Proceedings of the 1st NSLR Symposium

Law and Public Health

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EDITORIAL

Law plays an important role in shaping society, enabling us to articulate rights and realise societal aspirations. Public health focuses on the health, safety and well-being of a population, striving to provide the maximum benefit for the largest number of people through interdisciplinary engagement to evolve solutions. Public health considers a wide view of health, going beyond physical health to include issues ranging from mental health and violence to health inequity and universal access to health coverage. Government proposals in the past have been inadequate in addressing the dynamic factors behind poor health. In the context of law's role in improving access to healthcare, there has been a growing movement to see the right to health as a fundamental right in the developing world, ensuring that the government prioritises actualising universal health care. While the National Health Policy 2017 falls short of recognising health as a fundamental right, it advocates a progressive, assurance-based approach to universal health coverage.

The 1st NALSAR Student Law Review (NSLR) Symposium took place in February 2019, with the objective of improving the visibility and effectiveness of law as a tool to protect and promote public health in India from a human rights perspective. To this end, the symposium brought together individuals from law, medicine, sociology, economics and other disciplines together to engage with ideas at the intersection of law and public health, with an emphasis on looking for ways to bridge the gap between research and policy.

This issue of NSLR details the proceedings of the two-day symposium, including reports of four panel discussions, the transcripts of two special lectures and one article. We hope this compilation helps begin a deeper engagement with issues at the interface between law and public health in India.

The summarising, paraphrasing and editing of the symposium discussions and lectures are the responsibility of the Editorial Board and, therefore, any errors or discrepancies that may have arisen in the course of doing so are entirely the responsibility of the Board.

Thank you.

Editorial Board

LAW, TECHNOLOGY AND PUBLIC HEALTH: THE PRIVACY IMPLICATIONS OF THE STORAGE AND USE OF ELECTRONIC HEALTH RECORDS[*]

Dhvani Mehta, Divya Raj, Murali Neelakantan, Ruhi Kandhari & Varalakshmi Elango

The privacy implications of the storage and use of electronic health records (EHRs) lie at the interface of contemporary debates surrounding law, technology and public health. In K. S. Puttaswamy v. Union of India*, the Supreme Court held that infringements of privacy without the force of law are constitutionally invalid. Recent government initiatives necessitate reflecting on the privacy implications of storage and use of EHRs. EHRs facilitate public health surveillance, a system of collecting data to better understand infectious diseases, chronic diseases and environmental exposure. In 2016, the government notified the Electronic Health Record Standards to realise a "standard-based system for the creation and maintenance of EHRs." These standards deal with issues of data privacy and security of EHRs, aiming to safeguard confidentiality. However, they do not have the force of law.*

Additionally, NITI Aayog's National Health Stack (NHS), which is a shared digital healthcare infrastructure to oversee the

[*] Report authored by Prateek Surisetti and Aashna Chowdary. Transcription by Aashna Chowdary, Prisha Tejani and Raghunandan Sriram.

implementation of the Ayushman Bharat Scheme as well as other public healthcare programs, includes national health electronic registries, a federated personal health records framework and a national health analytics platform. While the goal of the NHS may be to utilise patient data for better implementation of welfare schemes, there is potential for abuse. The Digital Information Security in Health Care Act, 2018, a draft legislation brought out by the government, seeks to address this. The Act enables digital sharing of personal health records between hospitals and clinics and ensures the owner of health data "the right to privacy, confidentiality, and security of their digital health data." It also provides for the creation of health information exchanges to share EHRs and an authority to regulate them. India has the opportunity to realise a legal framework that strikes the appropriate regulatory balance between furthering the benefits of public health surveillance and safeguarding individuals' right to privacy. This panel discussion aimed to analyse NHS from a privacy perspective and suggest an appropriate legal framework for the storage and use of EHRs.

The opening session, moderated by **Ms. Tuhina Joshi**, Policy Associate at *Ikigai Law*, dealt with the intersection of technology, law and public health. More specifically, the discussion revolved around Indian schemes, such as PMJAY,[1] that involve Electronic Health Records (EHRs).

1 Pradhan Mantri Jan Arogya Yojana (PMJAY) or Ayushman Bharat Yojana.

Ms. Joshi, starting in broad strokes, put across a few questions associated with data and privacy.

> "*How do they treat this data? Do they know how sensitive this data is to us? Do they understand the implications of sharing and transmission of this data? Do they understand the threats that the possible exposure of this data could pose to us? These are the questions we would like to explore today, as we try and understand how the government has grappled with these issues of balancing the interests of privacy versus the public interest in maintaining public health.*"

Next, Ms. Joshi invited **Ms. Ruhi Kandhari**, a writer for *The Ken*, to explain the fundamentals of EHRs.

Ms. Kandhari explained that she had been following EHR related schemes since early 2017. At that point in time, the Indian government had released standards for EHRs as a precursor to initiating the "*Integrated Health Information Platform*" (IHIP).[2] The IHIP, as envisaged, involved collection of patient data, from various participants (e.g. doctors, social health workers, laboratories, insurance companies), that could be accessed by policy makers and academicians in real time. The patients were contemplated to be identified on the basis of a unique identifier (e.g. Aadhar).

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2 The IHIP was conceptualized earlier than the PMJAY. In 2018, the IHIP was hardly implemented but a new scheme, PMJAY was launched. Around the same time, the NITI Aayog proposed the National Health Stack as an aid in implementation of PMJAY. It is unclear as to whether the National Health Stack will co-exist with IHIP or one will be scrapped.

The benefits, from the government's side, were expected to include data driven policy making, improvement in epidemic detection capabilities[3] and greater efficiency in the insurance market through better targeted insurance policies.

> "*It is accessible in one place, for someone sitting in Delhi. It is relevant for a policy maker to know how many people have a particular disease profile, where they are, what they eat, how many cholera breakouts happen somewhere"*

Through data accessible through the IHIP, insurance companies were expected to assess risks better and produce tailor made products for patients based on their lifestyle, previous medical incidences and so on. Prior to EHRs, insurers weren't privy to such granular information.

> "*That data is very important for the insurance provider. If one is very active and eats healthy, one's insurance could be cheaper than someone far more likely to get hypertension or heart disease. If one manages it well, there are incentives for that.*"

Moving on to the perspectives of medical practitioners, Ms. Kandhari brought to light the disinclination practitioners would have towards feeding patient data into the system. Given the dearth of medical practitioners in the Indian context, time constraints disincentivise practitioners from data

[3] For instance, when data about patients is transmitted in real time to a central database, monitoring of such a database would reveal the location and other details pertaining to an epidemic's source.

collection. Even earlier, practitioners were constantly approached by technology providers that insisted on usage of software for appointment bookings, collecting symptomatic data and profile of patients. But Ms. Kandhari states that practitioners felt such methods weren't beneficial.

> "*Why should they spend the little time they have with the patient keying in data, learning how to manage a computer? They could use that time in prescribing medication, understanding, diagnosing, moving on to the next patient.*"

Furthermore, Ms. Kandhari informed the audience of EHR's impact on quality accreditation and practitioner's attitudes towards the development. Accreditation organizations, such as the National Accreditation Board for Hospitals and Healthcare Providers, could utilize data collected under the IHIP scheme to monitor clinical outcomes.

> "*Nobody knows if hospitals are following protocols. Nobody is monitoring the likelihood of cure by following a particular protocol or surgeon's success rate. How many times have they performed a surgery properly and how many times have surgeries gone wrong?*"

Practitioners are wary of the development as it would cause their activities to be subject to greater monitoring, causing greater scrutiny and accountability.

Moving on from the perspectives of the government and medical practitioners, Ms. Kandhari shifted her attention to an assessment of another EHR-based scheme, implemented in Haryana, that ran on a software called "E-Upchaar". Haryana had the highest quantum of EHRs collected in India. The Haryana government had contracted United Health Group, a Fortune 500 company, and paid them approximately INR 100 cr. for assistance and expertise in the healthcare field.

The Haryana experience highlighted both benefits and problems of such schemes. The benefits include (i) accessible patient data amongst medical practitioners, (ii) reduction in costs of medical care, (iii) regulation of pharmacies.

(i) Accessible patient data amongst practitioners: The use of EHR is expected to improve the quality of medical service. Currently, a patient needs to wait in different queues to avail the services of different medical services (general consultancy, surgery, anesthesiologist consultancy, etc.). But with the advent of EHRs, the patient's waiting time can be reduced by simultaneous and immediate sharing of information among multiple professionals.

Further, the Haryana government expects to develop better diagnostic methods by using artificial intelligence to analyze data and detect patterns associated with various medical conditions.

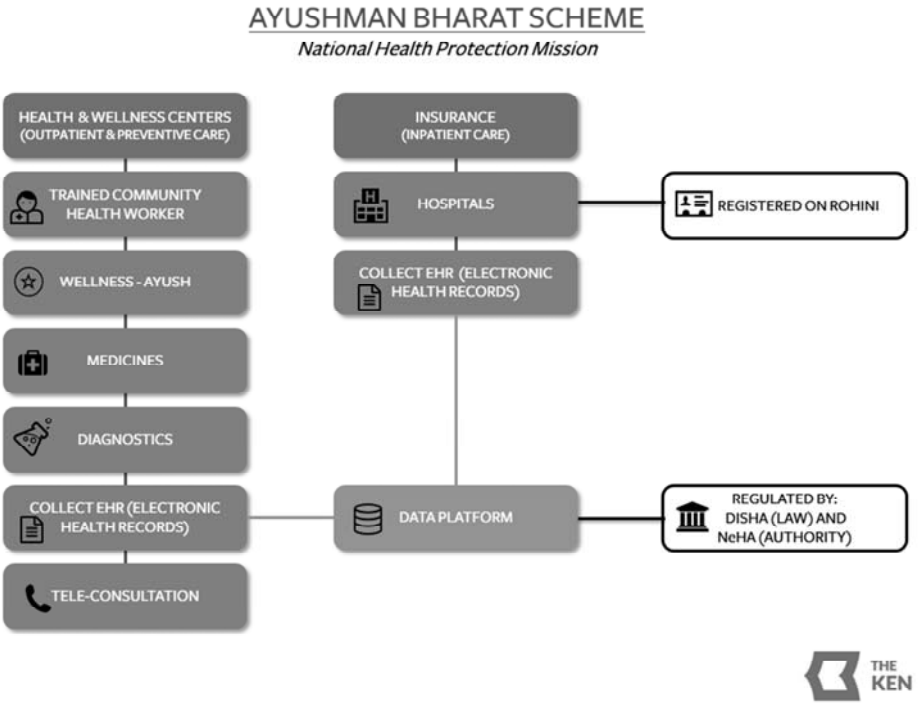
(ii) Reduction in costs of medical care: Through digitization, the expenses of paper, x-ray films and machines to read such x-ray films can be reduced. For instance, one medical college, Post Graduate Institute of Medical Sciences in Rohtak, is reported to have saved around INR 2,00,00,000 in under a year through digitization.

(iii) Regulation of hospital pharmacies: The Haryana scheme also aims to keep track of medicines in hospital pharmacies. Given that medicines of certain brands are significantly pricier, hospital pharmacies indulge in the practice of claiming, to the customer, the unavailability of cheaper medicines. Hence, the customer is forced to purchase pricier medicines, where the pharmacies achieve greater margins. The scheme, through monitoring, attempts to prevent such practices.

The problems associated with the Haryana scheme had to do with the unreliability of the data's accuracy. For instance, an interview with the relevant expert at the Haryana State Health Resource Centre revealed examples of data involving 26 kilogram infants and admittance of 800 patients to 200 bed hospitals. Hence, even after spending considerable resources, the data is unreliable. Further, given that medical practitioners were overworked and pharmacies feared loss of margins, the scheme wasn't met with enthusiasm despite the oversight possible through digitization.

Lastly, after discussing the Haryana scheme, Ms. Kandhari explained that the IHIP continues to remain a policy document. After floating the IHIP concept, the government announced PMJAY along with the NITI

Aayog-conceptualized National Health Stack. In order to participate under PMJAY, hospitals are required to empanel themselves, for which they have to fulfill certain EHR standards. Lastly, if they wish to treat patients insured under PMJAY, in some states, they are required to fulfill other standards, including registration under Registry of Hospitals in Network of Insurance (ROHINI) and register with the insurance regulator.



After Ms. Kandhari's speech, Ms. Joshi pointed out that often data is touted as a panacea for a variety of issues, but the same isn't always the case. Next, Ms. Joshi invited **Dr. Dhvani Mehta**, Senior Resident Fellow at *Vidhi Centre for Legal Policy*, to explain the regulatory framework.

> "*You might have noticed that over the past two years, data is being touted by the government as the cure for all problems. As though amassing enough data would cause all the problems ailing our country for years and generations to be solved on their own. But it's evident that this is not the case. Yet, there is a lot of data being collected, amassed, analysed, put to various uses.*
>
> *We have different players in this ecosystem – doctors, health workers, nurses (who potentially do not know the data that they are collecting and analysing; putting into a system they do not know how to operate). At the same time, the government is grappling with the way technology is going to grow and evolve. How is AI going to come into this picture, and interact with the data we have collected? What consequences does it have for our privacy? To add to this, we have the Supreme Court judgment in 2017 in* Puttaswamy*, where the right to privacy has been made a fundamental right. We have a lot of data collected over the years. Section 43A of the Information Technology Act provided a rudimentary framework to ensure data protection and privacy. Now, we proposed a personal data protection bill, which will hopefully be a game-changer.*"

Dr. Mehta went on to discuss the issue of increasing burden on medical practitioners due to technology, in the context of EHRs in the U.S. Given that the U.S. has a litigious culture, the digitization of patient data resulted in greater checks and security protocols, thereby increasing the burden of clerical activities for practitioners. Additionally, Dr. Mehta

suggested that the shift from paper records to digitization brought to light the possibility of a lack of trust in the patient-physician relationship.

> "*While a data protection framework is important, public trust in having personal health information stored and accessible by different kinds of users will also depend on ancillary measures that relate to clinical ethics and the medical profession.*"

Next, Dr. Mehta explained the regulatory framework governing data protection and privacy. Introducing two Bills, the Personal Data Protection Bill and Digital Information Security in Health Care Act (DISHA),she noted that the approaches of the prospective legislations are distinct. The Srikrishna Committee's Personal Data Protection Bill is applicable to personal data of all natures and envisages a situation wherein a "Data Principal" manages the data for the "Data Fiduciary" in the manner prescribed under the statue. On the other hand, the DISHA Bill is applicable exclusively to data pertaining to health and envisages every person to be the owner of her data.

Then, Dr. Mehta moved onto the implications of the aforementioned distinctions between the Bills. Dr. Mehta opined that the possible distinction between the Bills, in effect, could come down to the extent that the data may be alienated. In other words, "ownership" could allow the owner to alienate her data. But the same isn't clear. Under the DISHA Bill, there exists a prohibition on disclosure or transfer of data to pharmaceutical companies, even though one would presume that ownership would include the right to

alienate data owned. Hence, Dr. Mehta notes that further clarity is required regarding the rights espoused by the Bills.

Moving on, Dr. Mehta tackled the issue of balancing, in the context of EHRs, Right to Health (RTH) and Right to Privacy (RTP). She argued that RTH and RTP aren't always in conflict in the case of EHRs. In fact,

EHRs could serve to further reinforce RTP by providing patients with a greater sense of agency over the management of their health. Furthermore, Article 12 of the International Covenant on Social and Economic Rights imposes an obligation on States to prevent/control the spread of disease through techniques like epidemiological data research, which can be enhanced through use of EHRs. Therefore, RTH and RTP could be consistent with each other.

At the same time, Dr. Mehta noted that there exist situations where RTP and RTH may be in conflict with each other. For instance, where data, even when anonymized and de-identified, is collected for research. While research is relevant for the purposes of analysing causal factors, preventive measures and cures for diseases, collection of data for the same could be in violation of RTP.

Given that there exist considerable gains to public good through research, Dr. Mehta wondered if the consent model, the most popular model adopted by data protection legislations across the world and in India, is ideal. Should the requirement for consent be as sacrosanct?

Leaving the question for the audience to ponder over, Dr. Mehta delved into the realm of philosophy. While making it clear that she wasn't necessarily siding with the philosopher, she introduced the argument of Julian Savulescu. The philosopher argues that there doesn't exist a requirement to take consent for biomedical research on the ground that the people with the data have a duty to allow usage of the data for research and thereby, public good.

> "*He makes the argument that there is an ethical duty of rescue, which applies so that persons are duty-bound to consent to and allow their data to be used where there is a minimal risk presented by the use of the same. This ethical duty should remove the grounds for us obtaining consent from the individuals in question.*
>
> *The analogy here is with a thought experiment that Peter Singer, a philosopher, speaks about. He says that one doesn't have a duty to rescue someone from a raging river current or tide. But if one sees a child drowning in a shallow pond, and one is able to wade in, and the only discomfort one might have is their trousers get muddy, then perhaps there is a duty to save that child. Savulescu extends this analogy to consent in the context of biomedical research, saying that the use of anonymised data presents a minimal risk, and you have a duty to allow that information to be used, without someone having to ask your consent for it.*
>
> *The data protection bill also has a provision that allows research to be conducted for anonymised data without obtaining consent; but in the case*

> *of the bill, this exemption is granted on the understanding that it is impracticable to obtain consent, and there is a reasonable public interest in allowing such research.*"

Dr. Mehta ended by noting that Savulescu's argument is distinct from the Srikrishna Committee Bill's approach. The former argues that the data holders have an absolute duty to release their data for research and therefore, consent isn't required. On the other hand, the Bill acknowledges the existence of the right to disallow usage of data for research purposes, but the right has been outweighed by other interests.

Next, Ms. Joshi invited **Mr. Murali Neelakantan**, former Global General Counsel at *Cipla* and *Glenmark*, to provide another perspective on the National Health Stack.

Mr. Neelakantan initiated his speech by referring to a similar project that was launched in U.K. The U.K. government attempted to connect 30,000 doctors and 300 hospitals, and spent around £20 billion over 10 years. Ultimately, the project was abandoned as a failure.

He questioned the rationale for launching a project that was similar to one that had failed in conditions more suitable to success.

> "*In the U.K., healthcare is free and there is a significant amount of digital record already in existence. So, if you think about it, it is the*

> *perfect place to succeed, but after 10 years and £20 billion, they called it quits and said that it wasn't worth it.*"

At the outset, Mr. Neelakantan argued that the National Health Stack is more an exercise in data collection rather than providing better healthcare. Since "Public Sanitation and Health" is under the State List and National Health Stack is a Union Government scheme, he argued that the scheme isn't really geared towards improving healthcare.

Next, Mr. Neelakantan moved onto the details of the scheme. First, he warned the audience regarding the issue of linkages amongst databases through identifiers. He explained that to avail of the scheme, various identities are created and linked together. The person availing of the PMJAY needs to link her BPL and Aadhar identifications with a special identifier generated at the medical institution. Mr. Neelakantan argued that such interlinkages form the basis for exclusion of people from healthcare, in addition to causing exploitation of the poor by the local administration.

> *"Firstly, you must already have a BPL card. Essentially, to get into this system, you already need one form of identity i.e. BPL card… Local administrations issue these cards to poor people and poor people have paid money, which they don't have, to get these cards.*
>
> *Then they get into the hospitals where they have to apply for another identity. In addition, they have to link this new identity which the 'health*

identity' to the Aadhaar and the BPL card. So now you are creating linkages among databases. Now, what is wrong with that?

To state a few examples, if one member of the family gets a gas connection, they automatically go outside the BPL category. Which means, the next time the family runs to the hospital, it will be denied coverage under PMJAY. Similarly, if one of them gets a government job in the family (there may be a family of 10 and the youngest among them might get a Class IV employment), the whole family becomes ineligible as PMJAY isn't available for families of government servants.

Suddenly, we are using identity to exclude. Some Supreme Court judges believe that the Right to Health is a Fundamental Right but now, we are going to use linkages of data bases to exclude rather than include. Like Aadhaar, there aren't going to be more people whose lives will be improved. The government is going to use the National Health Stack to exclude in a manner similar to the exclusion through Aadhaar. For example, a shopkeeper may deny rations to a beneficiary on account of a mismatching Aadhar identity.

So, my biggest concern with more data collection schemes is exclusion."

Then, Mr. Neelakantan focused his attention on the issue of privacy. He contended that PMJAY compels people requiring medical attention to enter the system and part with their data. Since only an individual cannot register under PMJAY, the scheme requires the whole family to register.

Therefore, the scheme leverages the desperation of those requiring healthcare to extract the data pertaining to the entire family.

Closely linked to the issue of privacy is the issue of treating medical issues of a sensitive nature. Patients diagnosed with certain stigmatized diseases (like HIV-AIDS and tuberculosis) refuse to return for treatment, even when such treatment is free, due to the discomfort of identifying themselves with the disease. Even within familial discussions, abortions, for example, are often characterized as miscarriages to avoid judgment. Given such a context, management of data pertaining to such diseases gains significance.

> "*So, if the primary health care center, which is your local clinic, has access to such information, what happens to your social interaction in that village? How are you going to prevent the person who enters this data from leaking the information to the locals?*"

Since the citizens aren't benefiting from the scheme, Mr. Neelakantan questioned the audience regarding the real beneficiaries of the scheme. He noted that first, the entities which are a part of implementing the scheme, like IT companies, telecommunication companies, insurance companies and some hospitals, will benefit. Second, data entry companies like those who previously enrolled citizens for Aadhaar, will benefit. Given that India doesn't have a dearth of data entry professionals, the government is generating a database to claim achievements in the field of healthcare when they should be focusing on improving the fundamentals of healthcare i.e.,

more hospitals and doctors, better primary healthcare centers and better access to medicines.

Next, Mr. Neelakantan brought to attention the issue of inaccurate data. As mentioned above, medical practitioners are constrained by time and therefore, data entry professionals, uneducated in medicine, would be entering the data. The issue is further compounded when AI analyses this inaccurate data and consequently, provides perhaps accurate, but fatal solutions. The government hasn't been able to provide a satisfactory answer to the issues of data inaccuracy, misuse and mismanagement.

Moving on to critique the consent model envisaged by the Personal Data Protection Bill, Mr. Neelakantan argued that such a model is flawed. First, a legal intervention is being used to address problems that never existed prior to the technology. Second, a scheme with a basis in consent is flawed as people are often unaware of the full consequences of their consent.

> "*We have had examples, like the Malpani Hospital incident, where patients weren't even aware that they were on a clinical trial for an arthritis drug! They thought they were being given drugs for cure. They were told that the drugs were manufactured by a foreign company and were the most effective. The name sounded foreign. So, they believed the hospital.*"

Further critiquing the DISHA Bill, Mr. Neelakantan contended that "ownership" of data is meaningless and exists solely in one's imagination as there isn't a mechanism to verify or enforce it.

> "*Being an 'owner' of data is meaningless. It is like owning a part of the moon. The 'owner' is never going to be there. Neither can he verify whether he owns it, not can he verify if someone else owns or uses it.*"

Next, Mr. Neelakantan asserted that the utility of the National Health Stack as an epidemic detection mechanism is overstated. He suggested that the same purpose could be achieved through traditional methods. Furthermore, he argued that aggregation of data at the national level could obscure reality and therefore, it is best to rely on local records.

