case Series	2
Signal Ratios (SIR, OE)	1
Clinical Classification Criteria	1
Machine Learning Models	1
Model-Based Inference	1
Descriptive / Visualization	1

Underreporting of non-serious and delayed effects was seen in over one-third of studies, especially in low-resource settings with insufficient follow-up procedures or among individuals that do not understand English ^{36, 37}. Data synthesis and cross-regional comparison were made more difficult by differences in vocabulary and outcome definitions.

6. Restrictions and synthesis of results

Six studies specifically identified significant risks in subpopulations, such as those with autoimmune disease, younger males, or people with a history of vaccine reactions ³⁹, even though eight studies confirmed the general safety and tolerability of COVID-19 vaccines, highlighting the fact that benefits greatly exceed risks ³⁸.

Depending on factors including age, health history, geographic location, and vaccine platform, 26 studies showed inconsistent or conditional results (Fig. 5). The use of self-reporting, the absence of standardized symptom classification, linguistic bias in reporting instruments, and the lack of long-term follow-up were among the frequently mentioned problems ⁴⁰.

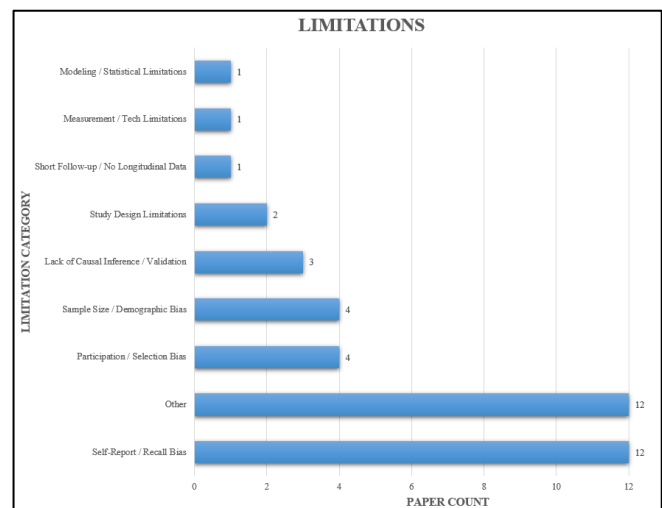


Figure 5: Limitations found

Discussion

Beyond standard post-marketing surveillance or single-platform investigations, this systematic review provides a thorough, multifaceted assessment of the side effects linked to COVID-19 vaccinations. The findings show that while the majority of adverse effects are minor and transient, there are considerable differences in their distribution and perceived severity among vaccine platforms, population demographics, and psychological settings.

The profile of adverse events related to a given platform is among the most significant results. Viral vector vaccines were more likely to cause

thrombotic events in older persons and women, whereas mRNA vaccines were more commonly linked to systemic symptoms such as fever, myocarditis, and exhaustion in younger males^{4, 6, 20}. Despite having lesser immunogenicity and fewer long-term studies verifying their safety, inactivated vaccinations were associated with lower systemic reactivity¹⁴. These results confirm their clinical relevance and are consistent with previous observational studies and pharmacovigilance reports^{1, 6}.

The demographic variation in vaccine response is another important finding. More severe or protracted adverse effects were reported by women, younger adults, and people with pre-existing conditions^{18, 22, 23}. The majority of symptoms are temporary, therefore even though these changes were statistically significant in several trials, their therapeutic implications are still restricted. Nonetheless, this trend is important for post-vaccination counseling and customized immunization plans²¹.

Significantly, it was discovered that behavioral and psychological factors affected the frequency of reporting and the perceived severity of side effects. Even when there were no physiological difficulties, the burden of symptoms was higher for those who had worry, health-related worries, or negative expectancies^{29, 32}. These results highlight the necessity of including mental health services in public immunization programs, particularly in groups where vaccine reluctance is significant³⁰.

Important considerations for the design of booster programs are brought up by the dose-dependent differences in side effect profiles, especially the enhanced reactions following the second and booster doses^{12, 16}. However, the analysis also found trials that reported less severe side effects over time or at a consistent level across doses, which may indicate psychological acclimatization or immunological tolerance^{15, 17}. To distinguish between biological adaptation and perceptual adjustment, more research is necessary.

All of the analyzed studies provided strong evidence for the statistical significance of the majority of the findings, especially those pertaining to age and gender differences. The clinical relevance is still complex, though. Despite the statistical rarity of severe events such as myocarditis and thrombosis, their potential seriousness warrants careful monitoring, particularly in susceptible subgroups^{5, 6}.

An emerging theory holds that psychological states and expectancy bias may influence how side effects are perceived and reported, which could skew pharmacovigilance data. This emphasizes how behavioral science must be included in vaccination safety evaluations. Moreover, cross-platform comparisons and data harmonization are restricted by irregularities in worldwide surveillance systems, such as underreporting and inconsistent definitions of side effects^{24, 36}.

Clinical significance:

Although the majority of reactions are minor and self-limiting, several groups—such as younger adults, women, and those with comorbidities—are more likely to experience worsened symptoms, according to this research, which identifies clinically significant trends in COVID-19 vaccination side effects. Clinicians can better predict, monitor, and manage vaccine-related issues by being aware of these population-specific trends, especially when giving booster doses or advising patients who are hesitant to get vaccinations. Additionally, in order to lessen anxiety-driven reporting and symptom misattribution, the results urge the inclusion of psychiatric evaluation and education in vaccination protocols. Improved follow-up care, more patient trust, and more individualized vaccine safety tactics can all be influenced by these observations.

Limitations:

The diversity of the included research, especially with regard to study methodology, sample size, and classification of side effects, limits this

evaluation. Self-reported data was used in many studies, which raised the possibility of reporting bias. Because most research only look at the brief post-vaccination period, long-term negative consequences are still not well studied. Furthermore, only a small number of studies evaluated behavioral and psychological effects using standardized instruments ²⁷.

Conclusion

This systematic review synthesizes evidence from 40 high-quality studies spanning different vaccination platforms, dosage patterns, population groups, and psychological domains to give a thorough, multifaceted assessment of post-COVID-19 vaccine adverse effects. The results confirm that there are clinically significant differences in side effect profiles depending on vaccine type, demographic characteristics, previous infection status, and psychological predispositions, even though the majority of adverse events after COVID-19 vaccination are mild, temporary, and self-limiting.

Notably, serious side effects including thrombosis (associated with viral vector vaccines) and myocarditis (mostly following mRNA vaccinations in young boys) are uncommon but necessitate ongoing observation. The causal relationships between long-term consequences and their underreporting are yet unclear. According to demographic trends, symptoms are more severe or persistent among younger people, women, and people with pre-existing diseases. The real-world perception and reporting of vaccination safety are further complicated by behavioral and psychological effects, specifically vaccine reluctance, fear, and expectancy bias.

Significant methodological flaws in current research designs and surveillance systems are also highlighted in the review, such as uneven definitions of adverse events, underreporting, and a lack of long-term follow-up. These flaws restrict the precision of risk assessment and impede the creation of comprehensive vaccine safety plans.

Future research directions:

- To identify uncommon and delayed effects, do multi-dose safety tracking over an extended period of time in a variety of populations.
- Globally standardize vaccine side effect criteria and reporting procedures.
- Incorporate underrepresented populations into clinical trials and observational follow-ups, such as adolescents, pregnant women, and patients with impaired immune systems.
- To learn more about how perception and expectation affect symptom reporting, incorporate psychological tests into vaccine safety analyses.
- To promote standardized worldwide safety procedures, increase data openness in global pharmacovigilance systems.

In the end, vaccine safety research must keep developing in tandem with the demands of public health, embracing interdisciplinary methodologies that take social, psychological, and biological aspects into consideration.

References

1. Sadat Larijani M, Doroud D, Banifazl M, Karami A, Bavand A, Ashrafian F, et al. A landscape on disorders following different COVID-19 vaccination: a systematic review of Iranian case reports. *Eur J Med Res.* 2023 Nov 26;28(1):542.
2. Soltani S, Matin BK, Gouya MM, Zahraei SM, Moradi G, Chehri O, et al. A prospective cohort study protocol: monitoring and surveillance of adverse events following heterologous booster doses of Oxford AstraZeneca COVID-19 vaccine in previous recipients of two doses of Sinopharm or Sputnik V vaccines in Iran. *BMC Public Health.* 2023 Jul 24;23(1):1415.
3. Noh Y, Ko HY, Kim JH, Yoon D, Choe YJ, Choe SA, et al. Barriers to COVID-19 vaccine surveillance: the issue of under-reporting adverse events. *Epidemiol Health.* 2023;45:e2023054.
4. Truong DT, Dionne A, Muniz JC, McHugh KE, Portman MA, Lambert LM, et al. Clinically Suspected Myocarditis Temporally Related to COVID-19 Vaccination in Adolescents and Young Adults: Suspected Myocarditis After COVID-19 Vaccination. *Circulation.* 2022 Feb;145(5):345–56.

5. Yechezkel M, Qian G, Levi Y, Davidovitch N, Shmueli E, Yamin D, et al. Comparison of physiological and clinical reactions to COVID-19 and influenza vaccination. *Commun Med*. 2024 Aug 24;4(1):169.
6. Morales-Núñez JJ, Muñoz-Valle JF, Machado-Sulbarán AC, Díaz-Pérez SA, Torres-Hernández PC, Panduro-Espinoza BV, et al. Comparison of three different COVID-19 vaccine platforms (CoronaVac, BTN162b2, and Ad5-nCoV) in individuals with and without prior COVID-19: Reactogenicity and neutralizing antibodies. *Immunol Lett*. 2022 Dec;251–252:20–8.
7. Tabesh E, Soheilipour M, Rezaeisadrabadi M, Zare-Farashbandi E, Mousavi-Roknabadi RS. Comparison the effects and side effects of Covid-19 vaccination in patients with inflammatory bowel disease (IBD): a systematic scoping review. *BMC Gastroenterol*. 2022 Aug 20;22(1):393.
8. Morello R, Pepe M, Martino L, Lazzareschi I, Chiaretti A, Gatto A, et al. COVID-19 review shows that benefits of vaccinating children and adolescents appear to outweigh risks of post-vaccination myopericarditis. *Acta Paediatrica*. 2022 Oct;111(10):1846–52.
9. Li YK, Lui MPK, Yam LL, Cheng CS, Tsang THT, Kwok WS, et al. COVID-19 vaccination in patients with rheumatic diseases: Vaccination rates, patient perspectives, and side effects. *Immunity, Inflammation and Disease*. 2022 Mar;10(3):e589.
10. Najjar M, Albuaini S, Fadel M, Mohsen F, Data Collection Group, Najjar G, et al. Covid-19 vaccination reported side effects and hesitancy among the Syrian population: a cross-sectional study. *Ann Med*. 2023;55(2):2241351.
11. Atalar AÇ, Acarlı ANÖ, Baykan B, Martelletti P, Bolay H, Ertaş M, et al. COVID-19 vaccination-related headache showed two different clusters in the long-term course: a prospective multicenter follow-up study (COVA-Head Study). *J Headache Pain*. 2023 Sep 29;24(1):132.
12. Knudsen B, Prasad V. COVID-19 vaccine induced myocarditis in young males: A systematic review. *Eur J Clin Invest*. 2023 Apr;53(4):e13947.
13. Camacho Moll ME, Salinas Martínez AM, Tovar Cisneros B, García Onofre JI, Navarrete Floriano G, Bermúdez de León M. Extension and Severity of Self-Reported Side Effects of Seven COVID-19 Vaccines in Mexican Population. *Front Public Health*. 2022;10:834744.
14. Joyce MC, Mountjoy NJ, Johnson JA, Newman JT, Bandy DL, Atalla NA, et al. From trial to practice: incidence and severity of COVID-19 vaccine side effects in a medically at-risk and vaccine-hesitant community. *BMC Public Health*. 2022 Dec 14;22(1):2351.
15. van Sleen Y, van der Geest KSM, Buisman AM, Sandovici M, van Baarle D, Brouwer E. Humoral SARS-CoV-2 Vaccine Responses in Patients With Giant Cell Arteritis and Polymyalgia Rheumatica: Decay After Primary Vaccination and Effects of the Booster. *Arthritis Care & Research*. 2024 Jan;76(1):105–10.
16. Kuriyama K, Murakami K, Masuda T, Sugiura K, Sakui S, Schuring RP, et al. Immunogenicity and safety of a single booster dose of NVX-CoV2373 (TAK-019) in healthy Japanese adults who had previously received a primary series of COVID-19 mRNA vaccine: Primary analysis report of a phase 3 open-label trial. *Vaccine*. 2023 Jun 7;41(25):3763–71.
17. Padilla-Flores T, Sampieri A, Vaca L. Incidence and management of the main serious adverse events reported after COVID-19 vaccination. *Pharmacology Research & Perspectives*. 2024 Jun;12(3):e1224.
18. Pillay J, Gaudet L, Wingert A, Bialy L, Mackie AS, Paterson DI, et al. Incidence, risk factors, natural history, and hypothesised mechanisms of myocarditis and pericarditis following covid-19 vaccination: living evidence syntheses and review. *BMJ*. 2022 Jul 13;378:e069445.
19. Hamilton E, Oversby S, Kitchener S, Ratsch A. Post COVID-19 vaccination: AusVaxSafety survey participation and adverse events – a community-based regional Queensland study. *Australian and New Zealand Journal of Public Health*. 2022 Dec;46(6):738–44.
20. Levi Y, Brandeau ML, Shmueli E, Yamin D. Prediction and detection of side effects severity following COVID-19 and influenza vaccinations: utilizing smartwatches and smartphones. *Sci Rep*. 2024 Mar 12;14(1):6012.
21. Domen J, Abrams S, Digregorio M, Van Ngoc P, Duysburgh E, Scholtes B, et al. Predictors of moderate-to-severe side-effects following COVID-19 mRNA booster vaccination: a prospective cohort study among primary health care providers in Belgium. *BMC Infect Dis*. 2024 Oct 10;24(1):1135.
22. Newbern EC, Wildisen L, Verstraeten R, Willame C, Haynes K, Levitan B, et al. Quantitative Benefit-Risk Assessment of Vaccination Against COVID-19: A Systematic Review. *Pharmacoepidemiology and Drug Safety*. 2025 Feb;34(2):e70099.
23. Warkentin L, Zeschick N, Kühlein T, Steininger P, Überla K, Kaiser I, et al. Reactogenicity after heterologous and homologous COVID-19 prime-boost vaccination regimens: descriptive interim results of a comparative observational cohort study. *BMC Infect Dis*. 2022 May 31;22(1):504.
24. Patone M, Mei XW, Handunnetthi L, Dixon S, Zaccardi F, Shankar-Hari M, et al. Risk of Myocarditis After Sequential Doses of COVID-19 Vaccine and SARS-CoV-2 Infection by Age and Sex. *Circulation*. 2022 Sep 6;146(10):743–54.
25. Wong HL, Hu M, Zhou CK, Lloyd PC, Amend KL, Beachler DC, et al. Risk of myocarditis and pericarditis after the COVID-19 mRNA vaccination in the USA: a cohort study