Finally, the issue of misdiagnosis was taken up. He argued that without accurate data, treatment will suffer and the question of responsibility arises. While the patient suffers, responsibility will keep circulating between the participants (medical practitioners, AI and data entry professionals), which could have severe ramifications on people's lives. The safest place for medical records would be with the patient herself.

Concluding his speech, Mr. Neelakantan suggested that the government, if it were to believe that the scheme is beneficial, should experiment implementation of the scheme with government officials under the Central Government Health Scheme, servicemen and ex-servicemen,

railway employees, Employee's State Insurance beneficiaries, M.P.s, M.L.A.s and other public servants before offering it to poor citizens.

> "*When they have done all this successfully, and IAS officers, Generals and MLAs haven't died, and nothing has gone wrong, then, I am willing to be subjected to this program.*"

After Mr. Neelakantan's talk, Ms. Joshi reminded the audience of the problems with treating technology as a cure to all problems. Next, she invited **Dr. Varalakshmi Elango**, a consultant to the WHO, to discuss the ethics and philosophical issues surrounding public health surveillance.

After providing an overview of the language used in the arena of public health, Dr. Elango proceeded to establish the significance of academic engagement in public health.

> "*There are a lot of anecdotes from the past, such as John Snow locating the source of Cholera to a hand-pump through analysis of geospatial data. It was extremely important that such data was freely available.*
>
> *There was a landmark research report on Polio by Albert Sabin. The WHO started mass immunization around the mid-1980s, which Sabin had suggested 25 years earlier.*

The tale of Small Pox is quite infamous, but it isn't a concern anymore. Polio is heading towards eradication. So clearly, public health research has led to a lot of improvement and betterment in the lives of people."

Next, Dr. Elango referred to the International Health Regulation, a binding treaty that India is a signatory to. It mandates surveillance and requires periodic reporting of public health data. Surveillance is essential for identifying threats, including bacteria, viruses, toxins and chemicals, across geographical boundaries. Given the benefits of public health research and the requirement of data collection for its furtherance, Dr. Elango argued for aggressive adoption of digitized data, as opposed to manual data.

After establishing the significance of data, Dr. Elango shifted her attention to the issue of balancing the benefits of data collection with privacy. After raising the issue of privacy, the issues with operationalization of the DISHA Bill were put forth. First, she noted that the Bill is complex and given the literacy rate, the limited access to information and resultant power imbalances, the people will be unable to protect themselves against infringements of their rights as they wouldn't understand their rights in the first place.

Second, Dr. Elango critiqued the DISHA Bill's consent model. She contended that taking consent is perceived as an administrative procedure and isn't carried out in true spirit. She questioned the practicality of such a model and stated that it is impossible to ensure that the sick, illiterate and disabled are completely made aware of the situation and give free informed

consent. Hence, she suggested that while consent, in its current form, should be mandatory, it is equally important to regulate the management and use of data.

> "*How regularly will the government access the data? Can it use for any purpose whatsoever? Since the data is anonymized, does it mean that government has the freedom to use it anytime it want*s?"

Third, Dr. Elango raised a question regarding the prudence of investing scarce resources in encryption and protection of data, instead of investing in providing better healthcare through improvement of healthcare fundamentals i.e. more and better trained medical practitioners, hospital infrastructure. Fourth, although the DISHA Bill does refer to anonymization of data, Dr. Elango raised issue with the *degree* of anonymization. She argued that the context, such as the location and population characteristics of the patient, is extremely relevant for conducting research on health issues. Anonymizing the data through aggregation (e.g. reporting data at the national level) obscures details and thereby, detrimentally affects the data's suitability for research purposes. Therefore, one needs to arrive at an aggregation level (e.g. panchayat, district or state level) that meets the demands of research and privacy.

Fifth, Dr. Elango brought the question of access to data to the fore. She questioned whether access was restricted solely to the State Government ministry responsible for health, or was allowed for other ministries as well. She explained the concern through a hypothetical scenario.

> "*A nomadic population was being tracked for the purpose of immunization. It was imperative to track them to check if their children were being immunized. Incidentally, the same nomadic population has also been involved in poaching.*
>
> *Now, the Forest Department could communicate with the Health Department and ask for the information it had on the population. Thereby, saving the Forest Department time and resources.*
>
> *The DISHA Bill allows for access in the event of an offence. But, the possibility of other departments accessing the data might not have been informed to the applicants at the beginning.*"

Sixth, Dr. Elango made a case for clearer exposition of the constraints and confines of data usage by both State and Non-State participants. Measures to scrutinize the purpose for data usage, by both kinds of participants, are necessary.

Seventh, the issue of ensuring sensitivity amongst individuals maintaining the data was analyzed. Dr. Elango stated that professionals working with data are inclined to view the data as mere numerals, instead of being cognizant of the fact that the data has human interests associated with it. She wondered if individuals' attitudes towards such data and imbuement of values, such as fairness and transparency, can be furthered merely through professional training.

> "*Are professionals involved in the Data and Technology field taught about ethics? Are they made to understand that the data is originating from human beings or is the data just random statistics*?"

On a concluding note, Dr. Elango suggested that the way forward involves increasing awareness of legal rights amongst the public, sensitizing those managing the data, establishing oversight organizations and updating health related legislations, such that they are consistent with the DISHA Bill.

Next, Ms. Joshi invited **Mr. Divya Raj**, Principal Technical Strategist at the E-Health Research Centre at Indian Institute of Information Technology, Bangalore to discuss the technological aspects of EHRs.

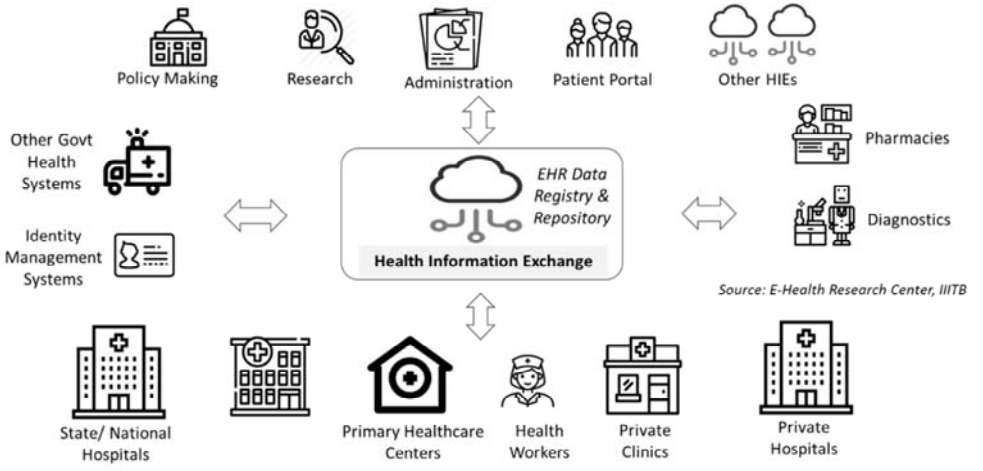
Starting with discussing the positive developments in the Indian healthcare field, Mr. Raj brought to attention improvements in life expectancy, infant mortality rate and maternal mortality rate. He asserted that various government schemes and initiatives have played an important role in such improvements, with the latest one in this series being Ayushman Bharat.

While contending that technology couldn't be construed as a panacea, he highlighted the immense potential of technology to improve healthcare. For instance, technology could assist in identification of pathologies (e.g. malignant tumours). With improving infrastructure and increasing access to technology, he's confident that technology's impact will increase even further.

Mr. Raj stated that, with the advent of EHRs, healthcare providers are expected to provide better medical services, patients are expected to make more informed decisions and the government is expected to have more information available to formulate better policies. But digitization has brought to fore the issue of balancing public healthcare benefits with privacy concerns.

Delving further into the healthcare benefits of EHRs, Mr. Raj explained that presently medical practitioners prefer to spend valuable resources re-examining patients, instead of relying upon prior reports from other healthcare providers. It is expected that with greater integration of healthcare systems across healthcare providers, reliability of reports will increase and consequently, we might see a decrease in re-examinations.

Further, Mr. Raj suggested that integration amongst government service providers (e.g. ambulance service) and other healthcare providers could further better healthcare. For instance, if the government ambulance service has access to patient data, in the event of an emergency, the ambulance can be dispatched with minimal delay as details (address, medical conditions, equipment required) are already known to the ambulance service provider. This can take place only if there is exchange of health information between the different entities in the healthcare system.



Depicting Health Information Exchange within the healthcare system.

Next, Mr. Raj argued that ensuring interoperability is essential for reaping the benefits of EHRs. Distinguishing between EHRs and other digitized healthcare information, he clarified that EHRs have to fulfil certain prescribed standards to qualify as EHRs. And such standardization is necessary for ensuring operability of the EHRs across platforms.

> *"Earlier, an entity would send another entity healthcare data and the receiver couldn't interpret the data as it would be in a different format. But with standardized EHRs, all these entities would be expected to communicate seamlessly."*

Standardization is also essential for ensuring patient's privacy and consent is respected. In the interest of public policy and avoiding ambiguity,

the Ministry of Electronics and Information Technology has developed a standardized understanding of consent.

Having briefly discussed the significance of technology in the healthcare sector, Mr. Raj analysed privacy concerns. Underscoring the significance of healthcare data, he reported that healthcare data is even more valuable than credit card data. He contended that fraudsters could utilize such data for purchasing narcotics, faking insurance claims and stealing identities and hence, it is imperative to safeguard patient data to prevent aforementioned occurrences.

For protecting patient privacy, Mr. Raj highlighted the significance of (a) building technology that incorporates respect of patient consent and (b) role based access.

At present, by virtue of having healthcare data in a physical form stored under the care of the patient, the data can't be accessed without the patient's consent. But with EHRs and digitization, the data's storage and access isn't, at least as far as technology is concerned, within the control of the patient. Mr. Raj suggests incorporating technological solutions to prevent patient's loss of control over her data. For instance, a possible solution could include protecting patient data through an OTP (One Time Password). Each time a pharmacist, a medical practitioner or anybody else needs to access the patient's data, the patient will have to provide permission by giving access to the OTP (initially known solely by the patient).

Moving on to role based access, Mr. Raj explained that the healthcare sector consists of numerous different players who require varying components of patient data for a variety of purposes. For instance, a pharmacist may require merely the prescription, while a diagnostician might require almost the entirety of the data. Also, a pharmacist doesn't need to store the patient data, while an oncologist might have to store patient data for considerable periods. Therefore, Mr. Raj argued that it is essential to build technological constraints that provide access and storage capabilities based on the data usage purpose. Additionally, ensuring role based access in the healthcare sector is especially complicated because of the various players amongst whom data needs to be shared for maximum benefit.

Adding to his point on regulating access to data, Mr. Raj brought up the significance of "granularity".

> *"The granularity of the information is the information's degree of detail. The issue of granularity is extremely important and peculiar to the healthcare domain. For example, one may like to share only particular aspects of an illness as opposed to everything on the medical record – entire medical history, family history, et cetera. Therefore, data granularity needs to be controlled while facilitating data sharing."*

Next, Mr. Raj brought to attention the "shelf life" of healthcare data. Healthcare data is relevant for the entirety of a patient's life and therefore, in the event of data theft, actions cannot be taken to render the data irrelevant. Consequently, misuse cannot be prevented. This is in contradistinction to

other data such as credit card data because even if credit card data is stolen, the affiliated information can be deactivated or altered.

After analysing privacy concerns and the particularities of healthcare data, Mr. Raj acquainted the audience with the relevant technological concepts. He delved into details of the three stages that data goes through: (i) collection, (ii) processing and (iii) dissemination.

During data collection, it's imperative that consent is respected and solely essential information is collected. Mr. Raj argued for technical safeguards being built into the system, if trust cannot be placed in those collecting the data.

Moving on to processing, Mr. Raj noted that privacy concerns arise with integration of databases, when data is aggregated in one place. For instance, the Aadhar system faces a similar criticism. A citizen's Aadhar number could be used to connect databases containing different aspects of data pertaining to the citizen. Therefore, a fraudster with access to the Aadhar database will be able to access all aspects of the data. The same has far more grave consequences than theft of a particular aspect of the data. By integrating databases, all data pertaining to a patient becomes available at one source and fraudsters can effectively create a complete digital identity of the patient by accessing integrated databases.

Other concepts that Mr. Raj discussed while dealing with data processing are as follows:

Secondary Use: It refers to usage of data for purposes that it wasn't acquired for and hence, such usage results in privacy breach. For example, a social media platform could utilize user data for a purpose (e.g. sale), other than the purposes it has informed its users of while collecting user consent (e.g. research).

Breach of Confidentiality: Medical practitioners get access to patient data under the condition of confidentiality, but breaches aren't rare. Mr. Raj averred to a documentary that was filmed featuring three patients without their consent.

Data Insecurity: Most data issues arise due to lack of data security as a result of having faulty or non-existent encryption mechanisms. Mr. Raj noted that to ensure maximum security, encryption mechanisms needed to be built into the IT systems from the beginning itself. This ensures that data transmission during the initial stages of system isn't left vulnerable to theft.

> *"During data transmission, the encryption and decryption process involves application of one function to encrypt the data and application of another function at the receiving end to decrypt the data."*

Privacy by Design: Mr. Raj argued that privacy concerns couldn't be treated as afterthoughts and instead, technological solutions that protect privacy need to be built directly into the architecture of the IT system. He

highlighted the significance of tracking and verifying the identity of external data recipients, granularity of accessed data, duration of access or storage and purpose of data access or storage. Reiterating that these concerns had to be built into the system, he asserted that technological solutions protecting privacy had to ensure *purpose specification*, *respect for consent*, *limited collection*, *limited use*, *limited disclosure*, *limited retention*, *accuracy*, *safety*, *transparency* and *compliance*.

Moving onto data dissemination, Mr. Raj explained that dissemination involves the provision of statistical data to policy makers and academicians, such that they can formulate better policies. In the context of dissemination, Mr. Raj noted that de-identification and anonymization of data are crucial to ensure that personal information of patients isn't revealed.

Mr. Raj highlighted two possible approaches in this regard:

1. The "*Safe Harbour Approach*" involves hiding fields containing sensitive information.

2. The "*Statistical Approach*" involves approaches that takes into account the insufficiency of merely concealing sensitive information, and attempts to prevent extrapolation of data.

Mr. Raj, noting that the latter approach was better, provided some examples of such an approach:

K-Anonymity is a method that involves removing unique patient identifiers (e.g. name, telephone number) and purely retain quasi-identifiers (age and PIN code). Though the method protects against identification of the patient, cross-referring other data bases and extrapolation could lead to patient identification. For instance, Latanya Sweeney, who was then a graduate student at MIT, found the medical records of Massachusetts Governor William Weld using public information.[4]

I-Diversity attempts to overcome the limitations of K-Anonymity through diversification of identifiers.

Mr. Raj ended by stressing the significance of EHRs. While conceding that there remain concerns with EHRs, he asserted that advancements in technology hold tremendous potential to integrate the various players in the healthcare system and consequently, ensure better healthcare services. Lastly, he advised adopting technology, integrated with privacy mechanisms, to protect patient privacy and ensure data isn't misused.

Finally, Ms. Joshi concluded the session by noting that there exist considerable nuances and concerns surrounding data protection despite the progress made through the *Puttaswamy* judgment or the Data Protection Bill.

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4 Keeping secrets: Anonymous data isn't always anonymous, DATA SCIENCE @ BERKELEY, https://datascience.berkeley.edu/anonymous-data/

LAW, GENDER AND PUBLIC HEALTH: EVOLVING A LEGAL FRAMEWORK TO CONFRONT GENDER-BASED VIOLENCE FROM A HEALTH SYSTEMS PERSPECTIVE*

Amita Pitre, Mrinal Satish, Sreeparna Chattopadhyay & Vyjayanti Mogli

Gender-based violence (GBV) lies at the intersection of the discourses on law, gender and public health. The World Health Organisation (WHO) has referred to violence against women as a 'global health problem of epidemic proportions,' with adverse health impacts ranging from death and injury to depression. India is a prime example, with a recent survey ranking the country as the most dangerous country for women due to the high risk of violence against women and inadequate efforts to tackle the issue. GBV includes sexual assault, child marriage and violence based on gender identity or sexual orientation. In India, people belonging to marginalised identities and sexual orientations face violence for gender non-conformity, besides harassment and discrimination.

In 2016, India adopted the global plan of action to strengthen the role of the health system to address interpersonal violence, in particular against women and children. However, marital rape continues to be legal. The National Health Policy, 2017 notes that GBV is a serious issue with

* Report authored by Nilav Banerjee. Transcribed by Aashna Chowdary, Aparajita Kaul, Prisha Tejani, Raghunandan Sriram and Srishti Suresh.

wide-ranging consequences and recommends the provision of free health care to survivors in the public and private sector, while ensuring their dignity is upheld. To this end, the government came out with guidelines for medico-legal care for survivors/victims of sexual violence in 2014 to build the capacity of health-workers to respond to instances of sexual violence in a sensitive and comprehensive manner. While this is a step in the right direction, the guidelines address the symptom rather than the underlying issue of widespread GBV. There is a need for a multi-sector approach to adequately address the different aspects of GBV. This panel discussion aimed to look at GBV from a health systems perspective to work towards evolving an effective legal framework.

The panel was moderated by **Prof. N. Vasanthi** (Professor of Law at the NALSAR University of Law, Hyderabad), who set the stage for the panel discussion by rooting gender-based violence into the idea of inequality and its implications on public health.

Dr. Amira Pitre (Lead Specialist, Gender Justice at Oxfam India), the first panellist, spoke about the legal implications of increase in the age of consent in India and how it has resulted in challenges and contradictions in sexual assault laws.

Dr. Pitre began by tracing the recent changes in the penal legislations around sexual violence in India; most notably the amendments to the Indian Penal Code ["IPC"] after the infamous Delhi rape case in 2013, as well as the prior enactment of the Protection of Children from Sexual Offences Act

2012 ["POCSO"]. The most notable amendment to the IPC included an expansion in the definition of the acts that would constitute rape. The latter legislation is an important reform because of its gender-neutral legal implications which extend to transgender as well as male children in the context of a whole range of penetrative and non-penetrative offences. Both legislations however increased the age of consent to legally engage in sexual intercourse to 18 years. Behind this fairly neutral amendment, is a patriarchal notion that only applies to girls, i.e. the age of consent, which by law is the age at which girls are considered mature enough to consent to sexual intercourse. While POCSO has extended the age of consent to all "children" under 18 years of age, confusion arises because of Section 376 of the IPC, which is gender specific, and according to which only women can be considered as survivors of rape. Therefore, while boys under the age of 18 are technically capable of consenting to sexual intercourse under the IPC, girls cannot. Therefore, the right of girls below 18 years of age to consent to sexual activity of any kind has been taken away by the raised age of consent and implies a blanket ban on all sexual activity under the age of 18 years.

Having laid down the *prima facie* issue with the raising of age of consent, Dr. Pitre outlined the three issues she would discuss. *First*, she would locate the raising of age of consent within other laws dealing with women's sexuality within and outside marriage. *Second*, she would look at the impact of such laws on the lives of young people, criminal justice system and access to health care. *Third*, she would briefly touch upon the ethical

dilemmas of medical professionals due to the amendment and what potentially could be a way forward.

Dr. Pitre began the discussion on the first issue by tracing the history of age of consent. Age of consent is quite an arbitrary age. Historically when such laws didn't exist, girls and boys were mostly considered mature enough to marry, and engage in sexual activity at the time of menstruation or puberty. In the 13th century, for the first time, age of consent was introduced in the common law, and fixed at 10 years of age. Through the common law jurisprudence, it spread to several British colonies and gradually it was raised in multiple contexts. It really doesn't have any objective criteria of physiological or emotional maturity to consent to sex; it is quite arbitrary. For example, the age of consent is 11 years in Nigeria, 21 years in Bahrain and several countries do not have an age of consent.

India introduced it for the first time when the IPC was codified in 1860. In the landmark case of *Phulmonee Devi*, the survivor, a child bride, was raped by her husband, and consequently, bled intensively and died. This gave an impetus to social reformers who were already working towards increasing the age of marriage for girls. Since the modification of Indian personal laws, especially in the backdrop of growing nationalism against the British rule, was against the coloniser's interests, the British introduced an age of consent law which was enforceable through criminal law for increasing the age of marriage. Therefore, any sexual activity with someone under 12 years of age now constituted a criminal offence, which the British expected would deter Indian families from marrying off their children early.

There exists a trajectory (comprising of the different years) where the age of consent has been gradually increased from 12 years in 1860 to 18 years in 2013. At different points in time, different ages were considered appropriate for girls to be sexually active. Within each of these categories, there is a marital exception in the IPC, which is slightly lower than the age of consent. The hypocrisy in the law is evident from the two standards for a girl's capability to consent to sex- one within marriage and the other out of it. Through the sanction of the law, the community reserves the right to decide when girls are mature enough to be married off. Except for some, a majority of girls do not have a say in their marriages and the consequent cohabitation which comes naturally linked to the marriage.

Some of the laws that govern sexuality of women have been recently repealed. For example, the erstwhile definition of rape fit in very well with the theory of rape being equivalent to the theft of property. If a forceful peno-vaginal intercourse wasn't the crux of the assault, it didn't matter how badly the woman was injured, or whether her bodily integrity was violated. Therefore, even brutal rapes which didn't involve the penis and the vagina were relegated to lesser offences. Even in the context of adultery, the law punishes sex with a married woman, unless it is with the connivance or consent of her husband. Therefore, even adultery in India is aligned with the theory of rape, i.e. as theft of property. The aggrieved party is the man whose wife has slept with another man. The woman's consent does not matter. However, adultery now has been decriminalised by the Supreme Court for such vehement sexist undertones in the law. Making a further mockery of

consent in law, marital rape is not yet recognised as a criminal offence in the IPC. Only recently, in 2000, it got recognised as a civil offence under the 'Protection of Women from Domestic Violence Act' (PWDVA), 2005. If these laws were meant to protect women from sexual violence then there was no reason to have these double standards.

These laws have imagined women's sexuality within the confines of marriage. The age of marriage and the age of consent have been closely aligned with each other and generally age of marriage has been lower of the two. It was only in 1978 that for the first time the age of marriage at 18 years was higher than the age of consent at 16 years. Even in this case, the 84th Law Commission Report, sought to bring parity in the two by recommending increasing the age of consent to 18 years. Between these patriarchal laws what was accomplished was a negation of a girl's consent to marriage (forced child marriage), consent to sex within marriage (exception to marital rape), as well as consent to have sex outside of marriage in the case of an extra-marital relationship (Adultery law). Within this framework, the only acceptable form of sexual intercourse for a women is within marriage.

Thus, according to Dr. Pitre, the raising of the age of consent fits very neatly into the narrative of such patriarchal laws. What disrupts this narrative is poring through data on sexual activity before marriage and before age of consent. In the National Family Health Survey ["NFHS"] 4, it was reported that 6.3% of the women who got married at the age of 18 years or above have reported having their first intercourse before the age of 15 years. Further, the 'Youth in India' study showed that 90% of men between the

ages 15-29 years and 9% of women between ages of 15-24 years had experienced a romantic relationship and out of that a subset had been sexually active. Overall, 15% men and 4% women had experienced sexual activity before marriage. So this clearly demonstrates the prevalence of sexual activity in India before marriage. Dr. Pitre used the aforesaid data to argue that the mere making of a (criminal) law wouldn't translate into the wishing away of adolescent sexual activity. The premise was especially problematic when 27% of women between 20-24 years were married before 18 years of age and the consummation of such marriages through sexual intercourse didn't invite any scrutiny of these laws.

Dr. Pitre moved on to analysing the consequence of raising the age of consent. After having considered judgments from the POCSO special court at the district level between 2013 to 2016, Dr. Pitre's research yielded that in about 25-50% of the cases, the girl came to the court and testified that she was in a consensual relationship with a man and it was her parents who lodged a complaint. The analysis showed that higher the age of the adolescent girl, more the possibility of the girl turning hostile in court. By hostile Dr. Pitre meant that there existed an FIR based on the testimony of the complainant-parents (of the girl) alleging the forceful kidnapping and sexual assault of their daughter, which becomes the basic narrative against which the girl's testimony is subsequently treated as hostile. The narrative which unfolds from studying these cases is of love relationships between young persons to which the parents are opposed. Often these are on account of the young man being from a different religion or caste or from an

incompatible community as per the girl's parents. While most such cases would not stand the scrutiny of the courts, the accused boys are detained for varying periods.

The predominant reason for most of these acquittals was that the girl was close to majority and understood the consequences of her action. A problematic consequence of such acquittals is that the social pressure of the opposition forces the girl to marry the boy or rather she is left with no option but to marry the boy. Supposed dishonour brought to the girl's family, and criminal case of rape against the boy compels the girl to marry the boy, as a way out of both situations. There is no alternative left for her, such as to rethink her situation, return to her parents' home, resume her education and yet be able to keep in touch with her boyfriend and decide on a marriage when both of them are more independent to handle their married life. This sheds light on the larger injustice that a girl has to go through in such cases.

Dr. Pitre also apprised the audience about the introduction of mandatory reporting clauses not only for all public servants and the police but also for doctors in situations when anyone approaches the hospital. They're mandated to not only give free of cost first-aid but also mandated to report such cases immediately to the police. Such mandatory reporting has its own host of problems, directly affecting the sexual and reproductive access of girls. Seeking abortions, contraception or services for remedying a sexually transmitted infection- are now under a scanner. Dr. Pitre exemplified the problem by highlighting that if a young woman were to seek a medical

termination of pregnancy (even with the consent of her parents) or treatment for sexually transmitted infections or enquire about contraception, she can be understood to have had underage sex or be preparing herself for future sexual activity and therefore, could come under this mandatory reporting requirement. There is a spate of petitions in higher courts because the girl is more than 20 weeks pregnant, and medical termination of such pregnancy is not allowed under the Medical Termination of Pregnancy Act, forcing such girls to petition the courts. Much of this delay could be directly attributed to the mandatory reporting requirement, because medical professionals are likely to turn away girls in need of healthcare for the latter's refusal to report to the police. Therefore, such a requirement is seriously jeopardising the physical wellbeing of women and girls in India.

On this note, Dr. Pitre concluded her presentation, and she was followed by the second panellist, **Dr. Sreeparna Chattopadhyay** (Senior Research Scientist and Associate Professor, Public Health Foundation of India). Dr. Chattopadhyay apprised the audience that she would be speaking specifically about marital sexual violence, highlighting the gaps within the health system as well as the legal system, by employing both the feminist and the health system's perspective to look at this problem.

Dr. Chattopadhyay began her discussion by reorienting the narrative for framing the question of gender-based violence perpetuated against women from an instrumental perspective to a non-instrumental one i.e. as an end in itself. In cases of marital sexual violence, while there are legal provisions in theory, in practice it is very difficult to actually evidence injuries. Within the

institution of marriage, there is a recognition of domestic violence through Section 498A of the Indian Penal Code (Criminal Law) and Protection of Women from Domestic Violence Act, 2005 (Civil Law), ["PWDVA"] without any consensus on what actually constitutes sexual violence within marriage. The NFHS describes three acts as examples of sexual violence:

1. Forced sexual intercourse;
2. Forcing a woman to perform certain sexual acts against her will;
3. Using threats for sexual coercion.

But research indicates that the ambit of sexual violence is actually much wider and Dr. Chattopadhyay proceeded to share some of these examples:

1. "*Forcing wives to have sex with a partner other than her husband;*
2. *Denying wives the right to contraception;*
3. *Wives not having a say in the number of children to birth;*
4. *Wives not having a say in the time period for conceiving children;*
5. *Wives not having a say in the gap between birthing consecutive children;*
6. *Forcing wives to have abortions;*
7. *Withholding the right to have abortions"*

While the aforesaid rights are often seen from the perspective of reproductive rights, which are under the state's responsibility, even individuals such as husbands and mothers-in-law can actually have a huge

role to play in terms of whether the women are able to exercise the aforesaid reproductive rights within their households. One of the problems with marital sexual violence in India is that there aren't good estimates in terms of NFHS studies. In fact, there is reason to believe that there is a huge undercount because considering various smaller studies *vis-a-vis* NFHS statistics, the latter's accounts of marital sexual violence indicates that it has gone down without there being any reason to believe that this has actually happened. The NGO DILASA, which has an excellent model for intervention in domestic violence, found that in about 2054 cases that were registered, there were 809 cases of sexual violence which is much higher than the NFHS statistics. Literature review on marginalized women who tend to also be at the receiving end of sexual violence as well as tend to under-report it, indicates that in some cases sexual violence is very prevalent.

Dr. Chattopadhyay proceeded to discuss a few cases to elucidate the manner in which cases of sexual violence within marriages unfold in courts. The first case that she referred to was *Smt Geeta v. Shree Kuldeep Bhatti, Jagdish Singh Bhatti, Dhyana Devi, Archana Devi and Sita Nand,* filed under both the IPC as well as the PWDVA. The plaintiff had suffered physical abuse and violence, including starvation at the hands of her husband and mother-in-law. Despite sustaining injuries and seeking treatment, due to the absence of documentation and tangible medical evidence, the court held that neither physical nor mental harm had come to her. She had two daughters and was tortured for the same, but again this could not be medically proved. The judge found that there wasn't enough evidence for him to convict the

plaintiff's in-laws for domestic violence, due to the absence of medical documentation.

The second case Dr. Chattopadhyay referred to was *Ms. Niramala Shah v. Vipin Shah and others*, where a report on head injury sustained by the complainant was accepted as sufficient proof of domestic violence and therefore the husband was asked to provide compensation. This is because there was a case in AIIMS and therefore, there was medical documentation which led to compensation being awarded in the case. Women lose cases on domestic violence in courts due to a demand for casualty medical officers and their consequent unavailability. Casualty medical officers under PWDVA, 2005 (*at least in Karnataka*) are supposed to provide medical documentation, and in their absence, it is difficult to litigate such cases.

The third case Dr. Chattopadhyay discussed was *Preeti Bharadwaj v. Krishna Kumar Bharadwaj*. Here, the plaintiff was forced by her HIV positive husband to have sex and was physically assaulted in front of her children, including an attempt to kill her by strangulation.

While Preeti had a broken tooth, she did not visit a doctor. However, in the court, the judge believed the survivor and clarified that the survivor's failure to visit the doctor didn't translate into the absence of torture. This case, makes for an interesting study, because there was no medical documentation here but because the perpetrator was HIV positive, perhaps the court took a more stringent view of what had actually happened.

The provision of grievous bodily hurt which exists in Section 498A of the IPC is a good place for women to actually evidence injuries but they're unable to legally establish physical or sexual violence - because such violence not only remains under-reported but also is invisible in the eyes of the law. When a woman actually walks into a police station to file a case for being sexually violated, it is very difficult for her to tell a police officer the specific details of such an assault. This coupled with the recent watering down of Section 498A, where the Supreme Court has decreed that unless there are visible physical injuries on a woman, a case cannot be registered, only compounds the problem for sexual violence. Therefore, there is a role for health systems, both in terms of documentation as well as in terms of providing support for the aggrieved women. Since there exists an exception to the rape clause for married women, clearly there's very little that the law can do which is why health systems are really important. Several studies demonstrate that there is wide recognition among health care providers about marital violence being a serious problem.

Having established the relevance of healthcare professionals in mitigating sexual violence against women, Dr. Chattopadhyay proceeded to assess how such systems fare. She began by apprising the audience that in most institutions in India, there exists no protocol on dealing with a survivor of sexual violence. Many countries around the world, including middle income countries in South East Asia have screening programs for dealing with a woman who shows up post an accident or due to an emergency. Hospitals have not adopted many of the guidelines issued by the Justice

Verma Committee's Report with regard to sexual assault. Dr. Chattopadhyay identified several reasons for such non-compliance, such as health being a state subject, the lack of trade providers, as well as other institutional constraints. So, the impact is poor or incomplete examination of survivors and documentation of their experiences. Another issue that women face while dealing with health systems is the concern for privacy. Survivors of sexual violence are sent for counselling or treatment for depression or any of the mental health issues, while the problem lies in the husband who is never interrogated. Thus, Dr. Chattopadhyay described the problem as a critical absence of comprehensive support systems, as the current ones only offer "*band aid solutions*".

Dr. Chattopadhyay then proceeded to inspect the gender inequitable norms and patriarchal practices within health systems. Victim blaming in cases of sexual violence is rampant in health systems, as the penetration of a "*feminist consciousness among health care providers*" is poor. The problem is exacerbated by the impact of poverty and other forms of marginalization. She specifically debunked the notion that women living in acute poverty are less likely to see violence as a serious problem. There is a link between structural or institutional violence and consequent exposure (of women) to sexual and domestic violence. The most immediate problem in the consciousness of many women themselves tends to be that poverty is a bigger problem than sexual violence. and then of course living in poverty diminishes social net worth, which consequently diminishes the ability to seek help which makes reporting less likely.

After interacting with several medical professionals (doctors, nurses and support staff at healthcare institutions) as a part of her research study, Dr. Chattopadhyay gathered the following recommendations to ameliorate the problem at hand:

1. "*Free of cost support group, consisting of doctors, psychologists, lawyers and social workers should be formed. Vocational and financial support should be arranged for such women to live life with dignity*"

2. "*The health systems should be linked to NGOs, psychosocial counsellors and the police. With a network of people willing to help them and address their issues, maybe there's hope.*"

3. The lack of linkages that exist between health systems and other units which can help the survivor, is something which can be remediated without incurring high costs.

4. The role of education is immense and considerable progress can be made by reforming the medical education curriculum to be more gender sensitive. Right from the way in which women articulate pain and how seriously it is taken, all the way to women being diagnosed of certain conditions later. Gender sensitivity embedded within the curriculum goes a long way in dealing sensitively with a survivor of sexual violence.

5. A critical suggestion received from the nurses was the crisis of role conflicts. Medical institutions being understaffed, nurses and doctors are already overburdened, who may be unwilling to take upon additional

responsibilities. Thus, when a survivor of sexual violence is their patient, the extra support, care and counselling that is required is not seen as a part of their job even if there is recognition of it being a problem.

6. There is a dire need to institutionalize best practices, which includes training of frontline staff, collaboration with support services and budgets to meet the needs of survivors.

Dr. Chattopadhyay proceeded to assess the various methods employed by nations in South Asia to address the aforesaid concern. Nepal has a one stop crisis management center ["OCMC"] to address problems very similar to ours. Bangladesh actually has a very good program called the Multi-Sectoral Programme on Violence Against Women ["MSPVAW"]. The DILASA program from Sehad in Mumbai draws a lot from the MSPVAW and it includes a collaboration between 10 ministries in Bangladesh and it has a 24-hour helpline service as well.

In India, while the demands are to construct a One Stop Crisis Centre ["OSC"] measuring at least 132 sq. metres within a hospital or medical facility or within a 2 km radius in a government or non-government institution, the amount allocated for it is just INR 1 lakh. Considering all the services that are required to be included in such OSCs such as medical assistance, police assistance, shelter and food (including clothing), psycho social support (empanelled counsellors), legal aid counselling, video conference facilities (for court proceedings), the allocated sum is disproportionately less. According to government reports, in the first phase

of construction, there were 2 OSCs, and in phase two, there were 150 OSCs, and in phase 3 an additional 50 OSCs were constructed. The latest government records reveal that 718 OSCs or Sakhi centers have already been established. The absence of any systematic evaluation coupled with the Center for Governance Budget and Accountability ["CGBA"] having pointed out glaring problems, poor signage, shortage of female staff (including there being no gynaecologist) and the absence of even basic training staff highlights the glaring issues marring OSCs. Additionally, there is no uniform state policy for withdrawing funds from the central corpus by the various states, and Dr. Chattopadhyay exemplified the concern by referring to the State of Karnataka which hadn't withdrawn a single penny to this date. The need of the hour according to her was a national commitment towards helping survivors, specific budgetary allocations, better auditing of how the money is being spent, and systematic evaluation of the existing OSCs. Collaboration between different sectors and a legal acknowledgment of sexual violence being an intersectional issue of rights violation and health concern are also necessary.

Dr. Chattopadhyay concluded her presentation by highlighting that the judicial characterisation of domestic and sexual violence as the regular wear and tear of family life is particularly harmful towards remediating the issue at hand. The third panellist to speak was **Vyjayanti** (Transgender Rights Activist and Founder of Telangana Hijra Transgender Samiti) who focussed on bringing to the forefront the issues and challenges that the transgender community continues to face in India.

The transgender movement and the transgender communities, embody diversity across class, caste, privilege, education, etc. *NALSA v. Union of India* ["NALSA"], was the very first landmark decision preceded by the expert committee report of the Ministry of Social Justice and Empowerment in 2014, which being just a policy document was not enforceable. The essence of the judgement was that it separated gender from biological sex and upheld the right of transgender people to self-identify their gender. It was also an instructive directive to the central and state governments to recognize this self-identified gender. It further held that any insistence on sex re-assignment surgery, popularly known as gender confirmation surgery, is immoral and illegal. Thereafter, the next advance was the introduction of a private bill i.e. the Rights of Transgender Persons Bill, 2014, by Tiruchi Siva, member of Rajya Sabha, who went beyond the mandate of the Supreme Court. The Court spoke about the reservation of backward classes within the 50% limit as vertical reservation while Tiruchi Siva envisaged horizontal reservations over and above with a 2% reservation both in the public as well as private sector. The Bill was unanimously passed in the Rajya Sabha but was not taken up in the Lok Sabha instead, in its place came the monstrosity called Transgender Persons Protection of Rights Bill, 2016 which later became Transgender Persons Protection of Rights Bill, 2018 ["Transgender Bill"].

The primary issue in this bill is that it throws 99% transgender people out of the very definition of transgender; in its 2016 form, it conflated intersex with transgender. There may be some instances where babies cannot

be identified as either male or female by health care providers (no genital, both genitals or other possibilities). The 2018 bill adopted the definition from Tiruchi Siva's Bill but failed to do justice to intersex people. The next issue with this Bill is that it mandates a district screening committee ["DSC"] which also has a Chief Medical Officer from a government hospital. Chief Medical Officers in Government hospitals are typically from a very high traffic foot fall department such as cardiology, oncology, etc, and are rarely women. So, for such people to be certifying transgender people on their gender which will often be conflated with sex is heavily problematic. There is a requirement to have many other people on that committee.

Further plaguing the bill is the fact that despite the whole layer of laws across states that criminalize begging, it had a clause that criminalized enticement of begging. It is important to know the socio-cultural, socio-economic and politico-legal context in which transgender people live. Most transgender people and gender non-conforming children, abandoned by their parents ("*Women are under immense duress to give birth to male babies and when they give birth to intersex babies, they do not know what to do. So, they give the baby away to communes of hijra people*"), or the children that go through abuse at home, run away from their homes, and generally resort to the hijra people. Globally, there are mainly two sources of livelihood for most transgender people i.e. begging and sex work. In India, like we glorify women on one side and brutalize them on the other, in the same way, transgender people have been glorified and brutalized at the same time. In some parts of North India, benediction by transgender people is considered auspicious but they are

limited to that kind of benediction. Such structural exclusion and stigma operate very strongly. So, when the bill criminalizes the enticement of begging, it decimates the support system that transgender people have. That is not to say that the transgender communes are washed in milk; in all of its inadequacies and shortcomings, the community has to cleanse itself from within. Lastly, the Supreme Court spoke about the sex reassignment surgery to be provided by the state, but the Bill is silent on whether or not that is free.

Vyjayanti then proceeded to assess the Trafficking of Persons (Prevention, Protection and Rehabilitation) Bill 2018 ["Trafficking Bill"]. The Trafficking Bill does not replace Section 370 of the IPC or the Immoral Trafficking (Prevention) Act 1956, but is another layer over the existing superstructure. It didn't have a definition of trafficking and is drawn out of Section 370 of the IPC which employs the phrase '*the consent of the victim is immaterial*' thereby stripping agency from sex workers involved in consensual and voluntary sex work.

Following up on the critique of the Trafficking Bill, Vyjayanti apprised the audience of the manner in which custodial homes and shelter homes were being operated. While this is largely affecting women, there are several transgender persons who underwent sex reassignment surgery (before NALSA) since they didn't have the option to self-identify as transgender persons, and hence, most of them who transitioned then were shown as 'Female'. Being dependent on sex work, some of these trans women who had gone to these custodial homes have been survivors of state owned, state run

brothels of trafficking. Compounding the issue is the demand to privatize these shelter homes. Under the government's Pradhan Mantri Ujjwala Yojana, which requires permanent home address verification, the NGO staff is trained to go and out the transgender persons engaging in consensual sex work which is a critical socio-economic issue for the transgender commune. This problem is looked at through the lens of criminal law and as a breakdown of criminal law which is merely a symptomatic analysis and not diagnostic. Due to such state sponsored outing of transgender persons dependent on sex work from their own homes, large villages have been pushed to starvation and extreme poverty.

Vyjayanti moved on to analyse the question of gender change after NALSA. Out of all the States and Union Territories, just about 5 had begun some work in this regard, with the State of Telangana being in default. In spite of massive representations in Telangana to the Chief Minister, Home Secretary, Home Minister, Law Secretary, Law Minster and other high ranked government officials there has been no response to remediate the issue at hand. This forced Vyjayanti to file a PIL in the Telangana High Court, which subsequently issued notices, but the State of Telangana has not responded till date.

The World Professional Association of Transgender Healthcare ["WPATH"] is an international body promoting healthcare standards for transgender persons. The Bill should have used WPATH as a standard instead, but it conflated intersex with transgender and till date, across these 22-23 states which are non-starters, gender confirmation or sex reassignment

surgeries are not available. In various hospitals before sex reassignment surgeries, the doctors take signatures of transgender people on blank pieces of paper to indemnify themselves. If the surgery goes well, it is the doctor's expertise and if it goes wrong, it is the transgender person's misfortune. For formal gender change, transgender people need to undergo a psychological and psychiatric clinical evaluation but often, these professionals are themselves not trained.

The last theme that Vyjayanti discussed was transgender persons and marriage. Transgender people are not able to access marriage unless they identify as 'Females' because Indian personal laws do not include transgender people.

The final panellist to present was Prof. Mrinal Satish (Professor of Law at the National Law University, Delhi) and the theme he had chosen for his presentation was mandatory reporting under POCSO and Criminal Procedure Code ("CrPC"), and its implication on the sexual and reproductive health rights of adolescent girls and women.

Prof. Satish began by highlighting how the medical profession has a very important role to play in law and the process of adjudication. Medical examination of victims of crime as well as accused in crime is considered very important in terms of proving the offense itself. Especially in gendered crimes where one may question the testimony of a woman, medical evidence serves as corroborative evidence, which is considered objective evidence and objective truth. In the context of the law reforms, with respect to POCSO

and the Criminal Law (Amendment) Act of 2013, law reform moved in two steps towards making things mandatory- mandatory reporting and mandatory sentencing. In sexual offenses, while judges previously had the discretion to award the minimum punishment after giving adequate and special reasons (7 years for rape and 10 years for aggravated rape), now that discretion has been taken away from them due to the controversy in determining these adequate and special reasons.

Mandatory reporting – in criminal law, there is a clear question of whether one can punish someone for omitting to do something. In common law, and more in civil law systems, there is criminal liability provided for situations where a person omits to do something. These variations are based on situations – through common law principles evolved by courts, statute etc. In the IPC, it says that Act includes Omission, so anything that can be done through positive act can also be done through negative act if the circumstances and wording of the particular section provides for that. In the CrPC, Section 39 provides a list of offenses where it is mandatory for any person who gets to know that the offense has been committed or likely to be committed, to immediately inform the police. These are predominantly murder, kidnapping for ransom, offenses against the state etc. This clearly does not include any sexual offense. According to Prof. Satish, the Justice Verma Committee recommended that sexual offences be included in the list. Parliament did not bring Section 375 of the IPC i.e. rape into Section 39 of the CrPC, which he felt was appropriate, keeping in mind the agency of the victim to initiate a criminal prosecution. Therefore, there is no obligation on

any individual, including the survivor to report any sexual offense if they get to know of it.

Prof. Satish proceeded to assess the role of medical practitioners in scenarios of sexual violence. While their traditional role has been to provide therapeutic care, the law requires medical practitioners to provide evidence in criminal and civil cases. In the context of sexual violence cases, the development of medical jurisprudence has been very problematic. The issue of how stereotypes regarding women, the way they behave and are expected to behave has become a part of medical jurisprudence. For example, the practice of virginity testing in cases of sexual offense or the two-finger test, have all came through medical jurisprudence. Section 164A was added to the CrPC in 2005 which provided a framework for doctors to provide medical examination in cases of rape. The content understandably was collection of evidence, and not looking at the therapeutic role that the doctor plays. As a consequence, there is role confusion in doctors in cases of rape. For example, if a medical examination is done by a doctor, especially a gynaecologist, they are bound to take the gynaecological history of the victim. Should such history go in the medical form that eventually goes to the court is a conundrum. According to Prof. Satish, it should ideally not, but if we read all these cases, these components are mixed. From sexual activity to all other private details of the survivor's sexual life, are available to the prosecutor, accused, judge, and police. In 2015, the Ministry of Health issued guidelines for medical examination of rape victims. However, since health is

a State-subject under the Constitution, these guidelines have to be adopted by each State, which has not yet happened.

In 2013, although the Parliament did not accept the recommendation of the Verma committee on mandatory reporting of sexual violence, they inserted Section 357C in the CrPC. Section 357C says that if a victim of sexual violence is taken to a hospital or individual doctors, they shall not refuse medical treatment. The first part of the Section requires that a medical practitioner should not refuse medical treatment, while the second part mandates the medical practitioner to also inform the police about the occurrence of sexual violence. To enforce that, Section 166B was introduced in IPC, which says that if one either does not provide medical treatment or report to the police, the concerned doctor will face imprisonment for a maximum of 1 year. Therefore, mandatory reporting has been introduced with respect to doctors.

The next issues Prof. Satish apprised the audience with were questions relating to the age of consent and mandatory reporting under the POCSO Act. Age of consent is a big issue in POCSO which has a blanket rule on age of consent- 18 years. According to Prof. Satish, such a blanket rule lacks the requisite nuance. In the context of mandatory reporting in POCSO, Section 19 says that if anybody gets to know that an offense under POCSO has been committed/likely to be committed, they shall report the offense to the police. This particular obligation to report includes hospitals and the punishment under Section 21 is six months. Looking at available data, Prof. Satish informed the audience that most cases of child sexual abuse

stem from families, which begs the question- is mandatory reporting the appropriate solution, when within families, no one is going to report such cases? According to doctors and psychologists when a child opens up to say that a teacher has abused them, putting them through the process of being taken to court is not only scarring, but also increases the risk of the child subsequently turning hostile.