- in claims databases. *Lancet*. 2022 Jun 11;399(10342):2191–9.
26. Ciapponi A, Berrueta M, Argento FJ, Ballivian J, Bardach A, Brizuela ME, et al. Safety and Effectiveness of COVID-19 Vaccines During Pregnancy: A Living Systematic Review and Meta-analysis. *Drug Saf*. 2024 Oct;47(10):991–1010.
 27. Al Khames Aga QA, Alkhaffaf WH, Hatem TH, Nassir KF, Batineh Y, Dahham AT, et al. Safety of COVID-19 vaccines. *J Med Virol*. 2021 Dec;93(12):6588–94.
 28. Karlstad Ø, Hovi P, Husby A, Härkänen T, Selmer RM, Pihlström N, et al. SARS-CoV-2 Vaccination and Myocarditis in a Nordic Cohort Study of 23 Million Residents. *JAMA Cardiol*. 2022 Jun 1;7(6):600–12.
 29. Kwon Y, Hwang I, Ko M, Kim H, Kim S, Seo SY, et al. Self-reported adverse events after 2 doses of COVID-19 vaccine in Korea. *Epidemiol Health*. 2023;45:e2023006.
 30. Janekrongtham C, Salazar M, Doung-Ngern P. Sex Differences in Serious Adverse Events Reported Following Booster Doses of COVID-19 Vaccination in Thailand: A Countrywide Nested Unmatched Case-Control Study. *Vaccines (Basel)*. 2023 Nov 28;11(12):1772.
 31. Mirnia K, Haji Esmaeil Memar E, Kamran N, Yeganedoost S, Nickhah Klashami Z, Mamishi S, et al. Short-term side effects of COVID-19 vaccines among healthcare workers: a multicenter study in Iran. *Sci Rep*. 2024 Feb 19;14(1):4086.
 32. Sharif N, Opu RR, Saha T, Khan A, Aljohani A, Alsuwat MA, et al. Side effects associated with homogenous and heterogenous doses of Oxford–AstraZeneca vaccine among adults in Bangladesh: an observational study. *Sci Rep*. 2024 Oct 11;14(1):23794.
 33. Juhel BC, Brunelle CL, Bernstein MC, Smith LH, Jung AW, Ababneh HS, et al. Side effects of COVID-19 vaccinations in patients treated for breast cancer. *Clin Exp Med*. 2023 Nov;23(7):3671–80.
 34. Roudgari H, Etemad K, Karami M, Mostafavi F, Sotoodeh Ghorbani S, Farhadi Babadi K, et al. Side effects of COVID-19 vaccines among Iranian healthcare workers: a retrospective cohort study. *J Infect Dev Ctries*. 2024 Apr 30;18(4):532–41.
 35. Sauserienė J, Serapinas D, Liseckienė I, Budrevičiūtė A, Vaičiūnienė R, Gradauskienė B, et al. The Impact of the Emotional Disposition of Healthcare Workers on the Expression of Adverse Events after Primary Vaccination against SARS-CoV-2. *Medicina (Kaunas)*. 2024 Feb 24;60(3):383.
 36. Almalki OS, Santali EY, Alhothali AA, Ewis AA, Shady A, Fathelrahman AI, et al. The role of blood groups, vaccine type and gender in predicting the severity of side effects among university students receiving COVID-19 vaccines. *BMC Infect Dis*. 2023 Jun 6;23(1):378.
 37. Ouaddouh C, Duijster JW, Lieber T, van Hunsel FP a. M. The role of co-morbidities in the development of an AEFI after COVID-19 vaccination in a large prospective cohort with patient-reported outcomes in the Netherlands. *Expert Opin Drug Saf*. 2024 Mar;23(3):323–31.
 38. Burian K, Heidler F, Frahm N, Hecker M, Langhorst SE, Mashhadiakbar P, et al. Vaccination status and self-reported side effects after SARS-CoV-2 vaccination in relation to psychological and clinical variables in patients with multiple sclerosis. *Sci Rep*. 2024 May 28;14(1):12248.
 39. Hoffman YSG, Levin Y, Palgi Y, Goodwin R, Ben-Ezra M, Greenblatt-Kimron L. Vaccine hesitancy prospectively predicts nocebo side-effects following COVID-19 vaccination. *Sci Rep*. 2022 Dec 5;12(1):20018.
 40. Bellitto C, Luxi N, Ciccimarra F, L'Abbate L, Raethke M, Van Hunsel F, et al. What is the Safety of COVID-19 Vaccines in Immunocompromised Patients? Results from the European “Covid Vaccine Monitor” Active Surveillance Study. *Drug Saf*. 2024 Oct;47(10):1011–23.

List of abbreviations:

- AI – Artificial Intelligence
 ANOVA – Analysis of Variance (statistical test)
 COVID-19 – Coronavirus Disease 2019
 GAD-7 – Generalized Anxiety Disorder-7
 IBD – Inflammatory Bowel Disease
 IRB – Institutional Review Board
 ITP – Immune Thrombocytopenic Purpura
 mRNA – Messenger Ribonucleic Acid
 OE – Observed-to-Expected ratio (used in signal detection)
 PHQ-9 – Patient Health Questionnaire-9
 SARS-CoV-2 – Severe Acute Respiratory Syndrome Coronavirus 2
 SIR – Standardized Incidence Ratio
 SJR – Scimago Journal Rank
 SLR – Systematic Literature Review
 TTS – Thrombosis with Thrombocytopenia Syndrome
 VAERS – Vaccine Adverse Event Reporting System
 WHO – World Health Organization
-

The Theoretical Foundation of Fritz Jahr's Bioethical Imperative and Asian Bioethics

- Michael Cheng-Tek Tai, Ph.D.

Chair Professor, Chung Shan Medical University, Taiwan

Email: mctaicht@gmail.com

Abstract

Fritz Jahr, a German theologian and philosopher was the first scholar that we know in human history to bring up the deliberation of an integrative "bio-ethics" in 1926. From his writings, we can see that his bioethics covers at least three areas. His main concern is always life, not only human life but all life in nature, therefore we can say his bioethics has threefold, biomedical, life in medicine, environmental, life on earth and social, living relationship among human lives. This article will first discuss the theoretical foundation of Jahr's bio-ethics and then compare it with the Asian thinking as there is much similarity.

Key words: Fritz Jahr, bioethics, Asian bioethics, bioethical principles.

A. Introduction

Medical ethics can be traced way back to the time of Hippocrates and it had remained medically centered especially about physician-patient relationship without much shifting till 20th century when bio-ethics came into being in 20th century. Albert R Jonsen stated in his influential book, the *Birth of Bioethics* (1998) that "...bioethicists appeared on the scene in the late 1960s, usually as migrants from other academic disciplines, and developed bioethics as a new way of viewing the traditional ethics associated with medicine".[1]

Jonsen himself was not a physician but a theologian and later became an important scholar in medical ethics. Abraham Flexner, a reformer of medical education in USA and Canada, changed the face of medical education through his *Flexner Report* in 1910. He was not a medical professional either. Other big names we often heard in the field of biomedical ethics, such as Daniel Callahan, Tom Beauchamp, James Childress, Robert Veatch, Hans M Sass... and even Peter Singer, who is presently

one of the most quoted hedonistic utilitarians are not medical doctors either. We can say that modern medical ethics is not a monopoly of medical professionals but rather a science where all who are interested in moral functioning of medical sciences can delve in. To be fair, I should mention that medical doctors such as Edmund Pellegrino and Tristram Engelhardt were highly respected bioethicists too.

Traditionally, we thought that the word "bioethics" was created in 1970 to expand the horizon of medical ethics to cover the rising issues related to health concerns. Van Rensselaer Potter was assumed as the first person to coin the word "bioethics" in his book *Bioethics – Bridge to the Future* published in 1971. Van Potter called it as the Science of Survival. He said: "Man's natural environment is not limitless. Education should be designed to help people understand the nature of man and his relation to the world... Man's survival may depend on ethics based on biological knowledge, hence Bioethics." [2]

The research carried out by a German bioethicist, also a Georgetown professor, Hans Martin Sass, however found that the idea of bio-ethics had been suggested as early as 1926 by a German theologian Fritz Jahr [3]. Today Van Potter and Fritz Jahr are both regarded as the pioneers of the new science called bioethics which Albert Jonsen defined as "the systematic study of the moral dimensions—including moral vision, decisions, conduct and policies--of the life sciences and health care, employing a variety of ethical methodologies in an interdisciplinary setting".[1]

The World Health Organization has defined health as "...a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" in 1946. In other words, health issues have gone beyond the scope of medical sciences and must be magnified to include other disciplines to work together in order to promote human's wellbeing.

The Fritz Jahr Documentation and Research Centre for European Bioethics has since been established in University of Rijeka, Croatia that publishes a journal bearing the name of Jahr, the European Journal of Bioethics as a recognition to his dedication to bioethics and also established an International Award given annually to a scholar

who made tremendous contribution to the promotion of bioethics through a process of nomination and selection by the five-member international board.

I was honored to be the recipient of such a privileged award in 2019, the first Asian to receive such an award. I was invited to receive the award on May 17, 2019 in Rijeka, Croatia. [4]

B. Bioethics is a relational science

Bioethics is a science of relationships, not only between human and human but also among human and their environmental and worldly interactions. Van Rensselaer Potter created and defined the term to describe a new philosophy that sought to integrate biology, ecology, medicine and human values. But bioethics, if it is about “bio”, must have a wider spectrum to include all beings co-existing with humankind on earth.

In the past, human used to regard themselves as the crown of creation standing at the center of earth with right to do whatever he likes to do to his fellow creatures. As some species disappearing from the earth and the fighting back of nature in response to human’s indiscriminating developmental exploitation of nature, human kind started waking up that they are but one of the creatures on earth and must be responsible for their activities. [5,6] Fritz Jahr’s Bioethical Imperative that says “ respect every living being on principle as an end in itself and treat it, if possible , as such” [7], becomes the foundational theory of bioethics.

Fritz Jahr called for our attention to our moral obligation and voiced his concern by giving his bioethical imperative. Bioethics should not be merely a human centered bioethics, but should ask human to be a responsible stewardship of the earth. His understanding of bioethics is that it must be holistic, integrative and cosmologically oriented. Based on this imperative, Jahr appealed: “respect every living being, including animal, as an end in itself, and treat it, if possible as such”, which he called the “bioethical imperative”. Therefore, bioethics must not be biomedical only but also social, psychological, ecological, philosophical, theological and relating to all forms of life.

C. Theoretical Foundation of Jahr’s Bioethics

1. Fritz Jahr has based his theory on these deliberations [8]:

i. Preservation of life is a moral duty which is directed to all living beings on earth.

ii. Bioethics is a foundational, cultural and moral principle and loving life as a virtue that requires new ethical and philosophical reflection.

iii. We need to build a new network to build reciprocity with all forms of life and to express compassion in the best interest of coexistence in our environment towards all beings.

iv. Bioethics is a new discipline, a principle and a virtue towards a more encompassing and accommodating integrative- content-based bioethical imperative as compassion is an empirical establishment of the human soul.

v. Bioethical imperative has to recognize, steward and cultivate natural and cultural living environments for all forms of life.

vi. Humans have a mandate to apply reason and responsibility in response to global, natural or man-made changes in protection and promotion of human loves and preservation of cosmological order.

2. Fritz Jahr’s thought reflected and re-emphasized the thought of the following great minds of the world:[8]

i. Francis of Assisi believed that nature itself was the mirror of God. He called all creatures his “brothers” and “sisters”, and supposedly persuaded a wolf in Gubbio to stop attacking some locals if they agreed to feed the wolf. His deep sense of brotherhood under God was a great inspiration to Fritz Jahr . Francis later became associated with patronage of animals and the natural environment.

ii. Schleiermacher was a German theologian and philosopher known for his attempt to reconcile the criticisms of the Enlightenment with traditional Protestant orthodoxy in 19th century. His view on the feeling of an absolute dependence earned him the title of the father of liberal theology. He was believed in saying that hurting any life formation was immoral if there was no reasonable cause to do so. The relation in the sphere of nature, either being or semblance, was the same in ethics between good and pleasure or feeling. Nature was where man met the ultimate reality with feeling and humankind must seek this

mutual dependence among things on earth.

iii. Karl Christian Friedrich Krause of the 19th century was a German philosopher whose doctrine became known as Krausism. His philosophy was known as Identitätsphilosophie (philosophy of identity). Krause endeavored to reconcile the ideas of a God known by faith or conscience and the world as known by sense. According to Krause, God - intuitively known by conscience was not a personality (which implied limitations), but an all-inclusive essence (Wesen). Krause requested a respect to every being including plants, animal and all forms of life that inspired Jahr.

iv. Schopenhauer, like Kant, argued that the phenomenal world was a representation which simplified the activity of the Kantian cognitive apparatus by holding that all cognitive activities occurred according to the principle of sufficient reason, that was, that nothing was without a reason for being. His call for a sentiment of compassion toward animals influenced Jahr's thinking.

3. If the bioethical imperative is implemented, Jahr foresaw a peaceful bioethical garden of the world where "wolves shall dwell with lambs and the leopard shall lie with the young goat and calf and lion and the fattened calf together and a little child shall lead them.. (Isaiah 11: 6)".

i. Jahr said that if we can go beyond the borders of human and sees the sanctity in the most miserable creature, we will find the sanctity in the most poor and lowest fellow human.

ii. How can we see this sanctity? It has to be based on compassion, a total kindness toward all form of life.

a. He thus proposed his bioethical imperative to " respect every living being in principle as end in itself and treat it, if possible, as such" because all plants and animal have similar rights as human.

b. Bioethical concern is not a single minded endeavor but should be extended from human to animal, from individual to society, from society to the whole environment.

c. To Jahr, bioethics is at the same time a land ethics, animal ethics, ecological ethics, plant ethics, sexual ethics, corporate ethics..... Dr. Sass wrote that in a broader perspective, Jahr's bioethics opened a wider spectrum of a global,

universal and integrated bioethics.[3]

D. Jahr's bioethical imperative coincides with Asian deliberation of bioethics that includes at least three aspects of bioethics, namely, biomedical, environmental and social

i. What is Asian bioethics ? [9][10]

Asia is not one but many. Its bioethics is found through its rich cultural past to the changing cultures of the present. The most distinguished cultures shaping Asian minds are Hinduism, Buddhism, Confucianism, Taoism, and Shintoism.