In *Shanker Kishan Rao Khade v. State of Maharashtra*,[1] the Supreme Court noted that Section 19 is a very important provision of POCSO and has to be implemented strictly. In that case, it was a horrific crime, and while the parents reported it, the police did nothing. Lamenting such poor state action, Prof. Satish opined that the court was probably talking about the strict implementation of Section 19 in that context. But here we have the SC saying "implement with all vigour". Prof. Satish moved on to assess the impact of mandatory reporting on medical professionals. Under the mandatory reporting obligation, gynaecologists are required to report instances where by underage girls wish to access contraceptive pills. There is a marked regression from the time of practicing "safe sex" to now jail time if an underage person asks for contraception, and for the doctor as well if they do not report it. In cases of unwanted underage pregnancy, privacy is the crux of the matter. But under the mandatory reporting requirement, now the doctor has to report such pregnancy. This may be a consensual relationship, where the girl may not want her partner landing in prison, and in the process may attempt to

1 (2013) 5 SCC 546.

terminate her pregnancy without medical supervision and thereby risking her life. Making matters worse is the fact that even judges have no discretion to reduce the sentence. Earlier, for such cases, the judges would award lenient sentences, but now, even in consensual cases, they cannot. The option is for the judge to acquit using unwarranted reasons, which may become precedent to be cited in some other case.

Prof. Satish also discussed the interplay of mandatory reporting with the Medical Termination of Pregnancy Act ["MTP"]. While the MTP Act prescribes for high levels of confidentiality, under the mandatory reporting requirement, there is an obligation to maintain records and share it with the state. Therefore, one may argue that such record keeping is in violation of some provisions of the MTP Act. To escape this conundrum, several doctors incorrectly report the age of underage pregnant girls as 18 and above. At a policy level, when such data is recorded, what an analyst is provided with is countless cases of 18-year olds coming in for medical termination of pregnancy. This in turn forces policymakers to look at how to deal with 18-year olds coming for termination of pregnancy based on incorrect data. Therefore, we are forcing people to fudge data and it is imperative to not underscore the policy implications of such incorrect data.

The other question that comes up in the context of POCSO, is the moment you introduce anything mandatory, the effect is always counterproductive. Discretion theory says that discretion is like fluid in a pipe. If we press it somewhere in the middle, water will go to both sides, but will not stop. Therefore, discretion moves away from one person in the

system to various others in the system. Under POCSO, such discretion moves from the judges to the police and the prosecutor. In the *Independent Thought v. Union of India* case,[2] the Supreme Court said that under the age of 18, any sexual activity is rape, even within marriage. In cases prior to the decision where girls and boys had eloped, engaged in sexual activity and returned, they were charged under POCSO. However, one defense they always took was that they just got married before performing any sexual activity. If above the age of 15 years, legally such a couple could not be convicted. After *Independent Thought*, even this little bit of discretion that a judge previously had doesn't exist anymore. In trying to curtail child sexual abuse, which is a laudable goal, we have tried to repress any sort of sexual activity. In reality, we are only taking consensual sexual relations seriously, not cases of actual sexual abuse. In law reform in the last 5 years, we have moved away from the therapeutic angle that medicine is supposed to give, to pushing doctors to become officers for enforcing the law for the entire criminal justice system, thereby failing the criminal justice system. On this note Prof. Satish ended his presentation.

2 (2017) 10 SCC 800.

MENTAL HEALTH POLICY IN INDIA: CHALLENGES AND SUGGESTIONS*

Amba Salelkar, K. Chandrasekhar, Rahul Shidhaye, Reshma Valliappan & Vaishnavi Jayakumar

Mental health care in India is plagued by economic, social and cultural barriers. This is rooted in a lack of awareness on what mental health entails, and how to identify and address mental health issues. An estimated 7.5% of India's population suffers from mental health issues and 80% of them do not undergo treatment. Suicide is the leading cause of death among the nation's youth and the WHO estimates that one out of six Indians suffer from depression, making it the most depressed country in the world. The doctor to patient ratio in the field of mental health is woefully inadequate at 0.3 psychiatrists and 0.07 psychologists per 100,000 population. The cost of mental health treatment is high, rendering it out of reach for most. Coupled with the lack of capacity and monetary hurdles, there is social stigma and cultural barriers to seeking mental health treatment. Further, poor mental health is perceived as a trivial issue and a sign of weakness. This prevents even those with adequate resources from seeking help. Realising access to mental health care is essential to restore the hope and dignity of those suffering.

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The Mental Health Care Act, 2017 seeks to improve the situation. The Act adopts a rights-based approach to mental health care, guaranteeing every person the right to access affordable treatment without discrimination. The Act's decentralised model obligates the Central and State governments to fund mental health services and facilities and help bridge the gap between patients and professionals. It integrates mental health care at each level of the public health system. While the Act has been hailed as path-breaking, it is not perfect. For instance, the Act retains an exception to a person's right to confidentiality for information related to mental health to "protect any other person from harm or violence." This reflects a negative view of persons with mental illness. Additionally, there are hurdles in implementation. Infrastructure gaps must be addressed to realise the potential of the Act. To this end, public initiatives at the community-level show promise in increasing capacity. However, there is need for State mental health authorities to step up in order to ensure compliance with the Act. The following panel discussion was aimed at suggesting steps that can be taken by the Central and State governments in order to address challenges to the Act and to promote its effective implementation.

The mental health panel was moderated by **Ms. Shubha Ranganathan,** Associate Professor in the Dept. of Liberal Arts at the Indian Institute of Technology Hyderabad. Ms. Ranganathan's research focuses on public mental health in India and local practices of healing. The panel discussion mainly revolved around the issues posed by the Mental

Health Policy in India, with a specific focus on the Mental Health Care Act, 2017. Against this backdrop, the panellists engaged in insightful discussions on the treatment of mental health in India and the deficiencies in the approaches adopted by the Mental Health Policy, including previous legislations dealing with mental health.

First, the moderator invited **Dr. K. Chandrasekhar,** Founder Director, Managing Director and senior consultant at Asha Hospital, Hyderabad, to begin the panel discussion. Dr. Chandrashekhar focussed on the issues relating to implementation of the mental health policies in India and in particular, the Mental Health Act, 2017.

Dr. Chandrasekhar began by observing that mental health is an oft-neglected component of public health in India. For decades, the focus has been on communicable diseases. Mental health has faced neglect, even in budgetary sanctions from the government. According to him, the Mental Health Bill of 2017 is nothing short of an election manifesto; in that it fails to address and resolve mental health issues and instead only paints a rosy picture of the state of mental health in India. Dr. Chandrashekhar also noted that the first step in framing a viable mental health policy is to determine whether such a policy can be implemented in practice.

Dr. Chandrasekhar then drew attention to the approach adopted by the Mental Health Policy whereby mental health care is to be provided through Primary Health Centres (**PHCs**), which are largely related to maternal and child health. Such an integration of mental health into primary

care has presented difficulties in the past, but has still been adopted. For instance, in 1982, attempts were made to integrate mental health care into general health care, but there has been little progress in this regard. A 2016 Report published by the Technical Committee on Mental Health, constituted by the National Human Rights Commission (**NHRC**), has advised against integrating mental health with general public health. Yet, the policy presents this integration as the primary approach. Moreover, the implementation of the policy varies from state to state. In a majority of states, Outside Hospital Care (**OHC**) is inaccessible. Physical Status Examination (**PSE**) is always a moot point. And yet, the Mental Health Bill has taken an integrated approach.

Moving on, Dr. Chandrasekhar highlighted the main issues in this policy, which are as follows:

(1) Not all mental illnesses warrant the same level of care. However, the policy makes no gradation in terms of what level of care should be provided for different mental illnesses.

(2) The burden on the families in case of mental health issues is more severe when compared to other forms of illnesses. Against this backdrop, service-users and care-givers should be included in the implementation and regulation of mental health care policies, which is rarely the case.

(3) The government along with private care providers should be responsible in providing the requisite health care.

He then went on to address the challenges which plagued the mental health setup, as follows:

First, providing services within the framework of general health care is the biggest issue.

Further, a distinction must be drawn between mental health issues and mental health illnesses. Dr. Chandrasekhar believes that every person will definitely have mental health issues at least once in their lifetime. In his own words,

> *"Lot of mental issues can be problems of just living- the poverty, the migration, rural-urban divide, the economic divide, all those things can produce some amount of restlessness, a moment of mental or a sort of a stress in a given individual."*

When such "mental issues" are combined with "mental illnesses", the emphasis is divided, and neither "issues" nor "illnesses" can be dealt with satisfactorily. Resultantly, the policy becomes too vast and unmanageable.

Second, ground realities further point out clear issues that the policy fails to address. As per the latest census, about 10.6 crore people are

suffering from 4 serious mental disorders in the country. There are 47 mental hospitals, with only 50,000 beds. Indeed, Dr. Chandrashekar substantiates,

> *"The number of beds available for mental illness at global level is 6.5 for 1 lakh population, but in India it is about 2.15 for 1 lakh population. This is absolutely low."*

The problem is further compounded by excessive focus on community-based care, resulting in inadequate hospital-based care, despite the latter's importance. He states,

> *"Community based care is an important issue, but it is not going to replace the hospital-based care as far as mental health is concerned - there are serious mental illnesses which need hospital-based care and one cannot wish away the problem."*

It would be wrong to assume that only community-based care is needed for mental health care patients; hospital-based care is equally necessary.

Third, Dr. Chandrasekhar criticized the District Mental Health Program (**DMHP**). He noted,

> *"The Mental Health Program came into being when I was a student 40 years ago. After almost 40 years, not even one-third of the country is covered. If you cannot implement in 30-40 years and still continue to*

> *harp on that as the basic policy of mental health care, I think there is something wrong."*

He added that, in almost fifteen years, only two districts have implemented the DMHP. There has been no cooperation between the State Governments and the Central Government in this regard.

Fourth, Dr. Chandrasekhar opined that mental illness is not a unitary disease – it cannot be boiled down to narrow streamlines. Providing mental health care requires infrastructural changes. The main stakeholders in mental health policies are the ones who are suffering, the care-givers, and the NGOs. Taking stock of human resources from across the public and private sectors to provide requisite care, we find that every medical college has a psychiatry department. Can the National Mental Health Program (NMHP) and DMHP in their present form really fulfil their roles in the delivery of mental health care along the lines envisaged by the National Mental Health Policy?

After pointing out these challenges, Dr. Chandrasekhar ended his address by suggesting that the model of mental health care has to be rethought and reframed. A district mental health department could be set up, to provide monetary compensation for hospitalization and outpatient service costs. He also added that there was a need to improve the psychiatric education across the country, and to focus on the ground realities to utilise the available local resources.

After hearing Dr. Chandrasekhar's views, Ms. Ranganathan invited **Dr. Rahul Shidhaye,** a Clinical Psychiatrist and faculty member at the Centre for Mental Health Law and Policy, having a keen interest in the field of public mental health, to speak on the strategies that may be adopted to transform 'evidence-based interventions' into 'practice', in order to improve mere 'access' to 'quality' mental health services in India.

Dr. Shidhaye began the discussion by reflecting on why students in a law university would be interested in issues such as mental health. According to him, there is scope for interdisciplinary work for legal advocacy and mental health problems.

The big challenge from the psychological perspective are with respect to the opportunities currently available to address the issue of mental health, and the implementation of government policies.

According to Dr. Shidhaye, the big challenge is in providing access to health care to people who suffer from these disorders. Here, he pointed out that psychotropic drugs and medical care are neither easily accessible nor always of good quality. In his own words,

> *"(The issue is) how to improve access to care - not just any care, but care provided with quality, which is effective."*

Dr. Shidhaye then went on to draw attention to the opportunity at hand – the National Mental Health policy, which he stated, enshrines mental

health care as a *right*. This "right" status helps in gaining access to mental health care, and can also be seen as universal access to care. Keeping this is mind, Dr. Shidhaye surmised that chasing this utopia might be the need of the hour. Indeed, the National Health Policy of 2017 acknowledges mental health care as a thrust idea. The question however remains about its implementation.

Going about answering this question, Dr. Shidhaye recounted his experience of working with the district health centre in the State of Madhya Pradesh. He remarked that the experience proved that there were some evidence-based interventions[1] which worked well towards producing positive results in the area of healthcare. He observed that there was a need to move from that point and translate these interventions into practice, and to understand the fora in which they work.

It is important to understand the context in which these interventions are delivered – either in a private healthcare system or the public healthcare system. The public health care system in India is not strong enough to absorb these interventions for mental healthcare and deliver them. However, there are a few examples in which evidence-based interventions have produced positive results, such as the work done by Banyan in which they advocated for the supply of psychotropic drugs for Primary Health Centres

1 Evidence-based interventions are treatments which are proven to be effective through credible and reliable evidence or outcome evaluations.

(**PHCs**) within the DMHP. This advocacy was led by users and the drugs were made available in the PHCs.

Similarly, Dr. Shidhaye recounted that in another case in Madhya Pradesh, efforts were made to get community health care workers to work in the mental health field and that along with availability of drugs, data was also regularly collected. They ensured that resources and space were allocated to the mental health program within the health care facility, and that space was called '*Mankaksh'*. These were efforts that were made and proved successful within the public healthcare system.

Dr. Shidhaye observed that the takeaway from these examples is that although evidence-based interventions involve considerable time and effort, they allow us to have a broader system in which the systemic goals can actually be achieved. Further, based on evidence-based interventions, services can be integrated and delivered for severe mental illnesses such as depression and alcoholism.

The findings are positive in the sense that people are optimistic about using such services. But there is a paucity of services. "*In the absence of services*," Dr. Shidhaye says, "*awareness (about mental health) cannot be created.*" Hence, he opined, the focus should be on starting to provide services, advocacy and availability of resources. In Dr. Shidhaye's words,

> *"Systems need to be organized and we need external help, an external facilitation team and a set of advocates who can push the policy"*

In this vein, Dr. Shidhaye agreed that we have to work together; almost get coached in order to get a clear idea of what we seek to provide. His team in Madhya Pradesh was able to achieve some results from evidence-based interventions, and he believes that such interventions will be able to achieve more.

Dr. Shidhaye concluded his speech on the note that he started. He remarked that law students play a critical role in working with the government and advocating the importance of mental health care as a right. Indeed, he appeals specifically to lawyers,

> *"You (Lawyers) can play a very critical role in working with government to advocate some of these things – how to get this system strengthened, how to get data, how to get information in place and how to get dedicated resource and space for some of these systems. You can fight for patients, people and some of us."*

From this position, Shidhaye concluded, we can move into the field of health care as a whole and bring about a change.

Ms. Ranganathan then proceeded to invite **Ms. Amba Salelkar,** a lawyer, disability rights activist and Board Member of the Equals Centre for Promotion of Social Justice, to share her thoughts on the issue.

Ms. Salelkar began by recounting that since 2012, she has been working on disability law and policy and that a large part of her work is

informed by the fact that she herself has been a "*user and survivor of psychiatry*" and a survivor of post-partum depression. Ms. Salelkar outlined that she would begin her discussion by unpacking certain terminologies that are commonly associated with mental health and mental disorders. Thereafter, she would proceed by recounting the experiences of a few people with mental illness and navigating health care systems. She pointed out that the term 'mental health' is reflective of mental well-being as a whole. She reflected that a lot of mental health issues revolve around stigma. She stated that while the idea of stigma was around for a while, there was a need to discuss the issue of discrimination as opposed to a focus solely on anti-stigma. While the term 'mental illness' or 'mental stigma' had been clarified by Dr. Chandrasekhar, another term people commonly used was 'psychosocial disability'. People with mental illnesses do not associate with these terms, for several reasons – such as being uncomfortable with the idea of being given special treatment in terms of a ration card or designated parking space, etc. The idea of 'disability' is loaded. The idea is that mental illness is an impairment which people experience and not all impairments necessarily lead to disability. She observed that it is when an impairment causes a barrier in terms of certain kinds of access, that is when the impairment leads to disability. In such cases, people with mental illnesses do identify with disability, especially when their conditions are chronic.

Ms. Salelkar then proceeded to explain the term '*users and survivors of psychiatry'*, which has its roots in the 1970s. She described the genesis of the

term in a civil rights movement led by patients.[2] Ms. Salelkar explained her reason for unpacking these terms is that when discussing mental health, it is important to understand what these terms envisage.

After outlining certain important terminology, Ms. Salelkar spoke in detail about stigma and how the spectrum of mental health from the idea of mental well-being to the people who face chronic restrictions on account of their impairments, is strangely promoting the stigma against mental health/illnesses. The common misconception is that mental illness only comprises of depression. Ms. Salelkar then clarified that she would be limiting her views on stigma and discrimination within the context of administration of healthcare. Mental illness is often looked at from a medical lens, whereas most modern psychological studies suggest mental illnesses are caused by very complex cyclical interactions of genetics and psychological, biological and social factors. Mental illnesses are looked upon as just a medical issue, whereas that is not the case. For example, the Rohit Vemula case – where the university said that he was depressed, but there was no discussion on the systemic factors that could have led to his mental illness/depression (such as caste in his case).

Ms. Salelkar then proceeded to talk about the experiences of users and survivors of psychiatry in healthcare. She had the opportunity to study

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2 The term essentially refers to a diverse association of people who either currently use mental health services, survivors of interventions by psychiatry or who are former patients of mental health services

the district health care program in the district of Cuddalore in Tamil Nadu. She recounted that the mental health care unit in Cuddalore had only a few beds, a psychiatrist, a psychologist, a nurse and a data entry operator. To begin with, there were only about 5 people coming into the centre each day. The doctor then started creating awareness within the community about mental health. A study on the cost of exclusion of persons with psychosocial disability was being undertaken. There was a satellite clinic at Katta Mannar Koyal, where there were 200 patients who had to travel long distances, to get treatment and medication. Post the awareness campaigns, the patients started coming to these satellite clinics instead of going to Chennai.

Ms. Salelkar highlighted that access involves two things – access to mental health care *and* access to other health care facilities. A whole range of facilities are required. The underlying idea is that mental illness deems to make a person unqualified for a lot of things because it is at the heart of one's decision-making abilities.

A conversation about access to health care should also include discussions regarding forced institutionalization and over/under medicalization. The reason behind having separate health laws is that people with mental illnesses cannot take decisions themselves, and therefore having such a law enables others to take decisions for them. The issue here is 'the right to informed consent'. For example, the dangers of putting someone on anti-depressants is well known. Therefore, while administering anti-

depressants, a prior warning of the consequences plays a crucial role. However, such information is usually hidden.

Ms. Salelkar commented that with regard to institutionalization, there have been money cuts in district health programs. People opted for institutionalization for a variety of reasons. It was not merely because of organizational issues. Factors such as insurance costs also played a vital role.

She highlighted that when people with mental illness go to seek other health care facilities, every issue, even physical pain is somehow attributed to mental illness. She finally concluded by observing that there is a need to look at the holistic experiences of people with mental illnesses instead of looking solely at the medication model.

Ms. Ranganathan then invited **Ms. Reshma Valliappan** to take the floor. Ms. Valliappan is an artist and activist focusing on issues related to mental health, disability, sexuality and human rights. She is also the Founder-Director of "The Red Door", a movement centred around developing holistic models of living.

Ms. Valliappan began by laying down the importance of terminologies that the government policies do not lay much emphasis on. She pointed out that, "*The psychological make-up of persons makes them what they are and the fact that people with mental health issues speak in a language we don't ourselves speak doesn't mean that what they say is irrelevant.*"

Unfortunately, she lamented, policies are being implemented in a perfunctory manner, rather than focusing on the patients. There is a need to understand where people are coming from, instead of labelling their behaviour/language as a mental disease. The adjectives that are commonly used for mental health patients come from flawed norms. By using such terms, we implement the language of someone else. Therefore, *'It is our job to understand what they come from instead of dissing it as a psychological problem that needs to be treated.*" she asserted.

Quoting the Convention on the Rights of Persons with Disabilities (**CRPD**), 'Nothing About Us Without Us', Ms. Valliappan said that if people talk about mental illness without involving those living with the very illness, it would be counterproductive. The very stakeholders would be deprived of their intrinsic rights. When people have illnesses such as cancer, diabetes etc., they are told to change their lifestyle. However, the same is not perceived for those with mental illness. "*How do you know my problem when you cannot even see it?*", she quips.

Ms. Valliappan asserted that the present system of mental health care lacks compassion. According to her, psychiatrists must first learn to empathize with their patients, have the ability to see beyond a label, and to see people as human beings in order to build a rapport. Law is essential to monitor this as it is connected to politics, and so is treatment and healthcare. With comprehensive law and policies, it would be possible to evaluate how

practitioners are working and what is the level of trust that is exchanged. Ms. Valliappan said,

> *"Many of us go beyond our bodies. It is mind that we give. It is the most valuable possession that needs to be handled with the greatest responsibility."*

Although it is great to implement mental health policies, we will not have the required ratio of psychiatrists to patients by the year 2030, owing to the growing population. To meet this challenge, India needs to be the change maker. This forces us to challenge what we know about each other and what we have believed so far.

Ms. Valliappan stated that medications have not worked for numerous people. Many people either choose to not opt for medications or refute it. Although it cannot be forced, we can only reach an understanding when the language of those with mental health conditions is understood and spoken. There is a need to understand their realities.

For instance, sexual fantasies and experimentation are easily classified as symptoms of sexual deviance. There is a need to evaluate how practitioners are working and what is the trust that is exchanged. It is the most valuable possession that needs to be handled with the greatest responsibility.

Ms. Valliappan stressed that community change is important and does exist. In a country as large as ours, it is difficult to gather data and resources regarding such changes. However, we cannot assume such change doesn't exist. We believe that there are numerous factors which contribute to mental illness. Everybody has an idea as to what has caused it; but there is a need to ask the person who is actually suffering from it as to what has caused his/her illness. She signed off by concluding that for achieving success in mental health care policy, there must be initiation of dialogues and conversations with people in languages by which we can understand each other.

The moderator then invited **Ms. Vaishnavi Jayakumar,** a disability rights activist and co-founder of "Banyan", a NGO based in Chennai working towards providing care to mentally ill and homeless women, to conclude the panel discussion with some insights on the evolution of the Mental Health Policy.

Ms. Jayakumar noted that the mental health policy has stayed more or less stagnant for decades. She pointed out the commonalities with the policy in the U.K and the fact that both the policies had the same starting point. The U.K's Lunacy Act of 1890 was followed by the Indian Lunacy Act of 1912. It was progressive legislation for its time. The Indian Lunacy Act spoke of the need for qualitative admission of people who have mental health issues. But in essence, it was clear that there exists a duty to provide mental health care to those who needed it.

The 1959 Mental Health Act of the U.K. and the 1987 Mental Health Act of India were rooted in the Lunacy Act. This was until 2017, when the Mental Health Act, 2017 came into effect and was notified. Parallel to that, the U.K has the Mental Capacity Act, 2005 and between 2005 and 2009, there was the Scottish 'significantly impaired decision-making ability' (SIDMA) which was restricted to persons with mental health issues.[3] The trend or the craze for the distinction between half capacity and complete negation of decision-making capacity started to emerge in 2005. This was before the time of the CRPD. Ms. Jayakumar remarked,

> *"We forget that the community does not really have to be caring, and there are people who do not have families. Then who provides care?"*

The concept of oversight is scrutinized by the Office of the Public Guardian in the U.K. In 2009, the "Deprivation of Liberty Safeguards" (DoLS) were developed for people with learning disabilities.[4] This was an amendment to the Mental Capacity Act which addressed the individual's rights within the entire framework of mental capacity. There is an underlying Bill in the UK that aims do away with DoLS. Ms. Jayakumar pointed out that

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3 SIDMA is different from the understanding of 'incapacity' as per the Adults with Incapacity (Scotland) Act, 2000. SIDMA occurs when a mental disorder affects the person's ability to believe, understand and retain information, and to make and communicate decisions. It is consequently a manifestation of a disorder of mind. While SIDMA arises out of mental disorders alone, incapacity is wider and can occur due to disease of the brain or impaired cognition and includes physical disability.

4 The Deprivation of Liberty Safeguards provide a framework for approving the deprivation of liberty for persons who lack the mental capacity to consent to necessary treatment in a hospital/care home. The idea is that through a set of checks, authorities can assess whether any care that restricts a person's liberty is both appropriate and in their best interests

the presence of Deprivation of Liberty Safeguards is itself an admission of an intrinsic problem. Wherever there is an imbalance of power, there will be abuse. How do we address this abuse? The imbalance of power is addressed by the 2010 Equality Act in the U.K., which is an umbrella legislation for anti-discrimination. The speaker pointed that India had a lot to learn from this. The system that provides protection to any group facing abuse/discrimination to be protected under public policy, is the way to go.

Moving on, Ms. Jayakumar remarked,

> *"An inquiry into seeking justice and shedding light on the ground realities with regards to people with mental health is almost like reading into the history of PIL in India."*

It started with Sheila Barsa and Veena Sethi, mostly with respect to prisons and mental illness. It concerned prisoners who were facing mental illness and those who had no business in prison but who were admitted there nevertheless, i.e., non-criminal lunatics. This was followed by Ervadi incident in 2001[5] wherein the Supreme Court took *suo moto* cognizance All states were directed to give affidavits and records on what the status of mental health/treatment was. These records should have been available as such, but were not. A year later, the Supreme Court passed an order which was controversial because it was prior to the CRPD and the seismic change as far

[5] The court took *suo moto* action based on a news item published in all the daily newspapers regarding more than 25 mentally challenged patients who were housed in a mental asylum were charred to death at Ervadi in Ramanathapuram district, Tamil Nadu.

as disability and mental health were concerned. The order mandated the setting up of a district mental health hospital in every district. In defence of the Supreme Court, Ms. Jayakumar observed,

> *"We need to think in terms of access to services at the district level. The uptake was slow and according to studies on how the DMHP was working, the progress was erratic. The plan was clear but the implementation was not."*

She then reflected on illegal detention - another situation which was not acted upon. In the aftermath, the order and the hearings of the Supreme Court came to a halt as it was argued that CRPD would bring about a new lens to look at these issues, and India would be ratifying the same. It was agreed to stall the home activities so that a more harmonized policy could be adopted. But nothing happened afterwards and the Ervadi case petered out.

Meanwhile the cases of illegal detention multiplied. Ms. Jayakumar then talked about how there was a zealous effort in 2008 in Chennai to round up people who appeared to be mentally ill from the streets of Kodaikanal in order to "clean up the streets" and this process entailed serious human rights violations. These people were given fresh clothes and a psychiatrist was assigned to treat these people. It led to a rush of people from different states coming into Chennai which sparked some jingoistic thoughts among the people of Tamil Nadu.

Ms. Jayakumar briefly reflected on the barriers of language in mental health hospital and asylums that has not yet been addressed by the system. There was a case where a man who was roaming on the streets of Kodaikanal and appeared to be in a bad condition was taken to a mental health hospital and was admitted there. Language being a barrier, he was unable to communicate with the staff/doctors of the mental health hospital. He was later traced by his daughter and a Public Interest Litigation was filed. The court reprimanded the mental health hospital as well as the Kodaikanal Collector. However, such incidents occur often and reflect the assumptions about people with mental health and illegal detentions. Another case in point is the incident wherein a judge was angered when a woman, who was arguing her own case, disrobed herself in frustration since her case was proceeding slowly. The judge ordered her admission into an asylum. Ms. Jayakumar reflected that the assumption that a person suffers from a mental disorder/illness is predominantly stronger against women than that against men with respect to actions that are not considered "normal".

There was a lot of discussion on people who had recovered and no longer needed to be admitted in mental health hospitals but had remained there for several reasons – for example, their families could not be traced. At some point in time, about 20%-30% of the occupancy in mental health hospitals was being taken up by such persons. Therefore, states began to partner with NGOs to deal with this situation. Several prisoners in India also suffer from mental health issues and are not given adequate or any treatment. In 2019, there were reports of several persons being chained in faith-healing

centres in U.P. The intervention of the Supreme Court was sought through a PIL. There is a dichotomy between the human rights aspect of mental health vis-à-vis the on the ground treatment of mental health emergencies. This dichotomy became apparent through the Ervadi issue. Ms. Jayakumar reflected that the main reason why there has been no consensus as to how to move forward and address these various issues is because there are severe ideological differences among various stakeholders, and people with mental health issues continue to face the brunt of it.

Ms. Jayakumar opined that there is a need for transparency in the functioning of state mental health authorities and mental health hospitals. She stressed on the need to move towards a community-based model of dealing with mental health issues. She quipped,

> *"If there is a community-based model and it is being tried out in districts, why is it not being taken directly to the target populations? The target population naturally congregates in a variety of faith-healing centres…."*

She opined that as a consequence, DMHP centres should be set up in areas where there are such faith-healing centres as they would naturally attract the target population. There is a need to accept that people have different beliefs as to how they will be cured. Not everyone has faith in medical treatments. There must be an attempt to integrate various models of treatment and the focus should not be entirely on the medical treatment model of dealing with mental health issues. To fill this gap, there is a need to

engage with the faith healing centres. In some places such as Ervadi, faith healing centres are almost institutionalised and accepted as a model of treatment alongside medical treatment. The funds allotted to the DMHP are underutilised and are often wasted. There has not been a significant increase in the number of psychiatrists in India over the years. Most of the focus is on mental illness and not mental health. Signing off, Ms. Jayakumar remarked, "*First, there is a need for acceptance of mental illness and its existence in ground reality. Only then can further steps be taken and we can move towards progressive realisation of mental health."*

THE FUTURE OF RIGHT TO HEALTH IN INDIA: THE PATH TO REALISING UNIVERSAL ACCESS*

-Imrana Qadeer, K. Sujatha Rao, N. Purendra Prasad, Soumitra Ghosh & Shreelata Rao Seshadri

Despite various government initiatives to improve public health in India, the average Indian's life expectancy is 68 years, significantly lower than that of other developing countries like China and Brazil. This is largely due to lack of access to affordable, high-quality healthcare. The amount spent on healthcare has reduced significantly in the last four years with only 1.28% of total gross domestic product being spent on healthcare in 2017-18. There is broad consensus on the need to realise universal access to healthcare for everyone in India. However, it is less certain which path is the best to achieve this. Various models of healthcare dominate in different countries – from UK's National Health Service where the government owns and operates most hospitals and clinics, to Canada's National Health Insurance model where the government runs health insurance programs by utilising private sector providers. In India, most pay for health care out-of-pocket while many more do not have access to hospitals or clinics at all.

* Report authored by Parika Kamra. Transcribed by Srishti Suresh, Pranav Mihir Kandada, Govind Singh, Karshin Malik, Harsh N. Dudhe and Mustafa Rajkotwala. Editorial assistance from Tanvi Apte.

Several policy initiatives exist to remedy this. For instance, primary health care centres and community initiatives like Delhi's Mohalla Clinic and Hyderabad's Basti Dawakhanas. Additionally, there is the Ayushman Bharat programme, which is a publicly-funded health insurance scheme while Andhra Pradesh's Aarogyasri community health insurance scheme echoes the Canadian model. This panel discussion explored different paths to realise universal access to health care in India and deliberate on our future towards achieving the right to health for all.

The panel discussion moderated by **Mr. Sidharth Chauhan**, Assistant Professor at NALSAR University of Law, Hyderabad, was concerned with the future of right to health in India.

The first speaker on the panel was **Prof. Imrana Qadeer**, a member of Council or Social Development and a faculty member of Jawaharlal Nehru University. She started the session by highlighting that universal access does not exist in India as a fundamental right. The meaning of universal access was itself misplaced in the context of healthcare. She stated:

"Universality is not an issue of numbers and covering numbers because universality is related to one's sensitivity towards different conditions, different needs. We should not be confused between the demands that may be coming from some very vocal sections and the needs of the minority that stay unarticulated."

All enquiries about healthcare delve into the medical and technical aspect of it, instead of looking at its sociological angle. When social approach to healthcare is incorporated, universality is not restricted to the limited question of numbers, but becomes a matter of inclusivity. Similarly, a social enquiry into access to healthcare goes beyond the economic and physical aspects of having healthcare facilities; it enquires about the limits of healthcare for certain communities and groups in society.

Prof. Qadeer pointed out that the idea of "universal access" to healthcare is not new; it first emerged in western democracies that were focused upon the economics of welfare. Similarly, democratic politics in independent India directed healthcare policy makers to create structural changes that could potentially lead to social and economic development. The ultimate aim of these changes was to eradicate poverty, then recognized by the Bhore Committee (1946),[1] as the root cause of ill health. However, the advent of capitalism opened up the area of healthcare to the private sector, thus limiting it to economic and insurance reforms. It was in this context that the National Health Bill[2] was passed. In Prof. Qadeer's words,

> *"The state acquired the role of the steward, the steward for the private sector, to smoothen the functioning of insurances in this country so the subsidy shift led to immense growth of public/private partnerships which*

1 BHORE JOSEPH, REPORT OF THE HEALTH SURVEY AND DEVELOPING COMMITTEE (Govt. of India Press, Calcutta 1946). Available: https://www.nhp.gov.in/sites/default/files/pdf/Bhore_Committee_Report_VOL-1.pdf

2 National Health Bill, Ministry of Health and Family Welfare (2009). Available: https://www.prsindia.org/uploads/media/Draft_National_Bill.pdf

> *I believe has had a very negative impact on the public sector institutions because not only did they lose out on money, they also lost out on manpower, the quality of work went down, there was demoralization among professionals, and we lost the vision that people are central."*

The Bill encouraged pooling of risks through insurance and management of health hazards by partnering with the private sector. This shifted the focus of healthcare from human beings as central to the ability to *afford* healthcare as central. Such a market model helped develop infrastructure primarily in the tertiary and now secondary sectors.[3] This ignores the concept of Primary Healthcare as stated in the Alma-Ata Declaration,[4] wherein primary level care constitutes the core of healthcare system and is fully supported by the other levels. The market model does not provide any link between the three levels of healthcare. Today, investments in Hi-tech services for non-communicable diseases are on the rise, whereas key areas such as maternal and infant health care, nutrition, and communicable diseases continue to be ignored.

Universality of healthcare can be achieved only if healthcare is conceived as a component of a welfare strategy based on Indian experiences. Healthcare should not be limited to curing diseases alone. Apart from Primary healthcare, it ought to include the right to basic amenities like access

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3 Primary health concerns itself with providing local health care. Secondary healthcare is provided by specialists. Tertiary healthcare is specialized consultative care for hospitalized patients.

4 Declaration of Alma-Ata, INTERNATIONAL CONFERENCE ON PRIMARY HEALTH CARE, WORLD HEALTH ORGANIZATION [WHO] (6-12 September 1978), https://www.who.int/publications/almaata_declaration_en.pdf.

to food, drinking water and cheap essential medicines, and also the right to live with dignity. The need of the hour is to focus on Primary healthcare. Changes in healthcare policy can ultimately be brought forth through clarity in political commitment, and by including people from diverse disciplines in policy making. Inclusivity will take healthcare beyond its limited focus on commodification and profit making.

The second speaker, **Prof. N. Purendra Prasad,** Professor and Head of the Department of Sociology at the University of Hyderabad, focused on the existing inequality in universal health care. Several reports have confirmed that income disparity has grown in India over the last few years. As Prof. Prasad pointed out,

> "*National Commission for Enterprises in the Unorganised Sector (NCEUS) data says that 79% of workers in the unorganized sector live on an income (that is) less than 20 rupees a day. The State of Working India Report 2018 also said that every 10% increase in GDP results in less than one percent increase in employment. There is growth, but no equity or redistribution. Even today Scheduled Castes (SC) workers earn only 56% of (the earnings of) their upper-caste counterparts.*"

Against this backdrop, it is extremely worrying that India's expenditure on public health care is considerably low. FDI investment in hospitals and mobilization of capital through other forms like American

Depository Receipts (ADRs)[5] and Global Depository Receipts (GDRs)[6] up to 49% has stimulated the establishment of corporate hospitals. This has completely transformed the Indian private sector, so much so that the private sector has grown exponentially to become the first line of treatment. In this vein, Prof. Prasad says,

> "*There is significant out of pocket (OOP) expenditure for medical treatment (in India) i.e. ₹ 2,750 billion of which 98% is OOP Spending. Even countries like Sri Lanka and Thailand have better health care allocation compared to India.*"

Emulating the American model of insurance, which essentially individualizes the healthcare sector, India has shifted the burden of providing adequate healthcare facilities from the government to individuals themselves. Another reason for the policy shift is that there is a gradual de-emphasis on public health care institutions (in terms of infrastructure, manpower, finances, services etc.), and the promotion of private and corporate hospitals by effective allocation of government resources.

Touted as the world's largest healthcare program, India's universal healthcare scheme, Ayushman Bharat, is envisioned to operate with a limited budget of ₹ 2000 crore. Importantly, Ayushman Bharat has further contributed to strengthening of the private sector. This has resulted in *first*,

5 It is a negotiable certificate, issued by a U.S. depositary Bank and represents specified number(s) of shares invested in a foreign company's stock.

6 It is a bank certificate issued in more than one country for shares in a foreign company.

siphoning off of health budgets from the government to private entities and *second*, pushing the government healthcare to develop stronger contractual arrangements with private sector providers in both the non-profit and for-profit sectors. Ultimately, the scheme is a final step towards successfully diluting the public health sector and strengthening the corporate sector, something which Prof. Prasad is wary of. Signing off, he says,

> *"Substituting prevention with treatment is a costlier and unsustainable option. Such financing has strengthened private hospitals without putting in place regulations to monitor them for price and quality."*

The third speaker, **Dr. Soumitra Ghosh,** Professor of Health Economics and Health Financing at Tata Institute of Social Sciences, Mumbai, began by laying down the characteristics of places where a universal healthcare system is present. He opined,

> "*In places where we have a universal health care system present, health care is looked at as public service. If you need it, you get it. Irrespective of your social or economic status you will be in a position to access health care.*"

Against this ideal, Dr. Ghosh evaluated the public health system in India, enquiring as to why India lacked better access to public healthcare. Although limited state capacity could be a plausible reason for it, the expenditure on public health had failed to keep at par with the economic growth and infrastructural development of the country. He remarked that:

> *"The opportunity to launch major initiatives in health policy, associated with the rapid growth of GDP and public revenue has largely been missed."*

The speaker then attempted to highlight the issues with insurance-based health system model by critically analysing the existing health insurance schemes such as Maharashtra's *Mahatma Jyotiba Phule Jan Arogya Yojana* (MJPJAY) and the centrally sponsored *Rashtriya Swasthya Bima Yajana* (RSBY) scheme, which is the predecessor of *Pradhan Mantri Jan Arogya Yojana* (PMJAY) being implemented under *Ayushman Bharat*.

Due to the popular perception within policy circles that public healthcare was inefficient, the government decided to limit its role to only financing the RSBY scheme. Although the scheme was meant for the lower income groups below the poverty line (BPL), only 11% of the population was enrolled as per the National Sample Survey Organisation's (NSSO) data. The data of the insurance companies reflected that RSBY scheme covered 50% of BPL households, thereby allowing these companies to collect more premium for enrolling a greater number of households. However, empirical evidence indicates that majority of the BPL families remained unaware of the existence of such a scheme.

The RSBY is also limited in its coverage as it only sponsors healthcare in case the beneficiary is hospitalized and leaves out a major chunk of out-patient charges incurred by BPL households. Moreover, using claims data of MJPJAY, Dr. Ghosh showed that private hospitals engaged in

significant amount of 'cherry-picking' by choosing patients requiring high paying surgeries, while leaving the 'low profit' ones for the public hospitals. There is growing evidence that, despite the tall claims of the insurance companies, the beneficiaries of the government insurance schemes incur substantial expenditure out of their own pockets. He concluded by demonstrating how the insurance-based coverage for high end secondary and tertiary care is skewing public health priorities, and displacing precious financial resources that should have been be utilized for primary and preventive healthcare.

The next speaker, **Prof. Shreelata Rao Seshadri**[7] started the talk by discussing the primary problem with the universal healthcare policy. Universal health programs advocate for a uniform policy for all without accounting for diversity in terms of age, gender, location, caste, etc. In reality, the right to heath is made up of two values; the *first* is the instrumental value of health which measures a healthy population in terms of numbers and figures and the *second* is the intrinsic value of health, which demands equality of access to health services across the population. Prof. Seshadri remarked,

> "*All of these things: age, gender, location, class; all of these define the way that we construct what the right to health means to each of us.*"

The idea of the right to health has been changed to the idea of right to healthcare. This shift has resulted in two things: *first,* it has removed the

7 Prof. Seshadri teaches Health at nutrition at Azim Premji University, Bangalore.

idea of equality and justice from the right to health and has systematically created a system where health outcomes are unfair. These inequalities occur due to economic backwardness, often coupled with factors like caste and gender. To improvise healthcare, there is a need to go beyond the binary of rich and poor and look at inequalities in healthcare from an intersectional lens. Prof. Seshadri opined,

> "*One person can be at the intersection of poverty, caste, gender, class, and this creates a level of vulnerability which is very different and far greater than what any one of those would have been by themselves.*"

Second, the shift has changed the role of the state in relation to healthcare. If Rawls' idea of social justice is to be followed, then every citizen should have equitable access to health. However, since public health system is in shambles in India, the distribution of healthcare largely depends on social policies. Public health needs to go beyond the public health system, all health-related policies need to include facilities like water, food, livelihood and sanitation. She elaborated,

> "*We need to move beyond whether hospitals are working; (we need to move to see) whether we have human resources for health. The right to health must be located in a larger canvas; we must look at it not in isolation, but as part of a larger rights discourse which looks also at right to food, right to water, right to livelihood.*"

Prof. Seshadri concluded the session by remarking upon the need to put "public" back in "public health". To achieve this, the government policies must prioritize primary health care instead of pursuing health care at a later stage.

The last speaker of the panel, Ms. **K. Sujatha Rao**, former Union Secretary for the Ministry of Health and Family Welfare, Government of India, started the presentation by recalling her days as a senior administrator in the Health Ministry when the demands for right to health started alongside the schemes for right to education and livelihood. Ms. Rao turned the attention of the room towards the macro-economic challenges for ensuring a Universal Healthcare Scheme in India: limited funds coupled with ill-equipped medical staff. She remarked,

> "*(The) forty countries (in the world) which provide universal health coverage, their Tax-to-GDP ratio is 30%. We (Indians) are at 17%. And out of the 17% that we collect, almost 50% are committed liabilities. Really speaking, if any one of you were made the finance ministers of the government today, you wouldn't be able to find more money in the current state of macro-economic fundamentals.*"

The global standards for universal health coverage require the State to provide for at least essential health care services. In that regard, India's experiment with universal care has been successful in the case of immunisation, maternity, infant health and treatment for infectious diseases like HIV, TB, Leprosy etc. Ayushman Bharat intends to move a step further

and provide for social health insurance by partnering with private healthcare providers. The scheme aims to *first,* strengthen wellness clinics and *second,* provide health insurance for hospitalisation. However, for partnering with the private sector, Ms. Rao pointed out that:

> "*(…) regulatory frameworks (...) needs to be put in place. Not only should the Parliament enact these different laws to suit today's conditions, but (it should) also get the infrastructure to enforce these laws and regulations.*"

Since private entities do not venture into non-urban areas, reliance on private sector can lead to a setback in reaching out to rural areas. In rural areas, the private sector's presence is limited. Further, another challenge to the scheme lies in its implementation. The subject of *"heathcare"* falls within the domain of State List under the VIIth schedule. As a result, the centre has a limited role in implementing healthcare scheme.

Ms. Rao concluded by stating that in order to ensure the success of the scheme, it is integral to establish a patient-centric redressal mechanism. Introducing checks and balances within the present scheme can help India realise the dream of Universal Health Care.

HUMAN RIGHTS AND HEALTH: LEARNING FROM HIV*

Mr. Vivek Divan

Introduction

Good afternoon everyone, I'm really thrilled to be here. Thank you to NSLR for inviting me. Today, I'm going to talk about an area that I've worked on for several years as a lawyer, and that is HIV. But before I do that, there are a lot of young people here and I'd like to ask them what they know about HIV. Because I think you've probably grown up in a generation wherein it may not have been discussed as much. I certainly grew up in a generation where it was highlighted quite a bit. Not in my youth, but certainly when I got involved in the work. It was then that there was a fear of a large- scale epidemic and a huge campaign around it, huge public messaging. So, I'm very curious what you know about HIV. Have you learnt anything about HIV in school or elsewhere? Within the family?

> *Student: As far as I know it is a virus that causes AIDS. It reduces the strength of your immune system which is why you're very susceptible to lot of infections.*
>
> *Mr. Divan: And how did you learn this?*

* Edited by Amani Ponnaganti.Transcribed by Aparajita Kaul.

Student: I learnt this in school. It is transmitted through bodily fluids. It can be transmitted through sex. If someone is a drug user and they use the syringe of someone who has AIDS, they could get the disease.

Mr. Divan: So, it is transmitted through blood transfusion and such. It is crucial to note that that it is a transmissable disease. It is not communicable in the general sense. It requires certain action to take place for transmission to happen. That it is sexually related makes it a very sensitive issue to discuss publicly. Because of this, working on HIV has been accompanied with significant challenges related to navigating how to talk and communicate about it in societies and communities where it is difficult to have such conversations. Because it is related to sexuality, it comes with its own baggage and stigma, including that it was something only 'dirty' people apparently do.

I'll make a few preliminary points before I get into the presentation:

One is around the idea of HIV exceptionalism: that HIV was getting all the attention at the cost of many other health issues in the previous decade and in the late 1990s, and because of such prioritization, so much money and publicity, there was insufficient focus on other health issues. Part of my attempt today is to connect the dots between my experiences with this so-called HIV 'exceptionalism' and what we've heard in the last day and a half: what can we learn from the experience of HIV that could be beneficial in other health contexts? Of course, I speak as a lawyer, so I will talk largely about law and policy and the implementation and practice of it. I'm not

going to talk about other larger issues around health although I think they are very much connected to law.