The essential emphases of this bioethics are harmonization, humanization, reconciliation, and commiseration. Humanization refers to the respect toward life. Harmonization pinpoints following the way of nature, Tao. Reconciliation is a process that aims at mending the broken relationship. Commiseration is the expression of the spirit of Bodhisattva and a teaching to have compassion on others.

ii. Cultural foundations of the Asian bioethics: [9] [10]

a. Confucianism stresses the importance of virtues and moral example - each person must cultivate his inner good for the betterment of the world through mutual respect and *Jen* (compassion...). And Fritz Jahr's Bioethical Imperative also expressed through the same principles, namely, *Jen* -- love, humanness, benevolence and *Yi* --righteousness, justice.

b. Hinduism regards dimensions of existence as correlated within the inclusive concept of *dharma* that is the duty to preserve and to guard individual and communal health. It is also a duty to rectify imbalance in the processes of interaction with nature and to correct and repair the distracted states both of human and nonhuman. Hindu's Ayurveda (the Veda on life) [11] views the person as an integrated whole and not just an aggregate of several body parts. Person is grounded in nature, diet, climate, soil, season, time and place. We must respect all life and any wicked person who kills animal has to live in the fire of hell for the days equal to the number of hairs on the body of the killed animal.

c. Taoism teaches that man should respect the flow of nature and restrict his activities to

what is necessary and what is natural. In doing so one should take simplicity as the guiding principle of life. Following what is of nature is the source of all happiness and goodness because following what is of man is the source of all pain and evil. Nature refers not only to one's inner being but also the world in which we live.

d. Shintoism has a great hint of the importance of reconciliation of relationship.[10] The goddess of Japan, Amaterasu had a wicked brother, Susannoo who always played tricks on others and the two eventually couldn't get along. Eventually Susannoo was expelled from heavenly court to the mundane world. Once touched the earth, he was confronted by an evil power of an eight-headed dragon who kept disturbing a poor farmer. Susannoo at this moment found his original good nature and determined to help this poor farmer by slaying this evil dragon from which he discovered a treasured sword that was missing from the heavenly court. Susannoo returned this treasure back to Amaterasu and the two ultimately reconciled and restored their good relationship. The three treasures in Japanese tradition are the pearl symbolizing benevolence, mirror, representing wisdom and sword, standing for courage. Thus the return of this sword embodied the restoration of a broken rapport.

iii. All these Asian teachings formulate the principles of Asian bioethics that are compassion, righteousness, respect, ahimsa and dharma (responsibility).

a. Compassion derives from all the Asian traditions. We can find the teaching of love in all of them.

b. Righteousness comes from Confucian teaching that is to do the right thing through filial piety. Shintoism's description of Susannoo's conversion also indicates the commiseration of heart to the poor farmer.

c. Respect is an application of filial piety, the foundation of family closeness in Confucianism.

d. Ahimsa is a well-known teaching of nonviolence in Hindu philosophy which regards all life as one, no distinction among human life or animal life or plant life... Life is one. Chinese Mo-tze also taught that love should be inclusive without inflicting harm on others.

e. Dharma is the core of Hindu teaching that

signifies order, custom, responsibility and virtues. [11] The virtue of the body is charity, the virtues of speech, truthfulness, and virtues of the mind, kindness and piety.

E. Three Aspects of Bioethics

When we discuss medical ethics, the traditional Hippocrates' central concern was the relationship between patients and physicians. Principles have been suggested to fortify these relationships, namely, non-maleficence and beneficence. The essential attention has been about the process of medical decision-making in clinical settings. But bioethics itself broadens this horizon. Now when we talk about bioethics, we discuss not only the physician-patients relationship and ethical concerns arising from medical dilemmas, we also expand our attention to a much wider spectrum as the ethical issues transcends medical field to include social, psychological, economical and even political issues. The complexity of the progress of medical technology has forced the onset of new bioethical concern that it becomes " an interdisciplinary subject including the study of environmental, ethical, legal and social issues by application of biology, medicine and science. Wide interdisciplinary debates is encouraged." [12]

Thus bioethics can at least covers three different aspects:

1. Biomedical ethics :

The long Hippocratic tradition has given us the medical ethics from which we lay the foundation of bioethics. As the medical progress rapidly moves forward, today's medical ethics has shifted its emphasis from patient-physician relationship to medical research and others. The normative ethics which gave us guidance of what should be done and what should not, or shall we say, the norms we used to follow are no longer regarded as morally binding unless they are enforced by law. The debates among different schools in medical ethics also deepened. The so-called principle-ism has provided us with some guidelines yet the virtuous ethics calls for action. Still, biomedical ethics with an integrative view has gradually dominated the discussion in bioethics.

In the Orient, the ancient healers of China called for a respect of life when treating patients.

Sun Ssu-miao, the father of medical ethics of China wrote Great Physician's Manual in 7th century in which he said that the first requirement of a physician was to be compassionate...[10], because human life was heavier than thousand pounds of gold... In Hindu tradition, a healer must endeavor for the relief of patients with all heart and soul and should not desert or injure patients.[11] These Oriental traditional teachings sound familiar because they are the reflection of the classical medical ethics which we are accustomed to.

2. Environmental ethics :

The impact of industrialization and the ever-growing expansion of the so-called development have much impact on us, not only we experience the pollution of the air and water, we also discover the natural resources on which we depend for our economic growth are gradually depleting. Charles Reich said in his book on "the Greening of America" that modern society makes war on nature. A competitive market uses nature as a commodity to be exploited, shifted its aim at getting profit. Technology sees nature as an element to be conquered, regulated, controlled.... [13]. The alarm has awakened some keen minds of the world who warned it is time to kindly take care of the planet in which we live. The discussion of ecological crisis become louder as the technology keeps moving forward that humans are condemned as the exploiter of nature. In order to save the earth, environmental ethics came into being.

Taoism regards flowing with nature not against it, is the key to a good health. All matters in universe works together. Yin and Yang represent all factors in universe and, the five elements on earth such as water, fire, earth, metal and wood, are echoing Fritz Jahr's Bioethical Imperative. Therefore, we must be aware that an ethics of man and for man is not enough, we must relate to all earthly and ecological factors of life in congruence. When yin and yang are harmonious, seasons will be smooth and all will be prosperous. Hindu Ayurveda also sees the person as grounded in nature, a microcosm within the macrocosm. Diet, climate, soil, season, time and places are all factors with which we have to reckon.

3. Social ethics:

Confucianism sees a harmony in social

relationship as a key to world peace starting with the cultivation of individual character, familial intimacy, social harmony and then world peace. There are five major relations in human family and each must behave according to the given roles. That is called the Rectification of Names. [10] Shintoism also sets rules for proper conduct between human social stations similar to the filial piety of Confucian teaching that there are orders within family, society and the universe. In reality, medical ethics cannot be isolated from social ethics. All the three different expressions of bioethics we mentioned in fact are inter-related and mutually enhancing. In short, the main concerns of these three aspects of bioethics can be described as follow:

1. Medical: relationship in clinical setting, clinical decision- making, biomedical research, biobanking ethics...
2. Environmental: ecological ethics, animal ethics, land ethics, man to nature...
3. Social: interpersonal relationship, human to human ethics, political ethics, economical ethics...

F. Concluding Words

We find much similarity between Jahr's bioethics and Asian teachings. In Fritz Jahr's words: " we not only have moral obligations toward fellow humans but also toward animals, even plants – in short, toward all forms of life – so that we can speak about " Bio-ethics".[14] Jahr has foreseen this holistic teaching and called for an integrative bioethics.

References

1. Jonsen A: *The Birth of Bioethics*. Oxford University Press,1998; preface
2. Potter VR: *Bioethics – Bridge to the Future*. London: Prentice Hall International, 1971; 1
3. Jahr F: *Essays in Bioethics and Ethics 1927- 1947*. In Sass HM eds. Bochum, Germany : Ruhr Universitat, 2011: 1-2
4. Jahr, *European Journal of Bioethics*. 10(19.) 2019; 259
5. Tai MC: *Harmonizing Bioethics*. Zurich: Lit Verlag, 2020; 139ff
6. Leopold A: *A Sound County Almanac*. Oxford University Press, 1966; 224-225
7. Sass HM: *Cultures in Bioethics*. Lit Verlag, 2016; 11
8. Jahr F: *Essays in Bioethics and Ethics 1927- 1947*. In Sass HM eds. Bochum, Germany : Ruhr Universitat, 2011: 1-2
9. Tai MC: *Harmonizing Bioethics*. Zurich: Lit Verlag, 2020; 95ff
10. Tai,Michael; *The Way of Asian Bioethics*. Taipei, Taiwan:

- Princeton International Publishing Co, Ltd. 2008.
11. Crawford SC: *Hindu Bioethics for the Twenty first Century*. State University of New York Press, 2003; 33
 12. Tai MC: *Harmonizing Bioethics*. Zurich: Lit Verlag, 2020; 9
 13. Chenmai Statement on Bioethics, Jan 16-19, 1997, J. Azariah, H. Azariah & D.R.J. Macer, eds.. *Bioethics in India. Proceedings of the International Bioethics Workshop in Madras*. Eubios Ethics Institute.
 14. Reich C: *The Greening of America*. New York: Randons House, 1970; 28-29
 15. Muzur A: *Fritz Jahr and the Foundations of Global Bioethics*. Lit Verlag, 2012

Ethical Integration of Artificial Intelligence in Healthcare in Low-Resource Settings

- Neebal Khaled Alkhaza'leh
 Independent Researcher based in Jordan
 She is currently pursuing a Master's degree in Biology at Al al-Bayt University
 Email: neebal.khazaleh@gmail.com

Abstract

Artificial intelligence (AI) is steadily transforming healthcare by introducing tools that support diagnosis, treatment, and clinical decisions. While most progress has occurred in high-income countries, interest in AI is growing in low-resource settings, where healthcare systems often face serious challenges—such as staff shortages, limited access to specialists, and infrastructure gaps. However, the ethical use of AI in these environments has received limited attention. Traditional ethical models may not fully reflect the cultural, economic, and structural realities of these regions. This is a conceptual analysis based on literature review and ethical theory. It aims to explore how ethical values can be applied in healthcare systems that are under-resourced and socially complex.

Keywords: *artificial intelligence, ethics, healthcare, low-resource settings, algorithmic bias*

Introduction

Artificial intelligence (AI) is becoming increasingly present in global healthcare, especially in high-income countries. It is used to support doctors in diagnosing conditions, creating treatment plans, and making decisions.

These technologies offer new possibilities to improve the quality and reach of medical services (Rajkomar, Dean, & Kohane, 2019).

In many low-resource healthcare environments, where clinics are often understaffed and under-equipped, AI is seen as a tool that could help fill critical gaps. However, these same environments are usually not well prepared to handle the ethical concerns that come with AI systems. Digital tools are being introduced into systems that may not have strong policies around privacy, fairness, or community inclusion (Vayena et al., 2018).

This paper was inspired by observing how AI is being introduced into such contexts. It aims to explore how ethical values can be applied in healthcare systems that are under-resourced and socially complex. Many ethical models used today were developed in high-income regions, and they do not always match the cultural or economic conditions elsewhere. Using a conceptual analysis approach, this paper reviews literature and ethical theory to highlight what a more inclusive and locally-sensitive framework might look like.

At the same time, the growing interest in AI across low-resource regions highlights a tension between innovation and preparedness. Although many governments and institutions are eager to modernize their health systems, the ethical readiness of these systems often lags behind (Mittelstadt, 2019). Existing frameworks may offer broad guidance, but they rarely account for the flexible and sometimes unpredictable realities that healthcare workers and patients face daily. This disconnect raises concerns about equity, safety, and the actual capacity to implement ethical standards on the ground.

This discussion is especially urgent in light of the speed at which AI is advancing. In many cases, health systems are adopting these tools without a full understanding of their implications, driven by pressure to modernize. But ethical capacity building should move in parallel with technological adoption. Otherwise, the gap between what AI can do and what communities are prepared to handle will only grow wider.

Ethical Challenges in Low-Resource Healthcare Environments

AI systems often reflect the values and data of the environments in which they were built. A major ethical issue is algorithmic bias. (Char, Shah, & Magnus, 2018). Many tools are trained on data from wealthier populations, which means their predictions may not work well for different groups. For example, an AI trained on skin cancer images from lighter-skinned patients may miss symptoms in darker skin tones.

Another issue is privacy. Many low-resource regions do not have strong laws to protect personal health data. Patients may not be informed about how their data is collected, stored, or used. This lack of transparency can make it harder to build trust, especially in areas where healthcare systems already face skepticism.

Also, AI systems are sometimes seen as “black boxes” because it’s hard to explain how they make decisions. In places where digital literacy is low, this can make people hesitant to accept or rely on AI recommendations.

Cultural Sensitivity and Local Ethical Norms

Ethics is not one-size-fits-all. For example, the idea of autonomy is central to some popular Western models, and it emphasizes that each person makes decisions for themselves. But in many cultures, decisions are made collectively, especially within families. If we apply only one version of autonomy, we may ignore how people actually make choices in their own context.

Many global ethical guidelines are written with good intentions, but they are often too general. In some communities, people may be uncomfortable with technology, or may not fully understand their rights around data. When people feel excluded from these systems, even the best-designed tools can fail.

For ethical AI to work, we need more than just high-level values. We need community involvement at every stage—from design to implementation. Ethical planning must begin with listening to people and understanding their values, concerns, and expectations.

Cultural sensitivity also means recognizing how communication, authority, and trust operate differently across communities. In some places, patients may not feel comfortable asking questions or challenging medical advice. A model

that assumes verbal consent or active participation can be misleading in such contexts. Without adjusting for these differences, even well-intended practices like informed consent risk becoming symbolic rather than truly empowering.

Toward a Contextual Ethical Framework

Moreover, ethical principles should not remain static once defined. As AI tools are deployed, these frameworks must be tested, adjusted, and refined through lived experience (Mittelstadt, 2019). To apply AI ethically in healthcare, we need a flexible framework that reflects the real-world situations people face. This paper suggests four principles that could form the basis for more grounded ethical AI:

Justice: AI should reduce—not increase—inequalities in health access.

Beneficence: AI systems should aim to improve health outcomes while avoiding foreseeable harm.

Respect for Autonomy: Understand how different cultures define and practice autonomy.

Participation: Involve community members in AI decisions that affect their lives.

These principles should not be treated as checkboxes. Instead, they must be adapted for each setting and applied through meaningful deliberation and balancing. Flexibility in design is not enough—it must be followed by flexibility in evaluation. Feedback from users, especially those on the front lines of care, is essential for making ethical principles meaningful in real-world settings.

Lastly, ethical frameworks must be designed not just for governments and institutions, but for everyday users. Nurses, technicians, and community health workers are often the first to encounter AI tools in practice. Including their voices in ethical evaluation is critical to ensuring relevance and sustainability over time.

Practical Applications and Limitations

Some AI systems are already being used in lower-income regions. For example, algorithms are being tested to help detect tuberculosis from chest X-rays, or to identify cervical cancer from visual inspection images. These tools are useful because they allow health workers to make faster decisions with limited resources.

But implementation is still difficult. Internet access may be unreliable, and electricity may not be consistent. AI systems that depend on cloud services may fail in rural areas.

Even when the infrastructure exists, usability challenges can persist. Interfaces may not be available in local languages, or may assume certain levels of literacy and digital familiarity. This creates another layer of exclusion, particularly for rural or older populations who may already face barriers to accessing healthcare. Moreover, many AI tools were developed in very different health systems, which makes them harder to adapt.

A good path forward is to build tools that are designed locally—using local data, addressing local needs, and involving local professionals (Morley et al., 2020). Also, clear policies should exist to protect patient rights and ensure accountability. Ethical use of AI is not only about what the system does, but also how it is introduced, monitored, and maintained.

Another important factor is local ownership. Technologies introduced without local leadership often lack sustainability. Ethical AI should be developed in ways that empower healthcare providers on the ground, not just external developers. This shift in focus helps ensure systems are not only technically functional, but also socially and ethically grounded.

Additionally, one challenge that often goes unnoticed is the gap between technical deployment and local adaptation. An AI tool may be functional in theory but still fail to meet clinical needs if it is not properly integrated into existing workflows. Lack of training for healthcare workers, or resistance due to uncertainty, can reduce its impact significantly.