Second and related, HIV was a standalone disease in terms of specific effort and response from the government, equipped with its own bureaucracy headed by the National AIDS Control Organisation. It had its own people appointed within it. It had its own district or state-level AIDS control societies. Since Mumbai was the epicentre of HIV in India, the city had its own AIDS Control Society, and Maharashtra had its own AIDS control society. A lot of this architecture is disintegrating because funding has almost entirely dried up. Therefore, what used to be a very vibrant, robust, busy site of work and attention is not so anymore. Priorities change over time but there was a time when a lot of attention was rightfully given to HIV prevention and control, which became a 'vertical' programme within the health bureaucracy. This was made possible initially through a huge loan that India received from the World Bank.

There was a belief in the 1990s and early 2000s that India may have to deal with an epidemic as serious as in Sub-Saharan Africa where at one point 1 in 4 adults in countries like South Africa and Zimbabwe were HIV-positive. My sister is a paediatrician who practised in Zimbabwe in the early 1990s and she told me how children used to come to her clinic with their grandparents because the entire generation of parents was dead or unwell. HIV was a scourge decimating societies. Its toll is less visible now because we have medication, but I have also lived through a period in India and worked in the realm of HIV when you saw death all the time. I remember

visiting a hospital in Chennai where there was a large and busy palliative care centre within which death due to AIDS was inevitable at one time. When I went five or so years later there was only life in the HIV treatment clinic there because everyone had medication.

Because HIV/ AIDS got special attention as a vertical programme I believe that much of the law and policy around it was far more fine-tuned and honed. I think there are lessons from HIV to be learnt and applied for other health contexts and challenges, including some of the issues that have been raised at this conference. Indeed, maybe we already have some of the answers or maybe those answers which HIV taught us need to be tweaked a bit for other health situations. And, maybe we need to start talking to each other a bit more about what we've learnt and how we can help in other health contexts to advance rights-based perspectives in the context of health.

One of the key and unique things that happened in the HIV context was that human rights became part of the discussion. And there is a very particular reason for it which I will tell you about. But before that let me add that I think there are also negatives to the 'vertical' approach I mentioned earlier. The obvious one is that it concentrates only on one disease at the cost of many other health issues. Yet, there is no doubt – and I have been frustrated at this – that in over a decade since, we are not taking learnings from HIV and emulating them in other health contexts. Why don't we have the imagination to do that? There are systems that the HIV response has suggested, including policy changes. We need to be imaginative about how we can apply these to other and larger health context for beneficial effect.

Unfortunately, I do not see this happening. One reason I say that is because more recently I have gotten involved in working on Tuberculosis (TB). And I noticed that TB, while different from HIV in several ways, also has certain aspects that are very similar. Rather than taking the lessons we have learnt from HIV, we are reinventing the wheel, which is unfortunate. It is a waste of resources - money and time. And, consequently a massive waste of life. So, I think there is something to be said about learning lessons from HIV. But, I'm also happy to some extent that HIV does not have the exceptional treatment that it used to get for many years because I think we need to start integrating the lessons from HIV in larger health contexts. The concern is that de-prioritizing HIV has meant that in the communities where it lingers its impact is increasingly ignored.

The last thing I want to say before we get into the lessons I referred to is that law and policy are not magic wands to deal with health challenges. They are not going to solve almost any problem. What they can do, if deployed properly, is be supportive in actually advancing what needs to get done. To see that people are empowered, that people realise their rights, that health care practitioners are also empowered and protected. Appropriate law and policy frameworks can facilitate a sound health response. They cannot by themselves solve the problems that health challenges throw up. Their appropriate use can also send out signals. For instance, if I'm thrown out of my job working in a glass factory because I test HIV-positive and my employer thinks that my working in a glass factory poses an infection risk to others, I can go to court and challenge that and I can get reinstated if I show

that there is no risk that HIV will get transmitted. This was an actual case which we handled when I worked at Lawyers Collective, which was the seminal NGO doing a lot of this work in India. We had a client like this and we were successful. The message the court sends out is that HIV is not a ground for discrimination in the workplace. This has a effect in other courts and we know that because we have seen similar judgments being issued. So, law can assist in signalling the appropriate response, but it alone will not solve all health challenges.

Now I'm going to talk to you about the lessons I've learnt. I don't think there is some particular wisdom here. I do not speak from a more general kind of experience around HIV; I come from my vantage point as a human rights lawyer and as a queer person - a person who is a member of the LGBTQ community who has seen his own community members dying due to AIDS or becoming HIV-positive. I also come from great privilege. I think one of the things HIV revealed over time was how it affected people because of their class and economic background, because of their social advantage or disadvantage. I come from a vantage point which is not necessarily representative. I come from the LGBTQ community, part of which is at high-risk for HIV, but I was also well-educated so I was aware of what HIV was and how to protect myself. Further, I'm a lawyer so I know how to use the law in certain ways.

The first lesson is to **listen to the voices of those most affected**. This is important because this is how we are going to arrive at the solutions. For me, it is the most vital thing I've learnt in HIV and it is something I'm

learning in TB. I've also engaged a bit in mental health. I see that the best articulations of their needs and challenges are by the people affected by these issues and they're the ones who will guide us on what needs to be changed for law and policy to actually cater to their needs and also the larger needs of society in terms of public health.

The second lesson is that **health law and policy should be based on evidence, not dominant morality.** Law and policy should not be based on emotion and morality but on evidence. We need to talk about what we know works rather than our prejudices, without being uncomfortable about these issues. If we really want to help people, we need to talk about how we help them and leave our morality aside. This is crucial and it played a huge part in stemming the impact of HIV.

The third lesson is that **public health interests are not at odds with human rights.** Often in public health, and in discussions that I have encountered related to HIV, there is a sense that public health and human rights are opposing notions. I remember the first time I heard this was at a workshop 16-17 years ago in Hyderabad. There was someone from the Andhra Pradesh State Human Rights Commission who said that all you're doing is talking about human rights which is about protecting an individual and you're not protecting larger society. He argued that the larger society needed to be protected and public health needed to be protected. HIV has shown us that protecting a person does not mean you are compromising societal interests and that public health interests and human rights can work

together. Indeed, often protecting individual rights serves in protecting societal interests.

The fourth lesson is that **public health issues should be informed by intersectionality.** We cannot look at public health, and health generally, in isolation. We have to look at the intersectionality between health and other issues, including understanding the social determinants of health. I think HIV showed that very clearly. If you do not engage with these aspects, you will not get to the bottom of why HIV is spreading and why some people are more vulnerable than others. Consequently, prevention and control efforts will not yield the desired results.

I'll start with a very simple message from Justice Michael Kirby, an openly gay judge formerly of the High Court of Australia who has pioneered global understandings of rights-based approaches to health and HIV. What he said – the AIDS paradox – best captures the role of law and policy in HIV:

> *"The protection of the human rights of persons at risk is the most effective way of arresting or slowing the spread of the virus."*

This is apparently paradoxical. Imagine, generally, what your response might be to meeting someone who has what you think is a disease which spreads. Your response is: "I don't want to be next to them. I want to remove myself from their presence or I want them to be removed from my presence." And so, the first reaction is isolation, to push people away, put

people in a cage, to lock them up so that we are all protected. This was the initial response to HIV also – that we lock all these people up so that the others would not get affected. But HIV is transmitted through sex and sex is a complicated thing. Sex happens in all kinds of ways and people's sexuality is not going to be curbed through barbed wires. Also, we do not even have enough barbed wire to put everyone in a cage. Therefore, there was a need to look at HIV in a different way.

This realisation happened in the 1980s and a new approach was finally articulated around that time, in the late 1980s to early 1990s. The alternative was actually the opposite of the previous isolationist approach. It was an integrationist approach – to protect affected people's human rights, recognising that that was the only way to control HIV. For example, if you tell someone that I will test you for HIV and if you are HIV-positive your spouse will be informed, it disincentivizes testing. It deters people from getting tested since they do not want their doctor to tell their spouse if they test HIV-positive. In such cases doctor-patient confidentiality is bound to be breached (which is a rights issue), and the standard response would be to avoid getting tested, leading to not knowing one's health status, and the possibility of continuing to have risky sex. Resultantly, HIV will go 'underground' and spread. Therefore health systems need to ensure that confidentiality of HIV status will be protected, which will encourage people to access the health system, receive counselling and be influenced by behaviour change information. If the health system does counselling, it can communicate key messages that need to be conveyed so that people will be

informed and take adequate precautions while having sex. What this reveals is that protecting people's rights (confidentiality in this case) will help in getting a handle on the HIV epidemic in order to control it. While you may think a disease which transmits is something we need to isolate, paradoxically, you actually need to protect those affected and that is what Justice Kirby articulated. This fundamental idea is closely linked to the centrality of listening to affected communities.

I. Listen to the voices of those most affected

So, who are the communities affected by HIV and stereotypically most vulnerable to HIV? It is truck drivers, sex workers, migrants, people who use drugs, gay men and transgender women. This may be due to their behavioural patterns, physiological reasons, or social determinants that increase their vulnerability. The foundation of the response to HIV was the need to understand the most vulnerable communities. Historically in the HIV context, these communities rose up in the west, particularly gay men who made a claim for their rights. They protested isolationist policies, demanded accurate prevention and treatment information and medication and investment in scientific research to find out how HIV/AIDS could be stopped. This empowered approach of affected communities and civil society asking for their health rights influenced the HIV response across the world.

So, in most open democracies where HIV was prevalent, it led to empowerment, and, in India, this happened in a significant way. The foundation of this was in Justice Kirby's paradox: empower people, and only

then will they be able to cope with their own vulnerability (and therefore other people's vulnerability), and this can only be done by ensuring their rights, and discarding morality for the sake of public health. This vulnerability includes looking at the complex nature of structural inequality, poverty, economics, gender, and law and policy that reaffirms it.

This foundation of the need to include and support affected communities led to NGOs becoming visible within big cities in India, which were focused on addressing the health and related concerns of these communities, including providing health information and services for gay men, transgender people, sex workers, and drug users. They became meetings spaces for these communities, which collectivized in his manner and were empowered in the process. It allowed these communities to understand that they had rights and think about how they could be exercised. Over time, they began to be spearheaded by people from within these communities.

What this did was remarkable to witness, particularly within the corridors of government – bureaucrats particularly those within the HIV bureaucracy – became increasingly sensitised to sexuality-related and other issues affecting drug users, men who have sex with men, transgender people, sex workers, and comfortable sitting with and working alongside people from these communities. Alas, this cannot be said of a vast majority of the government machinery, although ideally such understandings should have penetrated beyond the health ministry. This change happened because people's eyes were opened which resulted in destigmatization, because

people were empowered, and they were talking to their government representatives. People began working with local institutions such as civil hospitals. Therefore, when someone from government initially met me as a gay person, there was discomfort but in time that disappeared due to breaking of mental barriers. So, affected persons became partners in the journey to find solutions in creating policy/ law, HIV programming and implementation. They were the best people to know how to do things on the ground. I think that's what HIV really taught the health domain in a powerful way.

So how did that empowerment lead to change? Let me give you some examples:

A. Local Level

There were changes in attitudes to healthcare. There were groups and communities living with HIV forming their own NGOs across the country who do excellent work even today. They started engaging with say, JJ Hospital in Mumbai. At JJ in those days, the nursing staff were ignorant about HIV and therefore frightened. But when conversations took place with NGOs and community groups and advocates, over time one saw more sensitized treatment in public hospitals, and informed discussions within the healthcare system.

One way engagement with the community helped was by advocating for strengthened counselling protocols by introducing pre and post-test

counselling for HIV. Before the person takes the test, they are informed of the risks and benefits of taking a test. After they are informed, they decide whether or not to take the test. They take the test and receive post-test counselling depending on results. People realised they had a decision-making ability related to their health. They were being spoken to with a reasonable amount of dignity and decency. While it was not perfect and worked better in some places than others, there was a palpable change in delivery of and engagement with healthcare.

In TB treatment, it is unfortunate to see that very little has been allocated to or implemented in the form of robust counselling efforts at TB clinics, despite this being stated as vital in the government's TB control vision and policy. This is two decades after a commitment to strengthen counselling skills in HIV was made, backed by human and financial resources where lessons have been learnt, and rewards have been reaped. In my research, a person with TB who is also HIV-positive going to an HIV clinic will get sound counselling but a person who only has TB and seeks medication will not receive counselling at many a TB treatment clinic. Why is this happening? Why can't we learn from what we already know? For me it is mind-boggling and such a tragic waste. There is no need to reinvent some of these wheels.

One of the other things HIV did because of pressure from communities is to move away from criminalisation and isolation. As I mentioned earlier, the initial HIV response was to isolate a person who tested HIV-positive as being risky to their sexual partner and society at large.

Similarly, extant criminal law was seen as justifiable in repressing sexual conduct or behaviour – for instance, against homosexual behaviour Section 377 IPC, or against sex workers deploying anti-trafficking law. However, criminal law was only pushing behaviours and conduct underground and was articulated as violating rights and not serving public health imperatives. Yet, there were many proposals over the years – that India needed to mandatorily test everyone before they got married and deny the right to marry if they tested HIV-positive. All of this was reviewed and reconsidered over time when understandings on the social impacts of laws and policies were understood through multi-pronged engagement and sensitization of the HIV response with legal experts, policymakers, and most crucially with empowered affected communities.

Further, notions of confidentiality in a health context began to develop through HIV. The principle of confidentiality was recognised in the Indian Medical Council Regulations and in the Hippocratic oath etc., but it was often not adhered to in practice. In the Indian context, oftentimes a person doesn't come to the clinic alone, they do so with family. In such situations, it's difficult to maintain confidentiality. But the principle was highlighted in the HIV context as crucial to health delivery and this understanding was augmented within healthcare practice and delivery. Along with rights come exceptions to the rule in rare cases – with confidentiality comes notification of HIV status to a sexual partner because they might be at risk in exceptional cases. Now we have an HIV Act which actually very clearly defines those situations, although it was passed in 2017, twelve years

after its presentation to the government. I believe that an opportunity was lost – what should have been passed now is a law not just on HIV, but on health standards more generally that crystalized principles of informed consent, confidentiality and non-discrimination.

B. National Level

At the national level, there was the rollout of AIDS medication. I think we live in a time where we seem to forget our history in a matter of a few days. This rollout didn't happen out of the blue because the government suddenly felt compassion towards people with HIV. This happened because there was a huge movement demanding HIV treatment, which was only partly reported in the media. I was part of this vibrant effort across the country. Our generic pharmaceutical companies were manufacturing and sending cheap medicines to Africa but people in India were not getting them. Communities began to demand the fulfilment of their right to health, actualised through the provision of affordable medication.

Section 3(d) of the Indian Patent Act says you can't patent something which is simply the new use of a known substance. To take an example: assume I have a medication for headaches and I find that I can actually use it for constipation, I can't say I need a monopoly right because I found a new use for the same medication. This is something which foreign pharmaceutical companies even today don't like about Indian patent law. It is a way to prevent 'evergreening' intellectual property rights related to medicines. The inclusion of Section 3(d) happened not out of the blue but because of the

advocacy of patients' groups, researchers, lawyers and academics who said this section was vital to protect misuse of patent claims in India. Unfortunately, there is a very interesting background to this that needs to be documented and archived. (You can imagine the different disciplines of law which were interwoven in the work on HIV: from intellectual property to labour law, and criminal law to family law, and anti- discrimination law to constitutional law.)

Such efforts by HIV-positive people's groups and their allies led to others getting involved. Cancer patients' groups challenged certain measures taken by pharmaceutical companies to get monopoly rights in India. You may know of the Novartis judgment of 2013 where the exclusive marketing right of Gleevec to treat chronic myeloid leukaemia was revoked by the Supreme Court. This happened because there was a certain moment when people realised they needed to make claims to their fundamental rights. Again, empowerment was leading the change. Even today, groups like the Delhi Network of Positive People (DNP+) and others fight against illegitimate patents being filed for medicines. They do so with lawyers, scientists and pharmacologists. The question now is how to translate this process of empowerment and engagement to other health issues.

Such a community effort has had a massive impact: in the case of Gleevec, costs for the anti-cancer medication were cut to $1/15^{th}$ of the price foreign companies were offering. Other efforts led to passing of the HIV Act that I mentioned earlier – the first anti-discrimination law in India, which covered the private sector. To go back to the example of the worker in the

glass factory – if it was owned by the government, then he would be able to contest his sacking based on constitutional guarantees of non-discrimination/ equality (Articles 14, 15 etc.), but in terms of the private sector, earlier there was nothing to prevent the employer from sacking him except for some wrongful termination provisions in the Industrial Disputes Act. Earlier, the private sector was overwhelmingly out of the fray when it came to discriminatory actions: if I went to Apollo hospital and I was denied treatment because I was HIV-positive, there was very little protection under the law. Now the HIV Act covers the private sector. It also provides a template for other anti-discrimination law reform. Although I was one of the drafters of the HIV law in 2005, my view is that we didn't need an HIV law in 2017, we needed an anti-discrimination law and more broadly a health law now. I also think we should caution against this new zeal to have new legislation for every health issue, instead of investing in ensuring that we implement existing laws more robustly.

C. International Level

At the international level, no disease got attention like HIV got at the United Nations. There was a special General Assembly session on HIV in the United Nations and a Declaration of Commitment was passed in 2001. And this was useful in many parts of the world to foist accountability on signatory governments to deliver as per the declaration, even though such a document is not considered a law as per international convention. There was also the Doha Declaration on Intellectual Property and Public Health under the WTO, which articulated intellectual property rights as subservient to

public health interests. The Global Commission on HIV and the Law eloquently articulated why human rights are important in the context of HIV and how change in law will effectively change the way in which we respond to HIV.

II. Health law and policy should be based on evidence, not morality

Determine law and policy based on evidence and not morality. HIV is surrounded by enormous stigma. The Global Commission on HIV and the Law put it very well. It said,

> *"Criminalisation and collusion with social stigma makes sex workers' lives more unstable, less safe and far riskier in terms of HIV […] Police violence prevents sex workers from seeking their assistance, which ingrains the culture of more client and police violence."*

There's a cycle of violence and the law allows it to happen. Let's look at India where there are some of the best examples of sex worker empowerment.

In Sonagachi, a red light area in Kolkata, India, an intervention started in 1992 on HIV and STDs delivering treatment, education, information and communication to sex workers and their clients. Among other things, it promoted condoms. The approach emphasized not talking down to sex workers but making them partners. Over time, the sex workers collective – the Durbar Mahila Samanway Committee, DMSC – opened their

own cooperative bank and their own society. They became empowered and autonomous. The participatory, rights-based and self-regulatory approach meant that the gatekeepers of the brothel were the sex workers themselves. They made efforts to ensure that minors weren't getting in and condoms were being used by clients. And the results in terms of health were evident: condom use went up from 3% to 87% and STD rates significantly reduced. On the other hand, in places like Kamathipura in Mumbai where police raids and harassment constantly prevented community health efforts in taking root, HIV prevalence remained high. In Kolkata, DMSC started working with the police, local corporators, MLAs, healthcare facilities nearby and that's how empowerment happened. These are very good examples of the direct correlation between health and rights, and how empowerment can concretely help in very challenging circumstances.

I remember visiting Chakla Bazaar in Surat in the mid-2000s, a place where there was a brothel which doesn't exist anymore because real estate developers have come in and torn it down. I spoke to sex workers there and to the HIV clinic in the civil hospital providing vital health services to the women in Chakla Bazaar. Every time there was a police raid, and this happened often because the police had to collect their *hafta*,[1] condom use dropped, women scattered, safety became an issue and sexually transmitted disease trajectories went up. But, every time there was stability you saw better health outcomes. Unfortunately, the government there wasn't listening. But if

1 *Hafta* is a colloquial term used for bribes collected by corrupt policemen.

rights are protected, health improves. Empowerment and evidence lead to better public health outcomes, not moralising.

Part of the effort in the HIV response was also around dignifying and empowering people through appropriate use of terminology, which evolved over time with HIV, and which can come with much overt or implied morality. How do we respect people? Why should we use terms like PLHIV - persons living with HIV – instead of 'patients'? Or 'people who use drugs' instead of 'drug addicts'?

Providing needle and syringe exchange services by giving new needles to people who use drugs has been seen to improve public and individual health and stop HIV from spreading in multiple contexts. HIV can spread through syringes/needles if an HIV-positive person injects drugs to get a high and then shares it with someone else who also injects. Needle exchange entails giving the old needle to the NGO working within the community, and getting a new one. This began to happen in parts of North-East India, Mumbai and other places. It required discarding morality and prejudice and being practical about public health.

Recently, a very harmful anti-trafficking law got passed by the Lok Sabha but, fortunately, did not reach the Rajya Sabha. This was, in part because of collectivisation that has taken place in relation to HIV wherein sex worker collectives and their allies including lawyers, academics, researchers, women's rights and child support groups and others have resisted attempts to further criminalise their already precarious and criminal

existence. When there was an effort to criminalise clients 12 years ago, the proposed law reform – predicated on the idea that prevention of trafficking would be achieved by curbing demand – went to a Parliamentary Standing Committee. It was the sex workers' movement which articulated the pointlessness of such an effort, explaining to law makers the real impact of anti-trafficking laws and the far more complex dynamics of trafficking, which need to be addressed.

With respect to the LGBTQ community and decriminalisation of homosexual sex, there has been a recent impression that this was an effort of 5 'highly accomplished' gay people in New Delhi and their lawyers. It was not; nothing could be further from the truth. This was a collective effort by a steadily empowered community over 20-25 years debunking misplaced morality, including the Naz case which was filed in 2001. This battle for decriminalisation was prompted through HIV – the Naz Foundation being an NGO providing health services to men who have sex with men, and seeing really serious consequences on health due to the criminal law. And, Lawyers Collective HIV/AIDS Unit, which litigated this case being the convening organisation that brought a collective process of discussion and debate within the LGBTQ community to bear on strategies and pathways forward to litigate the case through numerous meetings across the country.

Like I alluded to earlier, I have seen policy makers over time completely change their body language while interacting with me. As a queer person who used to meet them often, they were often uncomfortable, but over time a relaxation took place. I've seen this in their interactions with

transgender people, sex workers and others as well, when moral baggage is left at the door or entirely discarded. If you have a health bureaucracy that understands and doesn't judge or stigmatise you, can you imagine the kind of work you can get done? Along with affected communities, it was also open-minded people in policy, health systems and bureaucracy who were sensitised over time and became supportive champions. And that's how morality was dealt with. Unfortunately, we have not been able to carry this message to the next generation of bureaucrats, and this remains a challenge not just in the context of HIV but wherever stigma exists in relation to health.

III. Public health interests are not at odds with human rights

Public health and human rights are complementary; they should not be seen as opposing. We need to recognise value of human rights in context of HIV and health. Human rights are valuable because they are human rights; they are valuable in and of themselves. We do not need a justification for them. But in the context of health, they can even serve public health goals. For instance, the pitting of confidentiality of a person living with HIV against the public health interest of containing the disease by breaching confidentiality is seen as the contestation of an individual vs. society, but it is not so. As I mentioned earlier, if you guarantee that person's right to confidentiality, you create faith in the health system and encourage the person to access it to seek vital information, testing, prevention and treatment services. Instead, if you legislate to disclose their HIV status forcibly, people will be discouraged to test and the disease will disappear 'underground'. This applies to the concepts of informed consent, non-

discrimination and decriminalization too, and is relevant to challenges like TB. Individual interest vs. public interest is a false dichotomy: protecting the individual's interest itself is in the public interest.

IV. Public health issues should be informed by intersectionality

Intersectionality is a lesson that I have certainly learnt from HIV. I could not possibly have learnt what I have and been enriched through this experience of working in the area of HIV if I had not looked at it from lenses of gender, sexuality, class, migration, inequality, livelihoods and economics. We need to start looking at health and law in an interdisciplinary manner. I think there is no better example of this currently than TB. The government has said that they want to eradicate TB by 2025. There is no better way of doing that than by comprehending intersectionality because TB is really an issue of the intersections of health with various other issues. TB is often a health problem because people are in environments where they don't have the tools to protect themselves. What do we do about things like sanitation and ventilation in public housing? How is urban planning related to health, to poverty? Why and how are migrants or people with certain livelihoods more susceptible than others? Indeed, the government's TB strategy recognises these intersections, but addressing them gets complicated in terms of policy and bureaucratic structures. Yet, we need to pay attention to this constantly. I'm sure around mental health as well there are intersections. Another advantage of thinking about health challenges in a multisectoral way is because allies for change can be fostered from different areas, issues and

disciplines. For this we who work within the health sphere need to talk about our work more generally within these other contexts.

Conclusion

And finally, how can we adapt some of these lessons to other health contexts? There is an end-of-life care bill proposed by government and one by people from the healthcare community, many of whom were part of the care given to Aruna Shanbaug. These drafts have been circulating over the last few years. It is worth examining where they are coming from: an empowerment-of-the-patient approach or from a defensive approach to protect the healthcare worker and avoid legal liability? It is an opportunity to apply rights-based principles to legislative attempts.

As mentioned earlier, counselling is so critical to TB prevention and control efforts. Telling people about how to prevent it, how to reduce one's vulnerability, how to make others in the family less vulnerable, how to adhere to treatment can be effectively done by bolstering counselling. This is fundamentally a rights-based approach, but I don't see this happening sufficiently.

Consent and confidentiality are also important in the context of TB. Guidelines on active case finding were issued by the Central TB Division of the Ministry of Health. They are alarming. In essence they guide community health workers on how to actively find TB cases, including descriptions of workers going around knocking on doors in villages with religious and

community leaders to get people tested. I can't imagine the kind of social upheaval this can cause when no stipulations are provided on respecting principles of consent, privacy and confidentiality. I was part of a team that carried out a Legal Environment Assessment on TB which was submitted to the government six months ago; one of the recommendations was to pull back this guidance based on these concerns, and what they may do to alienate people from the health system.

Lastly, and again an illustration in relation to TB: sections 269 and 270 of the IPC criminalise malicious or negligent transmission of life-threatening diseases. In March 2018, the government issued a notification stipulating that healthcare workers or pharmacists who fail to notify a case of TB that they come to know of to the central authority would be liable to imprisonment under these provisions. I find this astonishing. It is an ill-informed policy that uses a law to do something it was not intended for. In my anecdotal inquiries after this notification was issued I have found that pharmacies have stopped stocking TB medications because they don't want to deal with such criminal liability. What does this do for public health? It compromises what you're trying to do, which is to get people connected to treatment and services as soon as possible. Public and individual health are not served when punitive measures are applied. Such issues require careful consideration, and HIV has provided us some direction on the utility of deploying empowering rights-based approaches to achieve health goals.

THE LEGAL JOURNEY OF SURROGACY REGULATION IN INDIA: DENYING RIGHTS DELAYING LEGALITY AND INCREASING EXPLOITATION *

Dr. Presenna Madhavan Arathi

Introduction

Surrogacy legislation is going through a dramatic event in the parliament. During the 2019 winter session, the Rajya Sabha referred the Surrogacy Regulation Bill, 2019 to the select committee headed by Bhupendra Yadav, on November 21st 2019. Before that, in the previous monsoon session of the Parliament, the Surrogacy Bill 2017 was passed in the Lok Sabha, on 5th August 2019. After a long legal journey of over two decades, this Bill passed in the Lok Sabha to regulate altruistic surrogacy and prohibit commercial surrogacy in India, but it is still pending before the Rajya Sabha to become law. According to the new Bill, only hetero-sexual, married couples are to be permitted to seek surrogacy. Thereby, the Bill denies people who are single, queer, separated or in live-in relationships the possibility of having babies through a high-tech obstetric practice. In the case of surrogates also, the Bill sets out the condition that only married women with the consent of the husband can become a surrogate and the surrogate must be a close relative of intending couple. Feminist public health and legal scholars have critiqued how the new Bill excludes persons based on marital status, sexuality, gender identity and orientation.

* Edited by Amani Ponnaganti. Transcribed by Aashna Chowdary.

In this presentation, I focus on the legal journey of surrogacy in India, primarily the Surrogacy (Regulation) Bill and the Parliamentary Standing Committee ["***PSC***"] report . Some of my arguments are from a recent study I conducted at Council for Social Development for National Human Rights Commission. We interviewed almost 42 surrogates in two metropolitan cities in India - Mumbai and New Delhi - to understand the views of surrogate women about the upcoming law. Their view is hardly acknowledged in the law-making process. I owe some of my inputs to those surrogate women.

I will begin with an overview of surrogacy in India and a brief legal history of the 2018 Bill, and then move on to discuss various criticisms of the same from women rights and public health rights perspectives, primarily on the question of exclusion of surrogates and prospective parents, placed within the wider argument of a surrogate's political economy question of surrogacy from the lens of a feminist criticism of the legislative process and financial liberties.

I. SURROGACY PRACTICE IN INDIA

Surrogacy is a big business in India, estimated to be a $5 billion industry. What used to be a therapeutic process that would serve an infertile couple has become highly commercialized as a consequence of the opening up of the medical field of infertility treatment to markets. There is very little data on the 'in vitro fertilization' ["***IVF***"] medical industry in India. Reshma

Pai, president of the Federation of Obstetric and Gynaecological Societies of India, stated before the PSC that:

> *"India is witnessing a high burden of infertility, with an estimated 22 to 33 million couples in the reproductive age suffering from infertility. It is well established that surrogacy cycles constitute 1% of the total number of IVF cycles. If 1,000,000 cycles are the projected number of IVF cycles per year in India, the approximate number of surrogacy cycles in India is around 1000 per year. At a pregnancy rate of 40%, this would result in 400 pregnancies per year. At a take home baby rate of 32%, this would result in 320 babies being born from surrogacy a year."*

This is an understated way of gauging the reality of surrogacy. In fact, the business is much bigger than what these figures portray.

Our study showed that there is a huge amount of money involved in surrogacy, around INR 15-20 lakhs per surrogacy cycle. Interviews with surrogates in Mumbai and New Delhi showed surrogates getting about INR 4-5 lakhs for each surrogacy, with there being disparities among different states. A 2013 study I conducted in Kerala showed that the surrogates made about INR 8-12 lakhs for each surrogacy.

There is a wide network of agents involved in the commercial surrogacy business. Earlier it used to be hospitals hiring surrogates for an infertile couple, but now hospitals are not directly involved in the scene. They are handing over the patients to agencies that run surrogacy hostels or

those who are running IVF banks and they hire surrogates for the intending couple. They exploit the economic vulnerability of the surrogate women and the emotional vulnerability of the intending couple to extract huge amounts of money out of the entire process. A surrogacy agent can make around INR 7-8 lakhs. The structure of surrogacy agencies is different in Mumbai and New Delhi. Mumbai has more of an informal structure where the previous surrogates act as agents, bringing women to the clinics. In New Delhi, on the other hand, it is more professionalized. There is an established structure of how clients come in and how women become surrogates. Most women come from economically distressed, agrarian areas working as cooks, shopkeepers, domestic helps, etc, and their husbands are in the construction sector, garment exporters, etc. These women mostly decide to become surrogates to receive a one-time money to meet their immediate and long standing financial needs, which they are otherwise incapable to meet through their everyday work.

II. Important Definitions Under the Surrogacy Regulation Bill, 2018

The 2018 Bill primarily prohibits commercial surrogacy in India and promotes "ethical, altruistic surrogacy". Clause 2(b) of the 2018 Bill defines altruistic surrogacy as:

> *"'altruistic surrogacy' means the surrogacy in which no charges, expenses, fees, remuneration or monetary incentive of whatever nature, except the medical expenses incurred on surrogate mother and the insurance coverage*

> *for the surrogate mother, are given to the surrogate mother or her dependents or her representative."*

There is no money involved in altruistic surrogacy; only medical expenses and insurance are covered. Further, according to the Bill, only a close relative of the intending parents may be a surrogate mother, but the law doesn't define who is a close relative. The 102nd PSC Report on the Surrogacy (Regulation) Bill 2016[1] calls India as the 'world capital of surrogacy', generating $ 2 billion annually. Though the practice of gestational surrogacy is a therapeutic technological intervention to address the medical condition of infertility, in popular parlance, it is considered to be an industry. The commercial transactions involved in the treatment regime, especially in the hegemony of private care in the field, constitute it as an industry and not as a healthcare service provisioning. Like any other private sector, in India, commercial surrogacy was unregulated or remained a grey area in terms of its legal status. The 2018 Bill is the first of its kind to prohibit commercial surrogacy and allow only 'altruistic ethical surrogacy'. The Cambridge English dictionary defines altruism as "willingness to do things that brings advantage to others, even if it results in disadvantage for yourself"[2]. It critically raises the question of how to legally define 'altruism', that too with an adjective to it - "ethical"- which adds more confusion to it. If we go by literal meaning of

1 Department-Related Parliamentary Standing Committee on Health and Family Welfare. One Hundred Second Report on The Surrogacy (Regulation) Bill, 2016. New Delhi: Rajya Sabha Secretariat; 2017. Report No. 102. [cited 2018 Feb 20]. Available from: http://www.prsindia.org/uploads/media/Surrogacy/SCR%20Surrogacy%20Bill,%202016.pdf [Published in Gazette of India Extraordinary Part II Section 2, November 21, 2016.]

2 https://dictionary.cambridge.org/dictionary/english/altruism accessed on 25th December, 2018.

it, ethical altruism is based on the moral grounds, which has now gotten a legal sanction.

Clause 2(f) defines commercial surrogacy:

> *"'commercial surrogacy' means commercialisation of surrogacy services or procedures or its component services or component procedures including selling or buying of human embryo or trading in the sale or purchase of human embryo or gametes or selling or buying or trading the services of surrogate motherhood by way of giving payment, reward, benefit, fees, remuneration or monetary incentive in cash or kind, to the surrogate mother or her dependents or her representative, except the medical expenses incurred on the surrogate mother and the insurance coverage for the surrogate mother."*

In a society like India, where multiple levels of stratifications co-exist, a legal ban of commercial surrogacy is neither a solution nor an answer without exploring the primary questions such as how biomedical interventions affect the formation of identities based on caste- class and gender. How do enhancements of technologies in an unequally wealth-distributed society address the questions of exploitation and commodification of female reproductive bodies?

III. THE LEGAL HISTORY OF SURROGACY REGULATION IN INDIA

The demand for legal regulation and control of the practice of commercial surrogacy came from different platforms - from medical

practitioners to feminists, from legal and public health scholars to activists. India's medical practice emerged and spread surrogacy to various cities, big and small, taking advantage of the lack of regulation. This made surrogacy a multi-billion dollar profit-making industry. All demands for a 'new law' were articulated in the language of ethics and foregrounded the question of exploitation of women who act as surrogates as well as the legal protection for children born out of surrogacy arrangements. However, if we do a close analysis of all the legal documents prepared for this purpose, we see that they primarily propose to protect the rights of the intending parents, who are the consumers in the market, and the interests of the medical practitioners, who are the most powerful forces in the entire process. The most vulnerable people involved, the women who act as surrogates, were in fact never heard in the law-making process. On the other hand, the IVF practitioners and those who were running the surrogacy clinics enjoyed supremacy in the legislative process.

Surrogacy began in the early 2000s as a medical practice but then quickly flourished into a baby making industry. The prominent case of *Baby Manji v. Union of India* highlighted the need for surrogacy regulation. The Indian Council for Medical Research ["***ICMR***"] drafted the *National Guidelines for Accreditation, Supervision and Regulation of ART Clinics in India* in 2005. These guidelines aim to regulate the assisted reproductive technology ["***ART***"] clinics and IVF clinics in India. There is a registry, guidelines, format for surro-pregnancy agreements. This was the only legal document until now on this area governing commercial surrogacy in India, and this is

how commercial surrogacy sustained itself in India. A *suo motu* Law Commission Report came in 2009, which reiterated the need for a new legislation to regulate surrogacy. The seeds of the 2016 Bill can be traced to this report. It categorically mentions that there shouldn't be any commercial surrogacy and there should only be altruistic surrogacy. It also discussed compensation for altruistic surrogacy, which was left out of the new version of the law. There were several Assisted Reproductive Technology bills, beginning in 2008, drafted by the ICMR. Though it was reviewed several times in 2010, 2012 and 2014, it was never passed as a law.

All of a sudden, in 2016, the government came up with a separate surrogacy bill. Without consulting with members from the women's health movement working on reproductive rights and justice, the bill was introduced with the objective of protecting women from exploitation and protecting the rights of surrogate children. Soon after, the bill then went to a PSC, who came out with their report in 2017 which was more progressive and holistically looked into different questions from a political economy perspective. It examined why women were adopting surrogacy for economic survival and what the impacts of banning this could be in terms of exploitation. Yet, the final 2019 Bill as well reflects the 2016 Bill and didn't incorporate the recommendations made by the PSC but left it to a Select Committee.

In their report, the PSC states that:

"The Committee would like to observe that if many impoverished women are able to provide their children with education, construct home, start a

> *small business, etc. by resorting to surrogacy, there is no reason to take this away from them."*

[…]

> *"The Committee, therefore, finds merit in the argument that the proposed altruistic surrogacy is far removed from the ground realities."*

On the restriction of surrogate to a close relative, they observed that:

> *"[..] A close relative of the intending couple may be forced to become a surrogate which might become even more exploitative than commercial surrogacy. The Committee, therefore, firmly believes that altruistic surrogacy only by close relatives will always be because of compulsion and coercion and not because of altruism."*

The PSC observed that without an ART regulation bill, it would be difficult to regulate commercial surrogacy. They suggested that regulation should accompany an ART bill. They also recommended that medical insurance should consider the long term health impact of surrogacy on women six years from the date of conceiving, among many other observations.

Prabha Kotiswaran identifies three phases in legal history of surrogacy in India:

1. **Medico-liberal Phase (1990-2008)**: It set the terms of interaction between the various stakeholders of the ART industry and effectively shaped the political economy of surrogacy. It was liberal in nature

because it was oriented towards commodification of female reproductive bodies.

2. **Highly Contested Phase (2008-2012)**: It was a medically dominated phase, where the Indian courts were actively involved. ICMR played a crucial role in drafting guidelines. Further, various versions of the ART bill emerged which deal with the commodification of female reproductive labour.

3. **The Contracting as Normative Phase (2012-2017)**: It involved the production of varied legal documents and eventually the Surrogacy Bill. However, the Parliamentary Committee took a view to roll back its essential provisions. Kotiswaran says:

> *"The regulators imagination has the transfers from medico-liberal model in 2005 to a socially conservative prohibitionist model in 2016 to a proto-socialist model in 2017* [referring to the PSC Report]*, placing faith in turn in the market, family and the state, respectively, to protect the interest of the child born out of surrogacy."*

I would like to add a fourth phase to Kotiswaran's work, considering the Bill which took a U-turn to a complete ban on surrogacy:

4. **Hindutva Morality Phase**: This phase was characterized by the controlling of female sexuality, and when family values got state sanction in the name of *Indian ethos*, as was stated by the Health Minister while placing the bill before Parliament.

The logic behind framing surrogacy as something restricted within the family is that it will reduce exploitation. The decision to be a surrogate even for a family member, in a very ideal situation, cannot be considered as informed consent or choice. The coercion and undue influence exerted by the family structure makes the situation next to impossible to obtain free consent about a surrogacy agreement. Hence it makes surro-pregnancy contracts legally void/voidable, according to the provisions of a valid contract under the Indian Contract Act, 1872. I argue that it neither reduces exploitation nor questions the inherent violence in such decision-making within the patriarchal social structure.

IV. SALIENT FEATURES OF THE NEW SURROGACY LAW IN INDIA

The 2018 Bill prohibits commercial surrogacy and allows ethical altruistic surrogacy, which is limited to close relatives. If we assume altruistic surrogacy is good, then the benefits of such surrogacy are reduced by limiting it to a close relative. Altruism is reduced to something which in intra-familial. Why can't a close friend be a surrogate?

Another question relates to the advantages that a child born out of an altruistic surrogacy is entitled to that are denied in commercial surrogacy. For example, the child's right to know the identity of their surrogate mother may be easier in case the surrogate is a close relative. There is also the question of breastfeeding right. However, neither of these issues are dealt with in the law. Thus, the law does not create advantages of intra-familial surrogacy to the child born out of such surrogacy. Within the patriarchal structure, it will

become the responsibility of intending mothers to find out who could be a prospective surrogate in her family. This becomes complex in a Hindu caste system. There are many obstacles such as marriage barriers, including gotra systems, exogamous marriage system, etc. The law does not address the difficulty in finding someone of the appropriate lineage. This further complicates the issue.

The law establishes the National and State Surrogacy Boards which will decide the qualifications of intending parents and surrogates. The intending parents have to prove that they are infertile and have been trying to conceive for 5 years. This contradicts the WHO definition of infertility, cited by the ART regulations, which specifies the threshold of trying to have children after marriage as 1 year. The definition of the infertility period for 5 years was criticized by the Parliamentary Standing Committee. Intending parents are restricted to married heterosexual couples. It excludes single persons, homosexual couples or un-married couples living together. This is in clear contradiction of progressive Supreme Court judgments on homosexual and live-in relationships.

The Bill includes punitive action of 10 years and INR 10,00,000 as the financial penalty. It imposes a penalty on the surrogates. This worsens the situation of women who opt to become surrogates because of financial difficulties, who may be forced to pay steep fines, if the law is strictly enforced. If the ban is truly to address exploitation, placing penalties on the surrogates is a counterproductive step.

Exploitation is not legally defined in the 2018 Bill neither in 2019 Bill. Even in other laws, there is no legal definition for exploitation. Exploitation may be economic exploitation or socio-cultural exploitation. The WHO has been continually reducing the infertility period. Prof. Qadeer criticized this evolution, stating that we're not looking at infertility as a health issue and studying epidemiological reasons for it. There are very few studies to understand why this infertility takes place but we're more than willing to accept it as a major health issue and push couples towards fertility plans. These technologies have been handed over from inventors to investors and the market for ART began expanding. It is important to consider the political economy of surrogacy from this vantage point. With respect to socio-cultural exploitation, within the patriarchal structure, there are several situations where existing norms create further exploitation of the surrogate women and the intending mothers. Patriarchal values are reiterated and reinforced when one has to find a surrogate within the family and navigate emotional issues. Further, poor members of the family may be compelled to become surrogates.

V. THE POLITICAL ECONOMY QUESTION: BEYOND COMMERCIALISM AND ALTRUISM IN SURROGACY

Commercial and altruistic surrogacy creates a false binary reducing the debates to polemics. It frames the question as either being for or against commercial surrogacy. In this discourse, the real political economy question is missed.

Much of women's employment in India remains in informal, unorganized sectors which includes home-based work and piece-rate contracts linked to both domestic and export-oriented export chains as well as low paid service sector. The agrarian crisis and the neglect towards creating new employment opportunities in rural India over the past two decades has forced rural women to migrate to urban areas and undertake more vulnerable jobs for their survival. The expanding medical market used the anonymity of big and small cities to exploit women's labour and open hitherto inexperienced fields for their rapid private profits and growth. Privatization of medical care and new medical technologies, especially new reproductive technologies, created new sites for exploitation for many women. Surrogates constitute one such category and our work shows those women from both rural and urban settings who hailed from lower and lower middle-class backgrounds opted for it as a measure to make one-time money to address their immediate financial needs or to save for their future needs which are otherwise difficult to meet through their normal jobs.

The pressure of debt economies, producing subjects and agents, also plays a role in the exploitation of surrogates. Kumkum Sangari called the entire act of surrogacy as self-directional violence as a surrogate who in most cases belonged to debt-controlled family bears the health risk and social cost. Amrita Pandey identified commercial surrogacy as a new form of informal, stigmatized, gendered work and frames it as sexualized care work.

My work takes a different position from them. Surrogates' responses to us show that they don't consider it work per se. For them work is their

everyday work which involves hard labour. In surrogacy hostels, they tell us they were doing nothing for nine months and compared to their everyday life, it was much easier. While answering the question how it compared with their own pregnancies, they said that when they were pregnant, they were in the field just before delivering and they didn't get as many medicines. So, clearly, they see a difference between work and being a surrogate. On the question of having to part with the baby, they were quite clear about it.

As researchers, we tend to interpret from our own values of justice and notions of exploitation. We found the Marxian notion of alienation to be apparent here; they were not realizing the way they were being exploited. But after completing the study, we decided not to interpret it in that way. Instead, we decided to amplify their voices. We wanted to let the world know what the surrogates wanted to say about they're doing and what kind of a law they wanted to have. So, we asked these questions in our study.

Based on the empirical evidence of our work, we found that a woman opts to become a surrogate because of pressing financial needs due to underemployment or unemployment. The financial requirement is primarily for basic needs such as better education for their children, housing, buying land and to meet the medical expenditure and repay debts. When the state withdraws from responsibilities of universalization of education, including secondary and higher secondary education; better housing for all; land redistribution and universalization of health care, banning of surrogacy is counterproductive. All their needs are still unmet and the state is taking away their last way to get these amenities. Our work confirms that surrogates

don't even consider surrogacy as work but as one-time money to address their financial needs. They perceive the difference between work in productive sphere and being a surrogate, which is easy but not real work.

Why do women in developing countries end up engaging in the most dangerous and undesirable jobs? This is the primary question in the surrogacy legislative debate which we failed to address. And the entire process is insensitive to the point that the lower income jobs which women are forced to take up push them to take up assignments like surrogacy to build a life.

Conclusion

When we research in law, how are we going about it? When we are engaged in academics, what are we really doing? I ask these questions to myself. The question is not in the theoretical sense of the Hart-Fuller debate, but of what law ought to and seeing law as a social process. Law plays a crucial role in transforming a society within existing structural inequities. For women, historically and presently, law acts as an instrument of transformative potential in their everyday lives. Many feminist legal scholars argue that the law may take two opposite roles – either to oppress them in a patriarchal world or liberate their lives with positive discrimination.

What would the ideal law governing surrogacy in India be? How can we formulate a law that improves the lives of the most vulnerable in the triad of surrogates, intending parents and the surrogate child? We sought to

answer these questions through our study. However, now that the law is passed and we have to critically evaluate the legislation from a gender lens.

According to Catherine Bartlett, the women's question in law "*is designated to identify the gender implication of rules and practices which might otherwise appear to be neutral or objective. In law, asking the women's question means examining how the law fails to take into account the experience and values more typical of women than men for whatever reasons or how the existing legal standards and concepts might disadvantage women*." In surrogacy law, it's two-fold. The experiences of the intending mother who wants to have a baby and the experiences of the surrogate mother who wants to lend her womb for financial and other needs. How one incorporates these experiences while evaluating a surrogacy legislation is a critical question.