Ethics in practice also includes making sure users are supported—not just through manuals, but through ongoing dialogue, training, and responsiveness to their concerns. Without this, even the best-designed tools may not gain acceptance on the ground.

Conclusions and Future Directions

The use of AI in healthcare systems with limited resources presents both real opportunities and serious risks. A “one-size-fits-all” approach will not work. Ethical frameworks must be flexible,

locally informed, and shaped with the communities they serve.

The next step should be designing systems together with the people who will use them. Participatory design builds trust, improves relevance, and increases the chances of success. We also need to strengthen the structures that oversee AI use—so that when problems arise, they can be addressed fairly and quickly.

If we want AI to truly support global health, we must treat ethics as something active and ongoing—not just a list of principles, but a set of shared responsibilities.

In addition to inclusive design and participatory ethics, there must be continued evaluation of how AI systems perform in these environments over time. Ethical alignment is not a one-time achievement, but an ongoing process that requires feedback loops, transparent updates, and mechanisms for community input.

Furthermore, as AI becomes more embedded in health systems, attention should be given to how it changes the role of healthcare workers, not just patients. Ethical frameworks must also consider the lived experience of the staff who interact with these technologies daily.

References

- Char, D. S., Shah, N. H., & Magnus, D. (2018). Implementing Machine Learning in Health Care — Addressing Ethical Challenges. *The New England Journal of Medicine*, 378(11), 981–983. <https://doi.org/10.1056/NEJMp1714229>
- Elish, M. C., & Boyd, D. (2018). Situating methods in the magic of Big Data and AI. *Communication Monographs*, 85(1), 57–78. <https://doi.org/10.1080/03637751.2017.1375130>
- London, A. J. (2019). Artificial intelligence and black-box medical decisions: Accuracy versus explainability. *Hastings Center Report*, 49(1), 15–21. <https://doi.org/10.1002/hast.973>
- Mittelstadt, B. D. (2019). Principles alone cannot guarantee ethical AI. *Nature Machine Intelligence*, 1(11), 501–507. <https://doi.org/10.1038/s42256-019-0114-4>
- Morley, J., Floridi, L., Kinsey, L., & Elhalal, A. (2020). From what to how: An initial review of publicly available AI ethics tools, methods, and research to translate principles into practices. *Science and Engineering Ethics*, 26, 2141–2168. <https://doi.org/10.1007/s11948-020-00206-5>
- Rajkumar, A., Dean, J., & Kohane, I. (2019). Machine learning in medicine. *New England Journal of Medicine*, 380(14), 1347–1358. <https://doi.org/10.1056/NEJMra1814259>

- Suresh, H., & Guttag, J. V. (2019). A framework for understanding unintended consequences of machine learning. arXiv preprint arXiv:1901.10002. <https://arxiv.org/abs/1901.10002>
- Vayena, E., Blasimme, A., & Cohen, I. G. (2018). Machine learning in medicine: Addressing ethical challenges. PLoS Medicine, 15(11), e1002689. <https://doi.org/10.1371/journal.pmed.1002689>

Integrating Indigenous Knowledge and Ethical AI to Promote Social Sustainability among Indigenous Communities in Peninsular Malaysia

- Yew Wong Chin, Ph.D.

Faculty of Social Science and Humanities, Tunku Abdul Rahman University of Management and Technology, Malaysia;

Professor of Medical Anthropology, American University of Sovereign Nations, USA

Email: yewwc@tarc.edu.my

Abstract

Collaborative efforts to empower indigenous peoples and defend their rights are critical, as outlined in the 2030 Sustainable Development Agenda. This study proposes combining Peninsular Malaysia's Orang Asli indigenous knowledge systems with artificial intelligence (AI) to address difficult societal concerns. The resulting Indigenous Knowledge-Ethical AI Co-Design Framework takes advantage of the synergies between traditional wisdom and technology to achieve social sustainability and cultural preservation. A critical feedback loop enables the community to "ground-truth" AI judgements, ensuring that technology remains a vehicle of empowerment rather than cultural destruction. Within this loop, the Orang Asli "Council of Elders" is the ultimate authority, checking AI outputs for cultural accuracy and taboos. This mechanism supports Indigenous Data Sovereignty by guaranteeing that the AI's final results are culturally valid. By maintaining community control, the framework reinforces the social fabric and guarantees that technical growth is respectful, inclusive, and effective.

Keywords: *Indigenous knowledge, artificial intelligence, social sustainability, Orang Asli, Peninsular Malaysia*

Introduction

The development of artificial intelligence (AI), which provides innovative solutions where traditional ones fall short, presents Indigenous people worldwide with a challenging but immensely exciting future in their ongoing efforts to preserve, revitalise, and transfer traditional knowledge. AI has the potential to both speed up sustainable development and offer fresh approaches to mitigate the risks brought on by the loss of traditional expertise. Among other things, AI methods may simulate climate patterns impacting ancestral lands, digitise endangered languages, and transcribe oral traditions (Kasosi, 2025).

Contextualising indigenous empowerment and sustainable development necessitates recognising that indigenous peoples are not passive beneficiaries of charity, but rather active participants in their own development (Kessler, 2005). To address the complex socioeconomic challenges they face, a fundamental shift towards collaborative and inclusive approaches is essential, with indigenous knowledge systems and voices influencing decision-making when AI technology is used. By respecting their rights, traditional knowledge, and self-determination, such collaborative efforts not only follow the spirit of the 2030 Agenda for Sustainable Development, but also ensure that solutions are culturally relevant, effective, and sustainable. This inclusive engagement model, led by indigenous communities, is crucial to establishing true empowerment and achieving long-term social, economic, and environmental well-being (Bawack et al., 2025).

To promote the 2030 Agenda for Sustainable Development, particularly the goal of leaving no one behind, a crucial approach for Peninsular Malaysia's Orang Asli communities involves the strategic integration of their traditional indigenous knowledge with AI technology (Hassan et al., 2023). This multidisciplinary approach seeks to promote social sustainability by tackling crucial concerns such as gender

empowerment, healthcare, and education in these communities. By leveraging the synergies between traditional wisdom and AI-driven solutions, it is possible to create collaborative and inclusive decision-making processes, preserving the Orang Asli's rich cultural heritage while promoting their socioeconomic well-being in an effective and culturally sensitive manner (Abas et al., 2022).

In Malaysia, the Orang Asli, or indigenous groups in Peninsular Malaysia, use their ecological knowledge to inform long-term AI practices that take into account environmental interconnections (Ramalingam et al., 2025). Artificial intelligence (AI) has brought both new opportunities and challenges for indigenous cultures in the current digital era. In addition to mapping ancestral lands and interpreting their mother tongues, AI can help Orang Asli communities preserve traditional knowledge in more secure and easily accessible formats (Renganathan, 2024). It also has the potential to become a tool that marginalises Orang Asli communities if it is developed without understanding or respecting indigenous rights, such as data sovereignty, making sure AI doesn't take or imitate traditional knowledge without permission, prior notice, freedom, and transparency, and creating AI applications that are friendly to the language, culture, and context of indigenous peoples' lives (Bawack et al., 2025).

Objectives of the Study

Despite accounting for a small proportion of the total population, Peninsular Malaysia's indigenous Orang Asli groups are among the most economically disadvantaged segments of society (Hassan et al., 2023), with poverty rates as high as 89% in some evaluations (JAKOA, 2021). Indigenous peoples make up only around 6% of the worldwide population, yet they account for roughly 19% of the world's severe poor (World Bank, 2025). These communities are crucial to the Earth's sustainable growth, particularly for ecosystem preservation and biodiversity. The majority of Orang Asli live in biodiversity-rich areas, therefore their generational traditional knowledge has greatly helped to the preservation of these ecosystems (Abas et al., 2022). However, the indigenous traditional knowledge is vulnerable to degradation over time due to the

fact that it is often handwritten and spoken. Therefore, this study's goal is to define social sustainability in relation to Peninsular Malaysia's Orang Asli environmental monitoring. The study also looks at how the typical ethical AI principles of accountability, transparency, and fairness might be adjusted for indigenous cultures (for example, free, prior, and informed consent). In order to attain social sustainability, the article concludes by offering a conceptual framework for combining traditional ecological knowledge from the Orang Asli with ethical AI.

Literature Review

Orang Asli Indigenous Knowledge

Siyanbola et al. (2012) define Indigenous Knowledge as the wisdom, knowledge, and teachings of particular territorial, indigenous, or neighbourhood groups, as well as their long-standing rituals and practices. Indigenous knowledge of the Orang Asli in Peninsular Malaysia is the whole of the knowledge, customs, and beliefs that the Orang Asli have accumulated through interactions with their surroundings. This knowledge is comprehensive, encompassing an understanding of the interconnectedness of all elements in the environment, including land, water, plants, animals, and humans (Leveridge, 2024). Indigenous knowledge is often recognised as indigenous people groups' traditional wisdom (Nakata et al., 2005), and it is transmitted orally from generation to generation (Anyaku, Nwafor-Orizu, & Eneh, 2015).

As will be discussed below, earlier studies have shown the value of Orang Asli indigenous knowledge and its sustainability in traditional medicine and environmental preservation.

1. Orang Asli Indigenous Knowledge and the Sustainability of Traditional Medicine

Since their arrival on the Malay Peninsula, the Orang Asli have been able to identify natural plants and animals. While their forefathers spiritualised nature, they carefully monitored and preserved the forest where they lived. In other words, Orang Asli traditional knowledge and practices evolved as a result of their predecessors' intimate relationship with nature (Lye, 2004). They also believe in spirits and supernatural beings living in the woods. That is why, according

to Orang Asli pantang-larang (taboo), it is illegal to takbur (boast), injure, or ruin the natural ecosystem (Yew et al., 2017).

According to Yew et al. (2017) and Lambin et al. (2019), traditional medicine utilised by Orang Asli communities may contribute to their environmental sustainability because it is produced naturally by the Orang Asli. The medicinal plants were hand-picked with minimal environmental impact and no extra chemicals. The Orang Asli of Kampung Chuweh 2, Perak, Malaysia, continue to rely on native plants for their primary medicinal needs (Yew et al., 2017). The preservation of traditional methods of manufacturing herbal medicine is considered as a commitment to the well-being of indigenous people. To fight against bad omens, Orang Asli use traditional medicine alongside spiritual practices. They believed that their ailment was the result of divine punishment or karma for their misbehaviour.

In Peninsular Malaysia, the Orang Asli indigenous knowledge systems - which include cosmological beliefs, folklore, and cultural taboos - have been used to safeguard the tropical forests that are home to most indigenous communities, especially those with abundant biodiversity, such as the Royal Belum Forest Reserve in northern West Malaysia (Yayasan Sime Darby, 2022). The Jahai and Temiar tribes genuinely think that nature gods and spirits, such as Moyang Tapern and Tok Samin, live in forests where everything around them possesses supernatural abilities (Isa and Saidin, 2014).

2. Indigenous Knowledge of the Orang Asli and Sustainable Environmental Preservation

Southeast Asia is home to approximately one-fifth of the world's remaining tropical forests, and at least 36% of the world's intact forests are found on indigenous territories, which have been recognised for their relevance in environmental protection (Butler, 2021). According to Fa et al. (2020), Molnár and Babai (2021), and Jessen et al. (2022), indigenous tribes have a long history of resource use and knowledge, which is incorporated into the cultural context. They were able to sustain the forest's and its people's resilience because of their indigenous knowledge of the forest, the value of the forestland to their

culture, and their desire for a healthy forest for their community well-being.

In Peninsular Malaysia, Orang Asli Indigenous Knowledge (IK) was integrally tied to biodiversity protection via practices that were both naturally sustainable and adapted to particular ecosystems. Lambin et al. (2019) coined the phrase Indigenous Knowledge and Practice of Green Technology (IKPGT) to describe Orang Asli traditional knowledge and practices that are ecologically beneficial. The term "green technology" refers to natural resources, tools, products, and processes used by Orang Asli that have a low environmental impact. Furthermore, using green technology demonstrates the user's desire to preserve and conserve a sustainable natural environment (Ramle et al., 2014).

Orang Asli groups are prohibited from hunting and killing animals for purposes other than food, in addition to protecting the forest. This is because to their conviction that consuming and killing particular animals may result in sickness and bad karma. Elephants and tigers, for example, are considered prohibited animals by the Temiar and Jahai tribes and should not be killed for food (Benjamin, 2014; Loke et al., 2020).

Ethical AI

The first global AI ethics guideline, the "Recommendation on the Ethics of Artificial Intelligence," was published by UNESCO in November 2021. All 194 of UNESCO's member countries are covered by it. The defence of human rights and dignity, which is based on the advancement of fundamental principles like justice and transparency while never undervaluing the importance of human oversight of AI systems, is the basis of the recommendation (UNESCO, 2021).

Ethical AI is the development and deployment of artificial intelligence systems that emphasise fairness, transparency, accountability, and human values (Radanliev, 2025). The Orang Asli of Peninsular Malaysia's woods are increasingly marginalised, suffering from famine and a lack of access to basic utilities as a result of repeated violations of their land rights by mining, forestry, and cash crop planting. The subject of Orang Asli Indigenous Knowledge (IK) and Ethical AI is growing, and while dedicated, fully realised AI

systems created with the Orang Asli are still rare, the primary case studies focus on the ethical issues of data extraction and the need for data sovereignty.

Medicinal Plant Knowledge and Data Sovereignty is a real-world case study scenario that exemplifies the current state of situation and ethical issues. The intentional documentation of Orang Asli's Traditional Ecological Knowledge (TEK) using AI is a powerful mean of cultural preservation, but it raises important ethical concerns about Indigenous Data Sovereignty (IDS). According to Bawak et al. (2025), training AI models on medicinal plant data without community-led governance risks encouraging "digital colonialism" - the unauthorised extraction and commercialisation of ancestral wisdom for external profit. To prevent such exploitation, frameworks such as the CARE Principles (Collective Benefit, Authority to Control, Responsibility, and Ethics) are critical for ensuring that technological integration respects Free, Prior, and Informed Consent (FPIC) and provides equitable benefit-sharing for the Orang Asli.

Malaysian AI Governance and Ethics Guidelines - Applicability to Orang Asli Communities

Malaysia's National Guidelines on AI Governance & Ethics (AIGE) contain themes like inclusion and highlight the value of local and indigenous knowledge. Specific, fully documented, and publicly available real-world case studies demonstrating the implementation of these AI guidelines to an Orang Asli community project are still being developed. The concerns largely exist as ethical dilemmas around data sovereignty and the digital divide.

The following discussions present two key ethical dilemmas as case studies, illustrating real-world concerns now being explored in Malaysia:

Case Study 1: Traditional Ecological Knowledge (TEK) and AI-Powered Mapping

While the integration of AI-powered satellite imagery and drone footage offers a precise method for documenting Orang Asli forest territories, it carries the inherent risk of "technological dispossession." These algorithms frequently overlook the complex, unwritten

Traditional Ecological Knowledge (TEK) that establishes customary boundaries and sacred locations when they are trained on state-centric or colonial land-ownership information. Because AI models may classify culturally significant regions as "unutilised" or simply "resource-rich" zones for extraction, this misalignment may result in the "digital erasure" of indigenous rights (Bawack et al., 2025). AI risk-mapping may unintentionally justify environmental damage and land encroachment in the absence of a participative framework that prioritises indigenous sovereignty (Radjawali & Pye, 2017).

Case Study 2: Language Preservation AI and Cultural Bias

The creation of Large Language Models (LLMs) for endangered languages such as Temiar is a critical step toward digital inclusion, but it also risks imposing a "linguistic standardisation" that undermines cultural authenticity. When AI models are trained using limited historical or academic information, they frequently fail to grasp the living, diverse dialects spoken by various indigenous subgroups. This creates an algorithmic bias in which a single standardised version is elevated as the "correct" language, perhaps pushing future generations to forgo the rich diversity of their local speech (Bawack et al., 2025). To reduce these dangers, AI preservation must be community-driven, ensuring that the technology reflects the dynamic and varied nature of the language rather than a sanitised digital imitation (Whaanga et al., 2020).

Social Sustainability

The integration of Orang Asli knowledge with ethical AI is critical to ensuring that technology advancement empowers rather than marginalises indigenous populations. This synergy is a significant factor in determining whether AI protects cultural integrity or exacerbates social disparities. By focusing on community agency, ethical frameworks transform technology into a tool for empowerment and generational equity (Abas et al., 2025). Indigenous Data Sovereignty (IDS) lies at the heart of this, requiring the Orang Asli to maintain control over their traditional wisdom. Upholding Free, Prior, and Informed Consent (FPIC) is a pillar of sustainability that

protects against "data colonialism" or unauthorised value extraction. Ultimately, real sustainability necessitates community-led governance, with the Orang Asli remaining the principal guardians of their data and future applications (Bawack et al., 2025).

Methodology

This study applies the conceptual analysis and critical review methodology. The objective is to critically examine and review established theoretical frameworks, ethical principles, and existing research findings regarding the mixed components of Indigenous Knowledge (IK), Artificial Intelligence (AI) ethics, and Social Sustainability, with a focus on the Orang Asli context in Peninsular Malaysia.

Conceptual Framework

The Indigenous Knowledge-Ethical AI Co-Design Framework for Orang Asli Social Sustainability (IE-OASS) is the name of the conceptual framework. It illustrates the fundamental feedback loop and causal relationships between three important components:

1. Orang Asli Indigenous Knowledge (IK) Systems
2. Ethical AI principles and governance.
3. Social Sustainability Results for Orang Asli

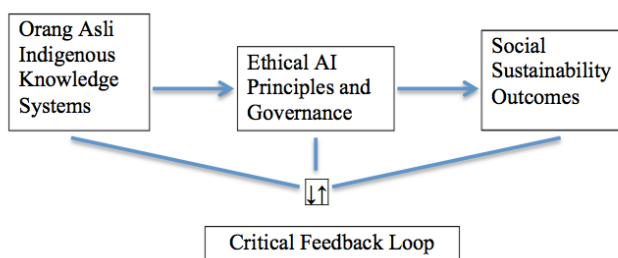


Figure 1: The Indigenous Knowledge-Ethical AI Co-Design Framework for Orang Asli Social Sustainability

The IE-OASS Conceptual Framework (Figure 1) is designed to demonstrate how Ethical AI serves as a facilitator for Orang Asli Indigenous Knowledge (IK), directly contributing to measurable Social Sustainability Outcomes via a Co-Design approach.

The Orang Asli Indigenous Knowledge (IK) Systems serve as the basic input, providing the culturally relevant data and logic required to train and instruct AI models. Traditional ecological knowledge (TEK), ethnomedicine, language and oral history, and sustainable resource management are among the key domains. The concept is that IK is an asset.

Ethical AI Principles and Governance serves as a facilitator. It is guided by fundamental pillars such as Indigenous Data Sovereignty (IDS) and Free, Prior, and Informed Consent (FPIC), as well as operational values like Fairness, Transparency, Accountability, and Inclusiveness. Tools defined by these principles broaden the scope and application of IK to complicated issues. For example, using TEK indications, IK may create an AI-based early warning system for forest degradation.

Social Sustainability Outcomes are the goals and dependent variables. They are the measurable outcomes obtained through the ethical use of IK via AI, resulting in improved socioeconomic indices. Outcomes include cultural preservation (e.g., AI for language documentation), health quality, economic diversification, and improved governance and self-determination.

The entire conceptual framework is based on a Co-Design and Partnership approach, implying a vital feedback loop in which outcomes and experiences educate and enhance IK systems as well as Ethical AI governance itself.

Discussion

The paper's discussion focuses on meticulously identifying how a conceptual framework might be utilized to use AI to address the specific social challenges of land claims and culturally sensitive education that the Orang Asli face. First, the paper describes the framework as a straightforward input-process-output system with a feedback loop. Next, move on to the specific challenges. The traditional knowledge of the Orang Asli will be used to address the first challenge, which is resource mapping and land claims. The key aspect of this issue is to determine how ethical AI analyses this data while keeping data sovereignty. For culturally sensitive education, AI processes oral histories and language appropriately. The overall discussion of the two challenges

acknowledges the core diagram and the importance of Indigenous knowledge. The feedback loop ensures that knowledge benefits the community.

The conceptual framework in Figure 1 depicts a cyclical process for ethically integrating AI into Orang Asli communities while prioritising Indigenous sovereignty. The approach starts with the Input phase, which only uses Orang Asli Indigenous Knowledge (IK)—such as oral histories and ecological maps—rather than biased external datasets, to ensure that the system reflects the community's fundamental viewpoint. This sensitive data is managed in the Process phase using Ethical AI Principles and Governance, with Indigenous Data Sovereignty protocols used to prevent exploitation. Instead of focusing solely on technology growth, the framework seeks practical Social Sustainability Outcomes such as legal resource mapping and culturally appropriate education. Importantly, a Critical Feedback Loop validates the entire system, allowing the community to actively monitor and "ground-truth" the AI's decisions. This guarantees that technology serves as a submissive instrument for empowerment, strengthening rather than weakening the Orang Asli social and cultural fabric.

Challenge 1: AI for IK-Driven Resource Mapping (Land Claims)

Applying the conceptual framework to the key problem of land rights, Figure 1 shows how AI might help Orang Asli territorial claims. The method starts with verifying the community's deep mental maps - such as ancestral cemeteries and foraging routes - as the primary data source, rather than depending exclusively on external geography. This sensitive Indigenous information passes via an Ethical AI Governance layer, which uses Indigenous Data Sovereignty to translate oral spatial information into legally recognised GIS formats while rigorously protecting sacred site locations from public access. The objective is to attain Territorial Security, which means securing legal tenure that protects both the community's economic viability and the local environment. Crucially, a Critical Feedback Loop serves as a safety valve, allowing the community to correct any AI misinterpretations of boundaries. This

technique prevents "digital dispossession," ensuring that final maps accurately reflect customary land use before becoming legally binding.

Challenge 2: AI for Culturally Sensitive Education
To address Orang Asli children's alienation from standardised schooling, the framework incorporates their individual languages (e.g., Semai, Temiar) and instructional practices, such as storytelling, as foundational input. This cultural context is processed using Ethical AI Principles and Governance, which adjusts biases in regular Large Language Models (LLMs) by training them on Indigenous datasets. This governance guarantees that teaching instruments adhere to cultural rules, prohibiting the misuse of folklore or the telling of taboo stories out of season. The outcome is Cultural Continuity and Inclusive Education, where dropout rates are decreased by using AI to support a curriculum that connects traditional identity with contemporary abilities. Finally, a Critical Feedback Loop serves as a quality control mechanism; elders and educators operate as the "human-in-the-loop" to fix linguistic faults or inappropriate content, ensuring the technology strengthens the community rather than contributing to cultural degradation.

Conclusion

In conclusion, the conceptual framework implies that AI cannot be "applied" to Orang Asli problems in order to solve them. It must start with their knowledge, pass through a filter of ethical governance (managed by or with them), and be receptive to their critical input in order to ensure that it results in true social sustainability. Indigenous knowledge about Orang Asli native lands, traditional remedies, or legendary stories is the tribe's intellectual property, and Indigenous Data Sovereignty explicitly serves as a governing principle. The AI system is merely a "steward" or temporary processor of that data. The most crucial element for power shifting is the "Critical Feedback Loop" at the bottom of the conceptual framework. The Feedback Loop enforces the rules, while the Ethical AI establishes them. For example, AI systems, especially those processing satellite data for Orang Asli land claims, often

make errors based on "outsider logic." The feedback loop forces the AI's output to be verified by the community before it is finalized. Regarding cultural accuracy and taboos, the Orang Asli community's "Council of Elders" serves as the ultimate authority in order to efficiently oversee the "Critical Feedback Loop" and uphold Indigenous Data Sovereignty.

References

- Abas, A., Aziz, A., & Awang, A. (2022). A systematic review on the local wisdom of indigenous people in nature conservation. *Sustainability*, 14(6), 3415.
- Anyaku, E. N., Nwafor-Orizu, O. E., & Eneh, E. A. (2015). Collection and preservation of traditional medical knowledge: Roles for medical libraries in Nigeria. *Journal of Library and Information Sciences*, 3(1), 33-43.
- Bansal, S., Sarker, T., Gupta, M., Sarvaiya, H., Yadav, A., & Garg, I. (2023). Indigenous communities and sustainable development: A review and research agenda. *Global Business and Organizational Excellence*, 65-87.
- Bawack, R., Roderick, S., Badhrus, A., Dennehy, D., & Corbett, J. (2025). Indigenous knowledge and information technology for sustainable development. *Information Technology for Development*, 31(2).
- Benjamin, S. (2014). *Temiar religion 1964-2012: Enchantment, disenchantment and re-enchantment in Malaysia's uplands*. NUS Press.
- Butler, R. A. (2021). *Climate efforts won't succeed without secure community rights, says Nonette Royo*. Menlo Park, CA: Mongabay.
- Department of Orang Asli Development. (2023). Retrieved from: <https://www.jakoa.gov.my/>
- Department of Statistics Malaysia. (2023). Retrieved from: <https://www.dosm.gov.my/portal-main/release-content/current-population-estimates-malaysia---2023>
- Fa, J. E., Watson, J. E., Leiper, I., Potapov, P., Evans, T. D., Burgess, N. D., et al. (2020). Importance of Indigenous Peoples' lands for the conservation of Intact Forest Landscapes. *Front. Ecol. Environ.* 18, 135-140.
- Hassan, M. S., Nordin, R., Mohd Zahir, M. Z., & Ab Rahman, N. H. (2023). Comparative frameworks of Orang Asli decision-making process and the Māori of New Zealand on Sustainable Development Goal. *Journal of Sustainability Science and Management*, 18(1), 22-38.
- Isa, H. M., & Saidin, M. (2014). *Sustainable hunters and gatherers in Belum-Temenggor tropical rainforest*. Proceedings of the 7th International Seminar on ecology, human habitat, and environmental change in the Malay world, Indonesia. Retrieved from: <https://repository.unri.ac.id/xmlui/bitstream/handle/123456789/8754/Hamid%20Mohd%20Isa%20%26%20Mokhtar%20Saidin.pdf?sequence=1&isAllowed=y>
- Jessen, T. D., Ban, N. C., Claxton, N. X., and Darimont, C. T. (2022). Contributions of Indigenous Knowledge to ecological and evolutionary understanding. *Front. Ecol. Environ.* 20, 93-101.
- Kasosi, L. (2025). Indigenous Peoples and AI: Defending rights, shaping the future of technology. *Cultural Survival*. Retrieved from <https://www.culturalsurvival.org/news/indigenous-peoples-and-ai-defending-rights-shaping-future-technology>
- Kessler, R. (2005). Sustainable Development: Empowering Indigenous Peoples. *Environmental Health Perspectives*, 113(9), A588.
- Lambin, R., Wahab, N. A., Choo, G. S., Mustapha, R., Abdullah, R., & Sharif, R.M. (2019). Sustainability of Orang Asli Indigenous Knowledge and Practices of Green Technology in Medicine. *Journal of Asian Vocational Education and Training*, 12, 74-89.
- Leveridge, A. N. (2024). Indigenous knowledge systems and their role in communication. In *Communication strategies: Effective practices for natural resources professionals*. Retrieved from <https://pressbooks.bccampus.ca/communicationstrategies/>
- Loke, V. P., Lim, T., & Campos-Arceiz, A. (2020). Hunting practices of the Jahai indigenous community in northern peninsular Malaysia. *Global Ecology and Conservation*, 21, e00815.
- Lye, T. K. (2004). *Changing Pathways: Forest Resettlement and the Batek of Pahang, Malaysia*. Lexington Books, Maryland USA.
- Molnár, Z., and Babai, D. (2021). Inviting ecologists to delve deeper into traditional ecological knowledge. *Trends Ecol. Evol.* 36, 679-690.
- Nakata, M., Byrne, A., Nakata, V., & Gardiner, G. (2005). Indigenous Knowledge, The Library And Information Service Sector, And Protocols. *Australian Academic & Research Libraries*, 36(2), 7-21.
- Ntoko, V. N., & Schmidt, M. (2021). Indigenous knowledge systems and biodiversity conservation on Mount Cameroon. *For Trees Livelihoods*, 30(4), 227-241.
- Radanliev, P. (2025). AI Ethics: Integrating Transparency, Fairness, and Privacy in AI Development. *Applied Artificial Intelligence*, 39(1).
- Radanliev, P. (2025). AI Ethics: Integrating Transparency, Fairness, and Privacy in AI Development. *Applied Artificial Intelligence*, 39(1).
- Radjawali, I., & Pye, O. (2017). Drones for justice: Inclusive technology and river-related action research along the Kapuas. *Geographica Helvetica*, 72(1), 17-27.
- Ramle, A., Greg, A., Nur Hafizah, R., & Mohd Sukhairi, M.R. (2014). Forest significance and conservation among the Semaq Beri tribe of Orang Asli in Terengganu state, Malaysia. *Aust. J. Basic & Appl. Sci.* 8(87), 386-395.
- Renganathan, S. (2024). Digital preservation of language, cultural knowledge and traditions of the indigenous Semai. *KMAN Publication Inc: AI and Tech in Behavioral and Social Sciences*, 2(4), 11-18.
- Siyanbola, W. O., Egbetokun, A. A., Oluseyi, I., Olamide, O. O., Aderemi, H. O., & Sanni, M. (2012). Indigenous Technologies And Innovation In Nigeria : Opportunities

- For SMEs. *American Journal of Industrial and Business Management*, 2(2), 64.
- UNESCO. (2021). Artificial Intelligence & Emerging Technologies. Accessed from: <https://www.unesco.org/en/artificial-intelligence/recommendation-ethics>
- Whaanga, H., et al. (2020). *Indigenous protocol and artificial intelligence position paper*. Concordia University Library. <https://doi.org/10.11573/SPECTRUM.LIBRARY.CONCORDIA.CA.00986506>
- World Bank. (2025). *Indigenous Peoples Overview*. World Bank Group. <https://www.worldbank.org/en/topic/indigenouspeoples>
- Yayasan Sime Darby. (2022). *Anti-poaching efforts in the Royal Belum State Park – Interview with Hadi, Orang Asli ranger*. Retrieved from: <http://www.yayasansimedarby.com/our-projects/environment/our-stories/anti-poaching-efforts-in-the-royal-belum-state-park-%E2%80%93-interview-with-hadi-orang-asli-ranger>
- Yew, V.W.C., Muhammad Haziq Sidqie Husin, W.W., Addynna Majnon, N., Sofi, N., Fashihah Mohd Salleh, S., Kayae, H.H., Ariffin, M.K., Yusof, F.D., Ibrahim, N.S., Norjalim, N.A.A., Mansor, A.A., Ramdass, S.K., Halim, H.A., Ramli, R., Yusoff, M.Y., Uzalli, A.H., & Idang, H. (2017). Tahap pengetahuan dan kaedah rawatan bagi penyakit tidak berjangkit di Kampung Orang Asli Chuweh 2, Lembah Belum, Perak [Translation: Knowledge and treatment approaches for noncommunicable diseases in Chuweh 2 Orang Asli Village, Belum Valley, Perak]. *eBANGI*, 12(3), 1-17.

Reflections on Artificial Intelligence (AI) – a support system for Human Wellness

- Dhastagir Sultan Sheriff and T. Manopriya
 Anna Medical College, Mauritius
 Dhanalakshmi Srinivasan Medical College,
 Samayapuram. Tiruchi. India. Tamilnadu, India
 Email: drdsheriff@gmail.com

Human intelligence is a complex interplay of brain activity involving prefrontal cortex and other regions of the brain. Activities that are closely linked to intelligence are skills like planning, problem-solving and decision making. These cognitive processes are dealt by Prefrontal cortex (PFC). Neocortex, superior parietal, temporal and occipital cortexes.

Integration, proper connectivity of the regions involved, sensory data processing and others influence intelligence and is adaptation by humans. The processing of information relevant

to context, and need are fast and efficient utilizing minimal amount of energy.¹

Current artificial intelligence does have planning skills, problem solving ability and decision making capacity. The models created by AI have made human life comfortable and easy. The use of lifts, remote controls, memory chips, and other machines like ROBOTS are changing the pattern of lives and living. Therefore, the use of AI involves the builders, beneficiaries and decision makers

(Political will). In other words, policy makers, and political will decide and drive the use of AI for human good as well as human destruction. The ability in decision making developed by AI models require transparency and ethical standards.²

Health and Healthcare

Algorithms dictate and decide the design and model to be employed for certain specific areas of healthcare. These algorithms are developed by computer engineers based on the clinical data provided by the physicians. For example certain hospitals screen and select patients to admit in the ICU unit. The cardiac specialist provides the clinical data and necessary information to computer engineer to develop the algorithm. If any error or omission or inclusion of improper guideline given by medical experts to create algorithm will result in a defect in selecting a suitable patient for admission. Such an error will put a cardiac patient at greater risk say by denying admission into ICU unit.³

To prevent avoidable human errors, AI models need universal guidelines formed by say by expert bodies like American Association of Cardiologists to treat acute coronary syndromes or The guidelines developed by European Society to deal with Non-alcoholic Fatty Liver Disease (NAFLD).⁴

Health Insurance

Health insurance companies use AI to screen and select clients to whom the insurance claims need to be approved. In such a process, it was found that claims of thousands of clients have been rejected by an insurance company. That decision made by the AI was found to be faulty and the

insurers were denied their right to claim the insurance money.⁵

Diagnosis

Critical thinking and clinical acumen are hallmarks of learning Medicine. The easy availability of information provided by AI will impair the cognitive, psychomotor and affective domains of learning by the physicians. Learning is a continuous process and human skill development based on their knowledge, comprehension, application dwell upon the experience and wisdom of those who deal with patients.⁶

Privacy and Confidentiality

The development of tools to diagnose conditions like HIV infection is made effective and fast by creating AI tool for diagnosis. The results of such diagnosis reaches the patient fast and in time so that therapy can be instituted immediately avoiding delay. The patient data has to be confidential and private. AI tools can provide the data in time but the ethical principles of privacy and confidentiality, need to be maintained by the prescribing Physician.⁷

In other areas other than Medicine, AI is used to set the credit card limits by encroaching on the personal details like stability of marriage.⁸⁻¹⁰

The AI algorithms prepared may carry biases related to personal characteristics, religious affiliations or political leaning depending upon the person who feeds the data. These biases may create inaccurate data to exclude certain clients from getting financial benefits.⁹

Deploying AI is distraught with new legal and regulatory issues, resulting in lawsuits say related to intellectual property rights and questions about the fair use of content in creative industries. In one case, a group of artists filed a federal class action lawsuit against Stability AI, Midjourney and DeviantArt for alleged violations of the Digital Millennium Copyright Act for their use of AI, focusing on the rights of publicity and unlawful competition.¹⁰ Companies that use third-party content to train AI algorithms must address the legal and regulatory risks surrounding intellectual property, particularly in using

generative AI that creates new images and written content.

Training of AI Models to Professionals

It is reported that certain AI Models emit of large amount of carbon that affects climate change. Research on AI's models are found to be big water consumers consuming thousands of liters of water.¹¹ Incorrect information and incorrect answers were found in AI language models. Furthermore, the model's answers displayed incorrect information retrieval and reasoning, which could have life-threatening consequences in practice.¹²

Creating AI models in different spheres of human activity helps to promote the well-being of humans. Such models need to be fully evaluated before allowing them to be functional. One such model that fulfills such criteria is Electrical vehicle launched by Mahindra EV 6GE.

AI driven Mahindra vehicle is autonomous and provides interfaces that help the driver interact with the vehicle to be safe, follow traffic rules, aware of the climate and the traffic, and the eco system in which the automobile gets launched. The principle of assurance allows the system development from the smallest parts to the final product and needs to follow the following features:

1. Safety- whether the vehicle launched is safe and what are its safety features
2. Trust- whether the vehicle has gained the trust of the driver apart from its capacity to take safety precautions on the road following traffic rules
3. Liability- Whether the product is liable for road traffic accidents and what systems are in place to guide and help safe driving on the highways
4. Manageability: Whether the operating system's battery life is good, can it be charged. If so whether there are adequate charge points are available on the highway, how long the charged battery can provide energy for the vehicle to travel
5. Finally whether the Government has a public policy and regulations to oversee the working as well as the manufacture of these vehicles. All these features are tested and followed in manufacturing the Electric Car.

The Mahindra car model is unique and represents a fully functional system in place, before they are put into public domain.¹³⁻¹⁴

AI has become the life and soul of human activity. Like the knife, in the hands of the surgeon AI can be beneficial or harmful depending upon its user and manufacturer.

References

- Hilger K, Ekman M, Fiebach CJ, Basten U. Intelligence is associated with the modular structure of intrinsic brain networks. *Sci Rep*. 2017 Nov 22;7(1):16088. doi: 10.1038/s41598-017-15795-7. PMID: 29167455; PMCID: PMC5700184.
- Anam Naz, Hikmat Ullah Khan, Amal Bukhari, Bader Alshemaimri, Ali Daud, Muhammad Ramzan. Machine and deep learning for personality traits detection: a comprehensive survey and open research challenges. *Artificial Intelligence Review* 2025; 58:23-57.
- Rao, S, O'Donoghue, M, Ruel, M. et al. ACC/AHA/ACEP/NAEMSP/SCAI Guideline for the Management of Patients With Acute Coronary Syndromes: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *JACC*. null2025, 0 (0).
- Jeffrey V Lazarus, Henry E Mark, Marcela Villota-Rivas, Adam Palayew, Patrizia Carrieri, Massimo Colombo et al. The global NAFLD policy review and preparedness index: are countries ready to address this silent public health challenge? *Journal of hepatology* 2022; 76 (4):771-780
- Patrick Rucker, Maya Miller, and David Armstrong, "How Cigna Saves Millions by Having Its Doctors Reject Claims Without Reading Them," *Pro Publica*, March 25, 2023.
- Alowais, S.A., Alghamdi, S.S., Alsuhebany, N. et al. Revolutionizing healthcare: the role of artificial intelligence in clinical practice. *BMC Med Educ* 23, 689 (2023). <https://doi.org/10.1186/s12909-023-04698-z>
- Naddaf, M. AI tool diagnoses diabetes, HIV and COVID from a blood sample. <https://doi.org/10.1038/d41586-025-00528-2025>
- Elise Reuter and Jasmine Ye Han, "The number of AI medical devices has spiked in the past decade", *MedTech Dive*, October 9, 2024.
- Patrick Rucker, Maya Miller, and David Armstrong, "How Cigna Saves Millions by Having Its Doctors Reject Claims Without Reading Them," *Pro Publica*, March 25, 2023.
- Artificial Intelligence/Machine Learning Risk & Security Working Group, "Artificial Intelligence Risk & Governance," Wharton AI & Analytics for Business, accessed October 12, 2023.
- El Bachir Boukherouaa, Ghiath Shabsigh, and Khaled Alajmi, et al., "Powering the Digital Economy: Opportunities and Risks of Artificial Intelligence in Finance," International Monetary Fund Departmental Paper No. 2021/024, October 22, 2021.
- Benj Edwards, "Artists File Class-Action Lawsuit Against AI Image Generator Companies," *Ars Technica*, January 16, 2023.
- Deng, J., Dong, W., Socher, R., Li, L-J, Li, K. and Fei-Fei, L. ImageNet: A large-scale hierarchical image database. In *Proceedings of CVPR*, 2009.
- Emily Harris, "Large Language Models Answer Medical Questions Accurately, but Can't Match Clinicians' Knowledge," *JAMA* 330, no. 9 (2023): 792-794.
- Monika Jain, Archana Singh, An empirical study on electric vehicle adoption in India: A step towards a greener environment, *Transport Policy* 2024;156;112-125
- Dhote, T, Chaitanya P.K., & Mandot, J. (2021). Mahindra Electric Cars: Challenges of Driving a Revolution in the Indian Market. *Asian Journal of Management Cases*, 20(1), 35-46.

Final Warning: Jewish Ethics, The Flood & the Climate Crisis: Case of Animals Sexual Abuse

- Nachshon (Sean) Goltz
 School of Business and Law, Edith Cowan University,
 Western Australia, Australia.
 Email: N.goltz@ecu.edu.au
"See the work of God, for who can mend what He has warped?" (Ecclesiastes 7:13)

Abstract

The climate crisis is upon us with undisputed scientific evidence indicating that our planet is rapidly declining. Reflecting on known human history, the Biblical Flood, mentioned in many ancient cultures, is one of the relevant points of reference. Well supported by archaeological findings, the Flood is very similar to the predictions of the near future, and is attributed to humanity's lack of morals, mainly expressed in greed and lust, among others.

This paper will argue that humanity's unethical behaviour along with advancement in technology is the root cause of the climate crisis and our future destruction. The article will present a case of sexual abuse of animals via advanced technology, examining the norm, the practice, and the law; These gaps will provide an illustration of the analogy between the Biblical Flood and the Climate Crisis.

Introduction

According to Jewish faith, on the sixth day, God created Adam the first man (Genesis 1:27). According to the Midrash, God then took him and showed him all the trees in the Garden of Eden, and He said to him: 'See My creations, how beautiful and exemplary they are. Everything I created, I created for you. Make certain that you do not ruin and destroy My world, as if you destroy it, there will be no one to mend it after you' (Kohelet Rabbah 7:13, https://www.sefaria.org/Kohelet_Rabbah.7.13.1?vhe=Midrash_Rabbah_--_TE&lang=bi)).

Nonetheless, this warning was not adhered to and the climate crisis, undoubtedly man made, is upon us with undisputed scientific evidence indicating that our planet is rapidly declining.¹ Reflecting on known human history, the Biblical Flood (Genesis 6-9), mentioned in many ancient cultures, is one of the relevant points of

reference.² Well supported by archaeological findings,³ the Flood is very similar to the predictions of the near future, and is attributed, based on the Bible and other Jewish sources, to humanity's lack of morals, mainly expressed in greed and lust, among others.⁴

The current indifference arrogance to the signs of the upcoming catastrophe are also similar. The book of The Zohar, attributed to Rabbi Shimon Bar-Yochai, a 2nd-century sage in ancient Judea, states that in the time just prior to the Flood, 'even the youth understood supreme wisdoms'. Given they all eventually died in the Flood, Rabbi Isa is pondering, 'if this is so then it was stupidity, since they did not know that God will bring the waters of the flood upon them, and they will die from it.' Rabbi Yitzchak replies, 'they knew. But foolishness held their heart'. As they knew the angel in charge of fire and the angel in charge of water. And they knew to stop these angels so that they would not be able to exact

¹ Graham Parkes; *How to Think About the Climate Crisis: A Philosophical Guide to Saner Ways of Living*; Andreas Malm, *Fossil Capital, The Rise of Steam Power and the Roots of Global Warming*, <https://ebookcentral.proquest.com/lib/ecu/reader.action?docID=5177317>; Kate Soper, *Post-Growth Living: For an Alternative Hedonism*, <https://ebookcentral.proquest.com/lib/ECU/detail.action?docID=6349472>; Lynn White, Jr. *His 'The Historical Roots of Our Ecologic Crisis'*, https://www-jstor-org.ezproxy.ecu.edu.au/stable/1720120#metadata_info_tab_contents; What is Seen and What is Not Seen, or Political Economy in One Lesson₁ [July 1850] [final edit], <https://oll.libertyfund.org/page/wswns>; Oil, power, and war: a dark history, Matthieu Auzanneau (Author) John F Reynolds (Translator) Richard Heinberg, <https://ecu.on.worldcat.org/search/detail/1061275126?queryString=1061275126&databaseList=&clusterResults=true&groupVariantRecords=false>; Keen, S. (2020). The appallingly bad neoclassical economics of climate change. *Globalizations*, 18(7), 1149–1177. <https://doi.org/10.1080/14747731.2020.1807856>

² See Rush, Elizabeth. 2018. *Rising: Dispatches from the New American Shore*. Minneapolis: Milkweed Editions at 91 (The Noah's ark story may have its origins in rising seas almost 15,000 years ago, as the post-glacial collapse of continental ice sheets produced Meltwater Pulse 1A); On Meltwater Pulse 1A, see Cronin, Thomas M. 2012. Rapid sea-level rise. *Quaternary Science Reviews* 56: 11–30; Gornitz, Vivien. 2013. *Rising Seas: Past, Present, Future*. New York: Columbia University Press; Koch, Paul L., and Anthony D. Barnosky. 2006. Late Quaternary extinctions: State of the debate. *Annual Review of Ecology, Evolution, and Systematics* 2006: 37; Liu, Jean, Glenn A. Milne, Robert E. Kopp, Peter U. Clark, and Ian Shennan. 2016. Sea-level constraints on the amplitude and source distribution of Meltwater Pulse 1A. *Nature Geoscience* 9: 130–34. Others favor a more recent widespread flood event (involving the Black Sea) as the historical origin of Middle Eastern flood stories, see Ryan, William, and Walter Pitman. 1998. *Noah's Flood: The New Scientific Discoveries about the Event That Changed History*. New York: Touchstone.

³ Noah's Flood: The Genesis Story in Western Thought - <https://www-jstor-org.ezproxy.ecu.edu.au/stable/j.ctt1ww3vpn>; VALUE OF HUMAN LIFE: A STUDY OF THE STORY OF THE FLOOD (GENESIS 6-9), <https://doi-org.ezproxy.ecu.edu.au/10.1163/9789004275881>; The Flood Myth, Alan Dundes (ed.), University of California Press (1 July 1992); DANIEL ANLEZARK, Water and fire: The myth of the flood in Anglo-Saxon England, https://www-jstor-org.ezproxy.ecu.edu.au/stable/j.ctv6p4vr.2#metadata_info_tab_contents; Byron Nelson, The deluge story in stone; A history of the flood theory of geology (1968), Minneapolis: Bethany Fellowship Inc.; Freudenstein, E.C. Ecology and the Jewish Tradition, *Judaism*, Vol. 19 (1970) pp. 406-414

⁴ For an analysis of different approaches to the Flood story see Nancy Menning, A Myth for the Sixth Mass Extinction: Telling Noah's Story during a Climate Crisis, *Religions* 13:243 (2022).

judgment upon them. And they did not know that God is the ruler of the earth”⁵

Rabbi Eliahu Dessler, a Jewish philosopher of the 20th century, ponders into the causes of this mass destruction, ‘What was the matter with the flood generation?’, and then replies: ‘[t]hat they forgot the purpose, for what the world was created for, and aim their lives with desire to this world, and all the animalism connected to it... therefore there was no right of existence to the world without this purpose, because this is not the way, and not for this God aimed in the creation of the world’.

This paper will argue that humanity’s unethical behaviour along with advancement in technology is the root cause of the climate crisis and our future destruction or potential salvation – just like the Biblical Flood. The paper will present a case of sexual abuse of animals via advanced technology, examining the norm, the practice, and the law. These gaps will provide an illustration of the analogy between the Biblical Flood and the Climate Crisis.

According to the Midrash, Noah lacked faith and unless the water reached his ankles, he would not have entered the Ark. If this is the case, the Midrash wonders, what about the years Noah worked hard to build the Ark? The answer is that Noah thought God will have mercy over his world and in that Noah was considered faithless since God will not take his speech back only if redemption and prayer and righteousness are done (Midrash Raba, Genesis, 85:10 (Etz Yosef)).

Technology

An argument can be made that the moral analogy between the Flood and the Climate Crisis cannot be supported since modern society is more moral than past cultures. While the Jewish approach to this argument is discussed below, this article will argue that regardless of the moral comparison among generations, it is the unprecedented advancement in technology that is amplifying the consequences of immoral human behaviour to the

level of the Flood generation. It is the combination of immorality and advanced technology that have brought us to the tipping point.

According to the Midrash, *Yeridat ha-dorot*, meaning literally “the decline of the generations”, express belief in the intellectual inferiority of subsequent, and contemporary Torah scholarship and spirituality in comparison to that of the past. According to the Talmud, there are four main things expressing this decline: the weakness of the brain, the increase in the desires, the laziness to study and the diligence in chasing the matters of this world.⁶

However, the Kabbalah limits the effect of *Yeridat ha-dorot* only to *nigleh* (the visible). In contrast, the “Concealed” (*nistar*) aspects of Torah, embodied in Jewish mysticism, are identified with an opposite process of successively higher articulations of mystical thought as the process of history unfolds. Even if we assume that humans of recent generations are not necessarily less moral than previous generations, the technology is developed to the point that its effect on the environment is crucial. An example can be found in the scale of current deforestation, and its analogy in the Midrash. We lose around 10 million hectares of forest annually.

On the third day, God created the trees and the Iron (Midrash Raba, Genesis, 85:10 (Etz Yosef)). The newly created trees started to shiver fearing they would be chopped down. Then God told them, ‘Why are you shivering?!’, since the axe cannot cut you unless it has a timber handle. This way you have a symbiotic relationship with the iron - you need to contribute part of you for the axe’s handle, without it, the iron (axe’s blade) cannot cut you.

Nonetheless, technology made this dependency redundant by interfering with the heavenly balance. Therefore, the relationship humans have with technology, is an important starting point in exploring the Flood and the Climate Crisis analogy. It is not necessarily that this generation has the lowest moral norms in

⁵ (Zohar(Sefaria.org, 2017), Genesis: 45-46 [trans. Nachshon Goltz], <https://www.sefaria.org/Zohar.1.1a?lang=bi>)

⁶ See Talmud Bavly (Shabat, 114, 72); Tamar Ron Marvin, On Building a Better World: The Tension in Jewish Thought between *Yeridat ha-Dorot* and *Aliyat ha-Dorot* (February 27, 2023), <https://thelehrhaus.com/scholarship/on-building-a-better-world-the-tension-in-jewish-thought-between-yeridat-ha-dorot-and-aliyat-ha-dorot/>

human history, but we do have the most advanced technology ever, capable of destroying our world.

The first documented human encounter with technology occurred in Babel: 'And they said one to another, Go to, let us make brick, and burn them thoroughly. And they had brick for stone, and slime had they for mortar'. The immediate result of this technological discovery was arrogance: 'Let us build a city and a tower, whose top may reach unto heaven; and let us make us a name, lest we be scattered abroad upon the face of the whole earth.' (Genesis, 11:1-4; *King James Bible (1611)* (Cambridge, Eng.: Proquest, 1996)).

Nowadays, argues Ellul, human society has become dominated by '*la technique*' — a focus on the values of the scientific system which promotes progress, efficiency and dependence on technology.⁷ Technology can be regarded as having its own set of laws, intentions, values, and incentives which are imposed on those who use them (Campbell, *When Religion Meets New Media*, p.46).

Rabbi Eliezer, writing in the 9th century C.E.,⁸ echoes Ellul's argument, "... the Tower of Babylon had stairs from its East to its West. Those who were bringing up the bricks climbed from the East, and those who stepped down did so from the West. And if a person had fallen and died, they would not pay him any heed. But if one brick had

fallen, then they would wail, and lament, "how shall we get another for it?"⁹ In the words of Ellul, "[t]echnique has no place for the individual; the personal means nothing to it."¹⁰

Just like the tower builders, 2000 years ago, we are worshipping technology¹¹ to the point that we would rather have our planet destroyed, than stop or even reduce the use of technology.¹² In fact, we increase the use of technology hence accelerating our planet destruction. This is a complete devaluation of human life and well-being; a reduction to zero importance compared with technology. No wonder that we have no value, whatsoever, for animals' lives and well-being. The connection between morals and technology is beyond the scope of this article.¹³

Not only that we are not protecting the environment as was commended to the first man; Just like the Flood generation, we are stealing as much as we can from the environment (and from one another). We murder, maim, strip fur and skin, genetically modify, injure, have sex with etc. etc. - literally causing and inflicting on animals every possible misery for human benefit, be it the most minor, marginal, and stupid benefit, driven mainly by greed.

These are the sins of the Flood generation. We are following their footsteps, soaking knee deep in the water.

⁷ Jacques Ellul, *The Technological Society*, trans. John Wilkinson (New York: Vintage Books: New York, 1967).

⁸ Mikranet, Migdal Bavel: Ibud Shel Gilunot Nechama Leorahat Anose, [trans. Nachshon Goltz] <https://mikranet.cet.ac.il/mikradidact/pages/item.asp?item=20278>

⁹ *Pirkei De Rabbi Eliezer* (Sefaria.org, 2017), "Chapter 24" [trans. Nachshon Goltz], https://www.sefaria.org/Pirkei_DeRabbi_Eliezer.2?lang=bi.

¹⁰ Jacques Ellul, *The Technological Society*, trans. John Wilkinson (New York: Vintage Books: New York, 1967) 286.

¹¹ David Noble, *The Religion of Technology: The Divinity of Man and the Spirit of Invention*, Penguin, 1999.

¹² See, e.g., The Ugly Truth behind ChatGPT: AI is guzzling resources at plant-eating rates, Mariana Mazzucato, The Guardian, May 30, 2024, <https://www.theguardian.com/commentisfree/article/2024/may/30/ugly-truth-ai-chatgpt-guzzling-resources-environment> ("The infrastructure used by 'cloud' accounts for more global greenhouse emissions than commercial flights. In 2018, the 5bn YouTube hits for the viral song Despacito used the same amount of energy it would take to heat 40,000 US homes annually"); Hessam Lavi, Measuring Greenhouse Gas Emissions in Data Centres: the Environmental Impact of Cloud Computing, *Climatiq*, <https://www.climatiq.io/blog/measure-greenhouse-gas-emissions-carbon-data-centres-cloud-computing#:~:text=Global%20emissions%20from%20cloud%20computing,that%20fuel%20our%20global%20economy;> Rory Carrol, Why Irish Data Centre Boom is Complicating Climate Efforts, The Guardian, Jan 6, 2020. <https://www.theguardian.com/environment/2020/jan/06/why-irish-data-centre-boom-complicating-climate-efforts>

¹³ See Goltz & Dowdswell, *The Imaginationless Generation: Lessons from Ancient Culture on Regulating New Media*, Brill 2019.

Animals Sexual Abuse

Man initiated sexual relations with animals, and among different species, have been one of the main sins of the Flood generation. Rav Huna, a Talmudic scholar living in the third century, argued in the name of Rav Abba bar Aybo, that: 'The generation of the flood was not obliterated from the world until they wrote nuptial songs for [unions between] males and animals' (Bereishit Rabbah 26.5). Referring to the verse: "For all flesh had corrupted its way upon the earth" (Genesis 6:12), Rabbi Yohanan ben Zakkai, an important Jewish sage during the late Second Temple period says, 'This teaches that the people of the generation of the flood mated male domesticated animals with female undomesticated animals, and male undomesticated animals with female domesticated animals, and all male animals with human females, and human males with all female animals' (Sanhadrin 108a:11).

History of Animal Sexual Abuse Law

Historical records reveal that concerns about sex with animals date back to the dawn of human history, with religious temple paintings from over 25,000 years ago depicting humans having sex with animals.¹⁴ Bestiality was the primary term used at the time. Sodomy was another. Throughout this article, I use the plain term 'sex

with animals'. In Hittite Anatolia, a person would be punished by death for having sex with a dog or a pig, but not if they committed the same act with a horse or mule (though this person would be prevented from becoming a priest or approaching the king). People in ancient Egypt would practice sex with animals as a form of worship at the temple, with punishment ranging from torture to death. Ancient Chinese men would have sex with geese, breaking their necks for added stimulation.

In ancient Greece, evidence suggests that sexual interactions between humans and animals were neither prosecuted nor morally condemned, and may in fact have been commonplace. Sex with animals was more widely accepted in the Middle Ages, thought to be a cure for disease associated with witchcraft and dark magic. On the other hand, the medieval Eastern father Basil condemned sex with animals by the same penance as other acts considered to be sexual sins.¹⁵ Written records from the same era recounted "monstrous births" of hybrid infants whose ability to be baptized would be questioned.¹⁶

In the sixteenth and seventeenth centuries, laws against sex with animals were harsh, and its punishments variable. From the fifteenth to seventeenth centuries in Europe, "buggery" was

¹⁴[https://institutes.abu.edu.ng/idr/public/assets/docs/Bestiality%20and%20Zoophilia_%20Sexual%20Relations%20with%20Animals%20\(Anthrozoos\)%20\(%20PDFDrive%20\).pdf](https://institutes.abu.edu.ng/idr/public/assets/docs/Bestiality%20and%20Zoophilia_%20Sexual%20Relations%20with%20Animals%20(Anthrozoos)%20(%20PDFDrive%20).pdf)

¹⁵<https://www.taylorfrancis.com/chapters/edit/10.4324/9780429056857-9/bestiality-middle-ages-joyce-salisbury?context=ubx&refId=00f5b367-33b7-4d03-aad1-2d5709b4e771>

¹⁶ L. Daston and K. Park, *Wonders and the Order of Nature, 1150 -1750* (New York, 1998), pp. 173-214; J. B. Friedman, *The Monstrous Races in Medieval Art and Thought* (Syracuse, N.Y., 2000), pp. 59-86, 178-96; D. Cressy, *Agnes Bowker's Cat: Travesties and Transgressions in Tudor and Stuart England* (Oxford, 2001), pp. 9-50; M. van der Lugt, 'L'humanité des monstres et leur accès aux sacrements dans la pensée médiévale', in *Monstre et imaginaire social: Approches historiques*, ed. A. Caiozzo and A.-E. Demartini (Paris, 2008), pp. 135-61; and K. Steel, 'Centaur, satyr, and cynocephali: medieval scholarly teratology and the question of the human', in *The Ashgate Research Companion to Monsters and the Monstrous*, ed. A. S. Mittman and P. J. Dendle (Farnham, 2012), pp. 257-74.

punishable by death.¹⁷ Throughout Europe, sex with animals trials in 1650s Scotland rose in response to Oliver Cromwell's interference,¹⁸ while shifting labor and gender roles contributed to a stark rise of sex with animals prosecutions in Sweden during the same period.¹⁹ The Catholic Church attempted to ban male herdsmen due to the overwhelming amount of sexual acts between boys, cows, and sheep.²⁰

The American colonies were no exception. A chilling scene of punishment comes from 1642, in the Massachusetts Bay Colony, when a teenager named Thomas Grainger was executed after being found guilty of engaging in sexual acts with multiple animals: a mare, goats, sheep, calves, and even a turkey. Before Grainger himself was hanged, each animal involved was publicly killed. In Judaism there is also the requirement to kill the animal in order to prevent its existence shaming the abuser. In these cases, animals were not viewed as victims but as extensions of human shame—they were viewed as props in the ritual of punishment. By the nineteenth century, the death penalty from sex with animals had been eliminated from countries including France, Spain, Romania, and Belgium. England and the United States substituted the death penalty with life imprisonment for those convicted of sodomy.²¹ The animal-welfare movement, generally

understood to have grown from England and then the United States, also began recognizing animals as deserving of protections from suffering and abuse by passing anti-cruelty laws that included sex with animals (See Bestiality Law in the United States, p. 3).

The Current Practice

Until she was rescued in 2003, a female orangutan named Pony, was prostituted for years by a black market operation in Indonesia, earning income for a village.²² A landmark UK study of non-accidental injuries in pets found that 6% of 448 cases were suspected to be sexual in nature, based on injuries, witness statements, or admissions.²³ Veterinary professionals in Portugal and Spain reported witnessing concerning behaviours and noted the widespread online search for sex with animals content (<https://doi.org/10.5565/rev/da.455>). These studies speculate that animal sexual abuse is much more common than the limited data from criminal records, publicly available data, and pornography sites can show.²⁴ Making matters worse, this content—found in dark corners of the internet—is disturbingly easy to find online. We are living in a dystopian reality where such activity persists in secret, yet it is also hidden in plain sight.

¹⁷ Fudge, E. Monstrous acts: Bestiality in early modern England. *Hist. Today* 2000, 50, 20–25.

¹⁸ P. G. Maxwell-Stuart, “‘Wild, filthy, execrable, detestable, unnatural sin’: bestiality in early modern Scotland”, in *Sodomy in Early Modern Europe*, ed. T. Betteridge (Manchester, 2002), pp. 82–93.

¹⁹ J. Lilliequist, ‘Peasants against nature: crossing the boundaries between man and animal in 17th- and 18th century Sweden’, *Journal of the History of Sexuality*, i (1991), 393–423.

²⁰ <https://books.google.com/books?id=Z-GbOvrbnIQc&dq=Russia+law+zoophilia&pg=PT9#v=onepage&q=Russia%20law%20zoophilia&f=false>

²¹ Sodomy was understood to constitute sex between two men or between a person and an animal. <https://books.google.com/books?id=Z-GbOvrbnIQc&dq=Russia+law+zoophilia&pg=PT9#v=onepage&q=Russia%20law%20zoophilia&f=false>

²² <https://theweek.com/98117/orangutan-shaved-made-up-and-prostituted-to-men-for-six-years>

²³ https://www.researchgate.net/publication/11861958_'Battered_pets'_sexual_abuse

²⁴ See, for example, <https://www.frontiersin.org/journals/veterinary-science/articles/10.3389/fvets.2023.1285463/full>; <https://www.news24.com/life/bestiality-is-much-much-more-common-than-you-think-20150218>; <https://doi.org/10.1080/10888705.2022.2131430>; at times, animal sexual abuse is discovered accidentally, such as in the well-known study of sexual behavior in U.S. males finds that 8% agreed to having had sexual contact with animals, <https://vermonthumane.org/wp-content/uploads/2016/02/Animal-Sexual-Abuse-Fact-Sheet.pdf>

Animal agriculture is another example of animals sexual abuse. Humans' sexual manipulation of animals is arguably the very foundation of factory farming: only with breeding—made possible with artificial insemination—can the operation proceed at a scale to meet demand for the byproducts and meat from billions of animals per year. Animal scientist Temple Grandin describes an encounter with an artificial insemination worker tasked with breeding boars:

*"I talked to a man who had one of the most successful records for breeding sows out there and he told me things no one's ever written in a book as far as I know. Each boar had his own little perversion the man had to do to get the boar turned on so he could collect the semen... He might have to hold the boar's penis in exactly the right way that the boar liked, and he had to masturbate some of them in exactly the right way. There was one boar, he told me, who wanted to have his butt hole played with. "I have to stick my finger in his butt, he just really loves that," he told me."*²⁵

Such an act may seem startling and even disturbing, but it is simply how animal breeding works: sexual stimulation and the insertion of foreign objects into other animals' reproductive organs. The sheer economic scale of the operation would be impossible otherwise, and such an account would be criminal in any other context.²⁶

The Current Norm

Moral philosophy also reveals diverging understandings of whether, and to what extent,

sexual contact between humans and animals is immoral. The prevailing view is that any sexual contact with nonhuman animals is morally detestable, a blow to human dignity. This is the view that made sex with animals punishable by death in early civilizations,²⁷ and that gave rise to its taboo status. The theologian Thomas Aquinas, in fact, declared sex with animals—which he defined as interspecies intercourse—as the gravest of human sins.²⁸ On the other hand, the philosopher Peter Singer, becoming renown for his calls to protect animals rights, controversially argues that if no harm or coercion is involved, then sexual acts between humans and animals are not inherently immoral.²⁹ Sex across the species divide need not be cruel, he argues, so long as the activity can reasonably be assumed to be pleasurable for both parties. He cites the example of a dog humping a houseguest, a common occurrence in households. It may be strange, Singer argues, but it does not have to erode human dignity if it is "mutually satisfying."³⁰ Singer writes: "The taboo on sex with animals may have originated as part of a broader rejection of non-reproductive sex. But the vehemence with which this prohibition continues to be held, its persistence while other non-reproductive sexual acts have become acceptable, suggests that there is another powerful force at work: our desire to differentiate ourselves, erotically and in every other way, from animals".²⁹ ...we are great apes. This does not make sex across the species barrier normal, or natural, whatever those misused

²⁵ Quoted in <https://animalliberationcurrents.com/interspecies-sexual-assault/>; <https://www.peta.org/blog/not-just-butterball-sexual-abuse-farming-industry/> — the original is from Temple Grandin's book, which we would eventually want to cite directly

²⁶ For example, https://www.researchgate.net/publication/320208999_How_Meat_Changed_Sex_The_Law_of_Interspecies_Intimacy_after_Industrial_Reproduction, which details how the meat industry and bestiality are intertwined.

²⁷ [https://institutes.abu.edu.ng/idr/public/assets/docs/Bestiality%20and%20Zoophilia_%20Sexual%20Relations%20with%20Animals%20\(Anthrozoos\)%20\(%20PDFDrive%20\).pdf](https://institutes.abu.edu.ng/idr/public/assets/docs/Bestiality%20and%20Zoophilia_%20Sexual%20Relations%20with%20Animals%20(Anthrozoos)%20(%20PDFDrive%20).pdf) – Hittite Anatolia, ancient Egypt, and others.

²⁸ T. Aquinas, *Summa Theologiae*, ed. and trans. T. Gilby and others (London, 1964–75), 2a2ae 154, 11.

²⁹ <https://www.scribd.com/document/264162868/Heavy-Petting-By-Peter-Singer>. For a comparable argument, see also https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1328310. He writes in response to a book by Midas Dekkers called *Dearest Pet: On Bestiality*.

³⁰ <https://www.prospectmagazine.co.uk/opinions/56258/heavy-petting>

words may mean, but it does imply that it ceases to be an offense to our dignity as humans”.²⁹

The Current Law

Today, legal frameworks vary widely across countries. Many nations have statutes that criminalize sex with animals, with notable exceptions including Hungary³¹ and Finland. In fact, Finland has decriminalized sexual acts between humans and animals, provided the animal was not harmed, because the issue was reframed as a matter of mental illness rather than criminality (<https://yle.fi/a/3-8153974>). Denmark did not ban sex with animals until 2015 (<https://www.bbc.com/news/newsbeat-32411241>). A study of 15 European countries that evaluated the penal sanctioning of sex with animals in the context of the legal status of animals found that the countries that afford animals an elevated legal status—such as recognizing the dignity of animals—were also the ones that more strictly criminalized sex with animals (<https://doi.org/10.3390/ani10061024>). In 2021, France adopted a new animal-rights law that explicitly addresses sex with animals pornography, or pornography that involves animals as subjects (<https://www.transcontinentaltimes.com/animal-rights-law/>). In Canada, most sex acts between humans and animals are legal.³² In Australian Capital Territory, sexual acts between humans and animals are punishable by imprisonment for up to ten years.³³

In the United States, at the federal level, sex with animals is addressed only within the military code: under Article 125 of the Uniform Code of Military Justice, “unnatural carnal copulation” with an animal constitutes sodomy and is punishable by court martial but only applies to military personnel.³⁴ Outside the armed forces, regulation is left to individual states. For decades, many lacked clear laws on the matter. West Virginia remains the only U.S. state without a specific statute criminalizing animal sexual abuse,³⁵ and even states like Kentucky and New Mexico were slow to implement legislation until the last few years.³⁶

Even where laws exist, many are outdated or vaguely worded. Massachusetts, for instance, still relies on a version of a 1672 law condemning “the abominable and detestable crime against nature with mankind or with a beast,”³⁷ language so archaic that it is difficult to apply on a case-by-case basis. Other states outline clearer definitions. Oregon, for example, defines animal sexual assault as any act done for sexual arousal or gratification involving contact with an animal’s genitals or anus (https://oregon.public.law/statutes/ors_167.333).

While Congress federally banned the sale and distribution of animal pornography in 1999, the issue reached the Supreme Court in 2010, in the telling case of *Stevens v US.*, Robert J. Stevens ran websites selling videos of dog-fights and dogs attacking other animals (*United States v. Stevens*, 130 S. Ct. 1577 (2010)). Among these videos were

³¹ There is a study that aims to assess public perceptions of zoophilia in Hungary, published in 2025: <https://pubmed.ncbi.nlm.nih.gov/40002947/>. Notably, most respondents viewed zoophilia as unacceptable both from a health and animal welfare standpoint.

³²<https://www.reuters.com/article/world/us/most-animal-sex-acts-not-against-canadas-bestiality-law-court-idUSKCN0YV1QX/>

³³ According to Section 63A of the Crimes Act 1900 (ACT) <https://www.legislation.act.gov.au/a/1900-40> and also Section

³⁴ 10 U.S.C.A. § 925: https://www.sapr.mil/public/docs/ucmj/UCMJ_Article125_Sodomy.pdf, see also <https://www.animallaw.info/topic/table-state-animal-sexual-assault-laws>.

³⁵<https://aldf.org/article/west-virginia-is-the-only-remaining-state-that-doesnt-ban-bestiality/#:~:text=West%20Virginia%20is%20the%20Only,Bestiality%20%2D%20Animal%20Legal%20Defense%20Fund>

³⁶ See <https://www.humaneworld.org/en/blog/kentucky-becomes-46th-state-ban-animal-sexual-abuse> for Kentucky, <https://aldf.org/project/protecting-animals-from-sexual-abuse-new-mexico/> for Mexico

³⁷ <https://malegislature.gov/Laws/GeneralLaws/PartIV/TitleI/Chapter272/Section34>

a Documentary including contemporary footage of dogfights in Japan (where such conduct is allegedly legal) and footage of American dogfights from the 1960's and 1970's. A third video, documented the use of dogs to hunt wild boars, including a "gruesome" scene of a pit bull attacking a domestic farm pig. Based on these videos, Stevens was indicted on three counts of violating §48. Stevens argued that §48 is invalid as it breaches his freedom of speech under the First Amendment and moved to dismiss the indictment.³⁸

Section 48 of the US Federal code establish a criminal penalty of up to five years in prison for anyone who knowingly "creates, sells, or possesses a depiction of animal cruelty," if done, "for commercial gain," in interstate or foreign commerce. An "animal cruelty" depiction is defined as one related, tortured, wounded, or killed," if that conduct violates federal or state law where, "the creation, sale, or possession takes place.". In the "exceptions clause," the law exempts from prohibition any depiction "that has serious religious, political, scientific, educational, journalistic, historical, or artistic value.". The interstate market for "crush videos," formed the legislative background of §48. According to the House Committee Report on the bill, crush videos feature the intentional torture and killing of helpless animals, including cats, dogs, monkeys, mice and hamsters (H. R. Rep. No. 106-397, p. 2 (1999)).

According to the report, "Crush videos" often depict women slowly crushing animals to death "with their bare feet or while wearing high heeled shoes," sometimes while, "talking to the animals in a kind of dominatrix patter", over, "[t]he cries and squeals of the animals, obviously in great pain.". Apparently these depictions "appeal to persons with a very specific sexual fetish who find

them sexually arousing or otherwise exciting." (pp.2-3).

While the animals torturing and killing shown in "Crush Videos" are prohibited by the animal cruelty laws enacted by all the states in the US, these videos rarely disclose the human participants' identities, thus making it impossible to prosecute for the underlying conduct (See H. R. Rep., at 3; accord, Brief for State of Florida et al. as Amici Curiae). In Stevens, the Supreme Court struck down section 48, on facial overbreadth grounds (130 S. Ct. at 1588).

Judge Robert E. Cowen, dissenting at the Court of Appeal, argued that the majority had essentially afforded constitutional protection to depictions of animal cruelty (Stevens, 533 F.3d at 236 (Cowen, J., dissenting)). The dissent rejected the argument that animal cruelty and child pornography were so dissimilar as to prevent §48 from prevailing under the same analysis used to prohibit the interstate commercial use of child pornography (at 247).

Finally, one of the most dramatic recent legal reversals in this field, occurred in India. In 2024, the country put into effect sweeping criminal justice reforms that eliminated Section 377 of the Indian Penal Code, which had criminalized "carnal intercourse against the order of nature with any man, woman or animal." The new legal code, the *Bharatiya Nyaya Sanhita*, does not mention sex with animals at all, effectively decriminalizing the act.³⁹ This omission has sparked concern among advocates, especially considering rising reports of animal sexual abuse in the region. Investigative reporting has documented a resurgence of such cases amid weak law enforcement and limited animal welfare infrastructure.⁴⁰

Conclusion

According to Rabbi Moshe Chaim Luzzatto, an Italian kabbalist, and philosopher born in 1707,

³⁸ See Goltz & Nikolic, Simulacra 's Day in the U.S. Supreme Court: Brown Versus Entertainment Merchants Association and United States Versus Stevens, Osgoode Hall Law School, Research Report No. 36/2013.

³⁹ The official document is here, https://www.mha.gov.in/sites/default/files/250883_english_01042024.pdf. A summary of the new criminal code is here, <https://www.juscopus.com/human-crimes-against-wildlife-in-the-context-of-bestiality-and-sodomy/>

⁴⁰ <https://easternherald.com/2023/12/17/indias-unseen-crisis-the-alarmed-rise-of-animal-sexual-abuse/>. It is also worth noting what has been written about the morality of human-animal relations in India: <https://journals.sagepub.com/doi/full/10.1177/25148486211035385>.

'Because at that time a great light was revealed (to the people of the Flood) that could have fixed the world, and it is the secret of the hidden light that will be revealed to them 7 days, and if they would not have prevented (it) everything would have been fixed, but since they did not want to (allow this great light) as they held their sins, than moreover this great light caused them a matter of real breaking of the tools, that they could not stand the light and fall, and it is the secret of the flood'.⁴¹

If we are to avoid bringing upon ourselves a second, human-made Flood, we must heed the timeless wisdom that calls for humility, responsibility, and compassion — toward animals, toward each other, and toward the Earth itself.

Acknowledgments

I would like to thank my friend and Associate Dean Professor Joshua Aston for his wise comments and kind support. This paper is part of the work done by the Socio Legal Cluster, School of Business and Law, Edith Cowan University.

EJAIB adopts and complies with the Committee on Publication Ethics (COPE) **Publication ethics and malpractice policy**. Our policy is on the EJAIB website. All potential authors should have read these guidelines and by submission of an article for publication you acknowledge that you have complied with this policy. Violations will be handled in proportion to the intention and seriousness of the violation. If there is a conflict of interest stated by the authors of an article it will be written in the paper.

Registered address of EJAIB: P.O. Box 16 329, Hornby, Christchurch 8441, New Zealand

Editorial address, and all correspondence to:

Prof. Darryl Macer, Ph.D., Hon.D.

President, American University of Sovereign Nations (AUSN), <https://www.ausovereignnations.org>

Email: darryl@eubios.info

Chief Editor: Darryl R.J. Macer

Associate Editor: Nader Ghotbi

Editorial Board: Akira Akabayashi (Japan), Martha Marcela Rodriguez-Alanis (Mexico), Angeles Tan Alora (Philippines), Atsushi Asai (Japan), Alireza Bagheri (Iran/Canada), Gerhold Becker (Germany), Rhyddhi Chakraborty (UK), Shamima Lasker (Bangladesh), Minakshi Bhardwaj (UK), Christian Byk (IALES; France), Ken Daniels (New Zealand), Ole Doering (Germany), Amarbayasgalan Dorjderem (Mongolia), Hasan Erbay (Turkey), Layne Hartsell (Thailand); Soraj Hongladarom (Thailand), Dena Hsin (Taiwan), Rihito Kimura (Japan), Abby Lippman (Canada), Masahiro Morioka (Japan), Anwar Nasim (Pakistan), Jing-Bao Nie (China, New Zealand), Pinit Ratanakul (Thailand), Mariadoss Selvanayagam (India), Yanguang Wang (China), Daniel Wikler (USA), Jeong Ro Yoon (Republic of Korea).

For forthcoming conferences see:

www.eubios.info or www.ausn.info

International Public Health Ambassadors

https://www.ausovereignnations.org/international_public_health_ambassadors

Email to: provost@ausn.info

⁴¹ Ramchal, Adir Bameromim, 31