Over the past two decades, feminists have expanded the women's question into emerging areas like queer questions to address the issue of how law fails to incorporate the experiences of people from different sexual orientations. Several feminist legal scholars ask the women's question in a broad sense, addressing the non-incorporation of certain experiences within the judicial system. When we conducted an elaborate examination of all the legal documents starting from the 2005 guidelines to the 2018 Act, we found that the experience of surrogate women was completely absent from the entire exercise.

> *"This is useful for poor people. We will be able to send our children to school, get our daughters married. Those who do not have land will be*

> *able to buy land. Those who do not have house, will be able to construct houses. If the government is ready to give us land, and if the government is getting us housing, and if the government prohibits dowry and gives our children proper education, we will never become surrogates."[*from the narratives of a surrogate woman, 14 November 2017]

The rampant privatization of health care and education will further push women to do more vulnerable jobs to meet their needs. Without addressing the ground reality on employment and wages in India, where women are forced to undertake difficult, dangerous and dirty jobs for their survival, banning commercial surrogacy is not a solution. Hence, I argue that the purposeful delay in enacting a legislation to govern surrogacy is ultimately helping the profit motive of the IVF industry. These actors exploit existing legal ambiguities from two ends: they extract more money from intending parents by mentioning the stringent legal provisions on the one hand, while on the other hand, they reduce the compensation for surrogates by misleading them into believing that surrogacy is legally banned. The delayed legislative process may be part of the hidden agenda of the IVF industry.

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PUBLIC HEALTH IMPLICATIONS OF INTENSIVE FARM ANIMAL PRODUCTION IN SOUTH ASIA: THE NEED FOR REGULATION

- *Humane Society International* *

Abstract

Intensive farm animal production (IFAP) is being increasingly implemented to meet the rising demand for animal source foods in South Asia. The siting of IFAP facilities in urban or peri-urban areas leads to large proximate animal populations, increasing human exposure to pollutants and pathogens. Improperly managed wastes from IFAP facilities and abattoirs can contaminate water with excess nutrients, pathogens, veterinary pharmaceuticals, antibiotics, heavy metals, and hormones, and can release ammonia, hydrogen sulfide, volatile organic compounds, bioaerosols, and particulate matter into the air compartment. The unregulated nature of IFAP in South Asia creates a risk for zoonotic transmission, including anthrax, brucellosis, Campylobacter, Cryptosporidium, cysticercosis, E. coli, Giardia, Highly Pathogenic Avian Influenza, leptospirosis, Salmonella and Nipah Virus. Recommendations to mediate adverse human health consequences include improved veterinary care, prohibition of confinement facilities that facilitate pathogen transmission and evolution, prohibition of

* We are grateful to Humane Society International / India for allowing us to reproduce this report from Human Society International.

nontherapeutic use of antibiotics, implementation of proper management of animal wastes, zoning for IFAP and abattoir facilities, and surveillance of slaughtering facilities to limit carcass contamination and reduce the burden of foodborne disease in South Asia.

Introduction

Statistics from the Food and Agriculture Organization of the United Nations (FAO) show that from 1960 to 2000, global meat production tripled, milk production nearly doubled, and egg production nearly quadrupled.[1] The FAO, International Food Policy Research Institute (IFPRI), and International Livestock Research Institute (ILRI) have termed this rapid expansion in the production and demand of animal source foods (ASF) the "Livestock Revolution." This revolution is being driven primarily by increased ASF demand in developing countries, and from the early 1970s to the mid-1990s meat consumption in these regions rose by 70 million metric tons—nearly three times that of developed countries. The rapid global increase in production to meet this demand has been accomplished largely by an increase in the number of animals, which in turn has led to high concentrations of animals and people, often in urban areas and with little regulation or governmental oversight for livestock production.[2]

1 Speedy AW. 2003. Animal Source Foods to Improve Micronutrient Nutrition in Developing Countries. The Journal of Nutrition 133(11) : 4048S-4053S.

2 Delgado C, Rosegrant, M. and Meyer, S. 2001. Livestock to 2020: The Revolution Continues. International Trade in Livestock Products: Proceedings of a Symposium of the International Trade Research Consortium. Aucklund, New Zealand.

These intensified farm animal production (IFAP) facilities are high throughput farms that house thousands of animals of a single breed for a single purpose, often in indoor and confined conditions,[3] and now supply the majority of meat and poultry products to the global market, replacing traditional, small, independently owned and operated farms.[4] These systems increase production yield and decrease cost by utilizing economies of scale, standardization of processes, and vertical integration.[5] Globally, IFAP is growing at a rate of 4.3% each year, twice that of mixed-farming systems and over six times that of grazing systems.[6]

While much of the demand for ASF in developing countries is being driven by just a few densely populated countries such as China and Brazil,[7] South Asian countries are quickly following suit. From 1980 to 2010 in South Asia (Iran, Afghanistan, Pakistan, India, Bangladesh, Bhutan, Nepal, and Sri Lanka), meat production tripled, egg production increased by a factor of five,

3 Pew Commission on Industrial Farm Animal Production. 2008. Putting Meat on the Table: Industrial Farm Animal Production in America, pp. 1. http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Industrial_Agriculture/PCIFAP_FINAL.pdf. Accessed May 13, 2013.

4 Pew Commission on Industrial Farm Animal Production. 2008. Putting Meat on the Table: Industrial Farm Animal Production in America, pp. 5. http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Industrial_Agriculture/PCIFAP_FINAL.pdf. Accessed May 13, 2013.

5 Sapkota AR, Lefferts LY, McKenzie S and Walker P. 2007. What Do We Feed to Food-Production Animals? A Review of Animal Feed Ingredients and Their Potential Impacts on Human Health. Environmental Health Perspectives. 115(5) : 663-670.

6 Sere C and Steinfeld H. 1996. World livestock production systems: Current status, issues, and trends. http://www.fao.org/docrep/004/W0027E/W0027E00.HTM. Accessed May 17, 2013.

7 Speedy AW. 2003. Animal Source Foods to Improve Micronutrient Nutrition in Developing Countries. The Journal of Nutrition 133(11) : 4048S-4053S.

and milk production quadrupled.[8] Because of cultural and religious practices in the region the increase in meat consumption has been slower than would be predicted by income,[9] and could explain why dairy and egg production has grown more rapidly than meat production. In addition, at least 54% of milk production comes from buffalo, while only 45% comes from cows.[10]

The increase in dairy production in India, termed the "White Revolution" and spawned by India's Operation Flood initiative,[11] has led to India becoming the world's largest producer of milk with Pakistan following their lead.[12] Because India's Operation Flood originally supported dairy cooperatives and limited private investment, 70% of India's milk producers are landless small and marginal farmers whose production comes from only one to two animals.[13] However, policy changes subsequent to the

8 Food and Agriculture Organization of the United Nations. 2012. FAOSTAT. http://faostat.fao.org. Accessed May 17, 2013.

9 Delgado C, Rosegrant M, Steinfeld H, Ehui S, and Courbois C. 1999. Livestock to 2020: The Next Food Revolution, pp. 8. http://www.ifpri.org/sites/default/files/publications/pubs_2020_dp_dp28.pdf. Accessed May 13, 2013.Food and Agriculture Organization of the United Nations. 2012. FAOSTAT. http://faostat.fao.org. Accessed May 17, 2013.

10 Delgado CL and Narrod CA. 2002.Impact of Changing Market Forces and Policies on Structural Change in the Livestock Industries of Selected Fast-Growing Developing Countries. http://www.fao.org/WAIRDOCS/LEAD/X6115E/x6115e00.htm. Accessed May 17, 2013.

11 Singh B and Tulachan PM. 2002.A dynamic scenario of livestock and dairy production in Uttaranchal Hills.ENVIS Bulletin.10(1).

12 Pakistan Dairy Development Company. 2006. The White Revolution "Dhoodh Darya." http://www.pddc.com.pk/DairyPakistan-Publication.pdf. Accessed May 17, 2013.

13 Sharma VP, Singh RV, Staal S, and Delgado CL. 2002. Annex I: Critical Issues for Poor People in the Indian DairySector on the Threshold of a New Era. http://www.fao.org/WAIRDOCS/LEAD/X6115E/x6115e0b.htm. Accessed June, 2012.

liberalization of dairy markets in 1991 have tended to put small farmer cooperatives at a disadvantage.[14]

In contrast, India's poultry industry has become rapidly industrialized. Today in India the poultry industry is one of the country's fastest growing sectors,[15] and broiler facilities with less than 5,000 birds are becoming rare. Most broiler and layer facilities house between 10,000 and 50,000 birds.[16]

In developed countries, where the effects of IFAP systems have been more extensively studied, the rapid spread of these systems has been known to contribute to significant animal welfare issues, as well as human health concerns for workers and residents of nearby communities.[17,18] The poor waste management practices, widespread use of pesticides, antibiotics, and the confinement and feeding practices customary to IFAP are responsible for

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14 Goswami B. 2007. Supply Management in Support of Rural Livelihoods Under the WTO: Can Indian Dairy Cooperatives Survive in the New Economic Order? http://www.wto.org/english/forums_e/public_forum2007_e/session11_goswami_e.pdf. Accessed May 17, 2013.

15 Speedy AW. 2001. The global livestock revolution: opportunities and constraints for the feed and livestock industries. Compound Livestock Feed Manufacturers Association of India, 43rd National Symposium: Growth Prospects Under Globalized Scenario in Goa, India. September 29, 2001.

16 Mehta R and Nambiar RG. 2008. The Poultry Industry in India. Poultry in the 21st Century: Avian Influenza and Beyond: Proceedings of the International Poultry Conference in Bangkok, Thailand.

17 Pew Commission on Industrial Farm Animal Production. 2008. Putting Meat on the Table: Industrial Farm Animal Production in America, pp. 1. http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Industrial_Agriculture/PCIFAP_FINAL.pdf. Accessed May 13, 2013.

18 Greger M and Koneswaran G. 2010.The Public Health Impacts of Concentrated Animal Feeding Operations on Local Communities.Family and Community Health. 33(1) : 373-382.

these negative consequences to environmental and public health.[1920] Although the adverse health effects related to exposure to IFAP pollutants among workers and nearby communities in developed countries, where the transition to IFAP occurred on a large scale roughly five decades ago[2122] have been well-documented, the human health effects of IFAP in developing countries remains largely undocumented, likely because reporting and surveillance in these regions are significantly lower and because the transition to intensified systems is currently less extensive. For this reason, the existing infrastructure of IFAP and its accompanying implications for human health in developed countries must serve as an important model for understanding the effects of intensification in developing countries and for guiding the generation of policies that attenuate these concerns.

In addition to what is already known from developed countries, several factors exist in the developing world that may exacerbate public health risks. IFAP facilities in developing countries tend to site themselves urbanly or peri-urbanly due to minimal technology and/or transportation

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19 Pew Commission on Industrial Farm Animal Production. 2008. Putting Meat on the Table: Industrial Farm Animal Production in America. http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Industrial_Agriculture/PCIFAP_FINAL.pdf. Accessed May 13, 2013.

20 Greger M and Koneswaran G. 2010.The Public Health Impacts of Concentrated Animal Feeding Operations on Local Communities.Family and Community Health. 33(1) : 373-382.

21 Pew Commission on Industrial Farm Animal Production. 2008. Putting Meat on the Table: Industrial Farm Animal Production in America, pp. 1. htt.://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Industrial_Agriculture/PCIFAP_FINAL.pdf. Accessed May 13, 2013.

22 MacDonald J and McBride W. 2009. The Transformation of U.S. Livestock Agriculture: Scale, Efficiency, and Risks, pp. iii. http://www.ers.usda.gov/media/184977/eib43.pdf. Accessed May 18, 2013.

infrastructure in developing countries,[23] thus bringing high concentrations of humans and animals within close contact. As the 2001 report by researchers at IFPRI states:

"Growing concentrations of animals and people in the major cities of developing countries also notably increased the incidence of zoonotic diseases such as infections from *Salmonella, E-coli,* and Avian Flu—diseases that can only be controlled through enforcement of zoning and health regulations… Greater intensification of livestock production has caused a build- up of pesticides and antibiotics in the food chain in places of both the developed and developing world. Furthermore, as the consumption of livestock products increases in tropical climates, food safety risks from microbial contamination become more prevalent."[24]

Other factors include a lack of regulatory framework or enforcement[25,26,27]and depletion and pollution of critical water resources.[28] As

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23 Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and deHaan C. 2006. Livestock's Long Shadow: Environmental Issues and Options, pp. 19. http://www.fao.org/docrep/010/a0701e/a0701e00.HTM. Accessed May 18, 2013.

24 Delgado C, Rosegrant M, Steinfeld H, Ehui S, and Courbois C. 1999. Livestock to 2020: The Next Food Revolution. pp.21. http://www.ifpri.org/sites/default/files/publications/pubs_2020_dp_dp28.pdf.Accessed May 13, 2013.

25 Delgado C, Rosegrant M, Steinfeld H, Ehui S, and Courbois C. 1999. Livestock to 2020: The Next Food Revolution. pp. 20. http://www.ifpri.org/sites/default/files/publications/pubs_2020_dp_dp28.pdf. Accessed May 13, 2013.

26 Steinfeld H. 2003. Economic Constraints on Production and Consumption of Animal Source Foods for Nutrition in Developing Countries.The Journal of Nutrition. 133 (11) : 4054S-4061.

27 Speir J, Bowden M-A, Ervin D, McElfish J, Espejo RP, Whitehouse T. 2003. Comparative Standards for Intensive Livestock Operations in Canada, Mexico, and the United States, pp. vi. http://www.cec.org/Storage/49/4168_Speir-etal_en.pdf. Accessed May 18, 2013.

South Asian countries continue to develop livestock systems to meet their growing demands, it is imperative that they utilize the experiences of developed countries to anticipate risks and generate livestock policies that protect human and environmental health.

IFAP Related Exposures

IFAP systems negatively affect public health by exposing the community to pathogens and chemical contaminants through soil, water, and air pollution, as well as through animal source foods themselves. The former two pathways are largely precipitated by the abundant and ever-increasing production of animal wastes.[29][30] At least 150 enteric pathogens are known to be present in untreated animal wastes, and during the last decade at least one new enteric pathogen has been discovered each year.[31] The populations most at risk from environmental contamination are the young, elderly, pregnant, and immunocompromised.[32]

Although waste production varies according to species, diet, and age, the United States Environmental Protection Agency (USEPA) has estimated

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28 Hoekstra AY. 2012. The hidden water resource use behind meat and dairy. Animal Frontiers. 2(2) : 3-8.

29 Martinez J, Dabert P, Barrington S, and Burton C. 2009. Livestock waste treatment systems for environmental quality, food safety and sustainability. Bioresource Technology. 100 : 5527-5536.

30 Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and deHaan C. 2006. Livestock's Long Shadow: Environmental Issues and Options, pp. 4. http://www.fao.org/docrep/010/a0701e/a0701e00.HTM. Accessed May 18, 2013.

31 Gerba CP and Smith JE. 2005. Sources of Pathogenic Microorganisms and Their Fate During Land Application of Wastes. Journal of Environmental Quality.34 : 42-48.

32 Burkholder J, Libra B, Weyer P, Heathcote S, Thorne PS, and Wichman M. 2007.Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality.Environmental Health Perspectives. 115(2) : 308-312.

that for each animal unit (1000 pounds of animal) 50-60 pounds of manure are created each day and that a single facility housing 2,500 dairy cows can produce as much waste as a city exceeding 400,000 people.[33] In the small country of Bangladesh alone, poultry is estimated to produce 1.5 million metric tons of manure every year.[34]

As animal production intensifies, it is uncoupled from crop production, with the result that standard nutrient cycles between plants, soil, and animals are severely altered.[35,36] In developed countries such as the United States, more manure is now produced than can be assimilated by the soil and thus other manure management strategies such as lagoons may be used.[37,38] In India cattle wastes have traditionally been used for cooking fuels, but this use is on the decline.[39] India reportedly uses the majority of manure for fertilizer, while only one percent of bovine manure is managed in slurry

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33 United States Environmental Protection Agency. 2004. Risk Management Evaluation for Concentrated Animal Feeding Operations, pp. 7. http://nepis.epa.gov/Adobe/PDF/901V0100.PDF. Accessed May, 18 2013.

34 Sarker BC, Alam MA, Rahman MM, Tariqul Islam AM and Chowdhury MF. 2009. Waste Management of Commercial Poultry Farms in Bangladesh. Journal of Innovation and Development. 3(1) : 34-37.

35 Schröder J. 2005. Revisiting the agronomic benefits of manure: A correct assessment and exploitation of its fertilizer value spares the environment. Bioresource Technology. 96(2): 253-261.

36 Hooda PS, Edwards AC, Anderson HA, and Miller A. 2000. A review of water quality concerns in livestock farming areas. The Science of the Total Environment.250 : 143-167.

37 United States Department of Agriculture. Manure Nutrients Relative to the Capacity of Cropland and Pastureland to Assimilate Nutrients: Spatial and Temporal Trends for the United States, pp ii. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_012133.pdf. Accessed May 18, 2013.

38 National Association of Local Boards of Health. 2010. Understanding Concentrated Animal Feeding Operations and Their Impact on Communities, pp. 2-3. http://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf. Accessed May 18, 2013.

39 Patankar M, Patwardhan A, and Verbong G. 2010. A promising niche: waste to energy project in the Indian dairy sector. Environmental Science and Policy. 13(4) : 282-290.

form and lagoon use remains negligible.[40,41,42] Manure waste in India is commonly stored on the surface in countryside ditches prior to use as manure.[43] Bangladesh now reports that more poultry manure is now being produced than can be spread onto the available land.[44]

Regardless of the methods used, both the storage and application of untreated manure as fertilizer has been shown in developed countries such as the U.S. to present a human health hazard as certain nutrients, contaminants, heavy metals, and pathogens can volatilize and become airborne or can leach into water supplies.[45] It is likely that similar issues may arise in developing countries, as waste management can be a significant hurdle for some developing areas. For example, the city of Karachi, Pakistan produces 6,600 tons of waste per day. Roughly one-third of this waste is not managed and

40 Mehta R, Narrod CA and Tiongo MM. 2008. Livestock Industrialization, Trade, and Social-Health-Environment Impacts in Developing Countries: A Case of Indian Poultry Sector, pp 23. http://mpra.ub.uni-muenchen.de/32678/. Accessed May 18, 2013.

41 Delgado CL and Narrod CA. 2002.Impact of Changing Market Forces and Policies on Structural Change in the Livestock Industries of Selected Fast-Growing Developing Countries. http://www.fao.org/WAIRDOCS/LEAD/X6115E/x6115e00.htm. Accessed May 17, 2013.

42 Gupta PK, Jha AK, Koul S, Sharma P, Pradhan V, Gupta V. 2007. Methane and nitrous oxide emission from bovine manure management practices in India. Environmental Pollution.146 : 219-224.

43 Gupta PK, Jha AK, Koul S, Sharma P, Pradhan V, Gupta V. 2007. Methane and nitrous oxide emission from bovine manure management practices in India. Environmental Pollution.146 : 219-224.

44 Sarker BC, Alam MA, Rahman MM, Tariqul Islam AM and Chowdhury MF. 2009. Waste Management of Commercial Poultry Farms in Bangladesh. Journal of Innovation and Development. 3(1) : 34-37.

45 University of Idaho Extension. 2009. Dairy Manure Field Applications—How Much Is Too Much?, pp. 1. http://www.cals.uidaho.edu/edcomm/pdf/CIS/CIS1156.pdf. Accessed May 18, 2013.

ends up "in drains, water ways or [is] indiscriminately dumped in open spaces in air and water causing environmental pollution."[46]

Additionally, it is of particular concern that IFAP facilities tend to cluster together, as well as site themselves in urban or peri-urban locations.[47] Because urban demand for animal source foods tends to precede adequate transport infrastructure in developing countries, IFAP facilities must locate themselves near demand to ensure food safety. This trend can be illustrated by the intensive pig sector of Vietnam, where most feed mills, pig farms, and slaughterhouses can be found within 40 kilometres of the centre of Ho Chi Minh City.[48] In India, roughly 98% of dairy production occurs rurally. However, 75% of egg production and nearly all broiler production occurs in India's urban areas.[49] In Nepal at least 11% of the country's animal source foods are produced in Kathmandu,[50] a city of 990,000 people.[51]

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46 Mahfooz SA, Saghir A and Ashar A. 2006.Composting: A Unique Solution to Animal Waste Management.Journal of Agriculture and Social Scences. 2(1) : 38-41.

47 Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and deHaan C. 2006. Livestock's Long Shadow: Environmental Issues and Options, pp. 33. http://www.fao.org/docrep/010/a0701e/a0701e00.HTM. Accessed May 18, 2013.

48 Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and deHaan C. 2006. Livestock's Long Shadow: Environmental Issues and Options, pp. 59. http://www.fao.org/docrep/010/a0701e/a0701e00.HTM. Accessed May 18, 2013.

49 Speedy AW. 2001. The global livestock revolution: opportunities and constraints for the feed and livestock industries. Compound Livestock Feed Manufacturers Association of India, 43rd National Symposium: Growth Prospects Under Globalized Scenario in Goa, India. September 29, 2001.

50 Smit J, Nasr J, Ratta A. 2001. Urban Agriculture: Food, Jobs, and Sustainable Cities, pp 3. http://www.jacsmit.com/book/Chap02.pdf. Accessed May 18, 2013.

51 Central Intelligence Agency. 2013. The World Factbook. https://www.cia.gov/library/publications/the-world-factbook/fields/2219.html. Accessed May 18, 2013.

Because industrial livestock production is detached from the land and concentrated in certain areas, nutrient cycling through the use of manure as fertilizer is no longer occurring, allowing nutrients to accumulate in limited space or be expelled without treatment into waterways.[52] The close proximity and high concentration of human and livestock populations, such as that which occurs in urban and peri-urban IFAP in South Asia, creates human health hazards by exacerbating disease transmissions, accelerating pathogen evolution,[53] and causing serious problems of pollution and surface water contamination.[54,55]

Globally, livestock intensification is occurring in a "policy and institutional void."[56] The inability of regulations and enforcement to keep up with the rapidly changing livestock sector can lead to a significant increase in risk to public health. The rise in human pork tapeworm infection (cysticercosis) in Eastern and Southern Africa that followed the development

52 Devendra C. 2007. Perspectives on animal production systems in Asia.Livestock Science.106 : 1-18.

53 Otte J, Roland-Holst D, Pfeiffer D, Soares-Magalhaes R, Rushton J, Graham J and Silbergeld E. 2007. Industrial Livestock Production and Global Health Risks, pp. 1. http://www.fao.org/ag/againfo/programmes/en/pplpi/docarc/rep-hpai_industrialisationrisks.pdf. Accessed May 18, 2013.

54 Alvarado CS, Gibbs SG, Gandara A, Flores C, Hurd WW, and Green CF. 2012. The Potential for Community Exposures to Pathogens from an Urban Dairy.Journal of Environmental Health. 74(7) : 22-28.

55 Devendra C. 2007. Perspectives on animal production systems in Asia.Livestock Science.106 : 1-18.

56 Steinfeld H. 2003. Economic Constraints on Production and Consumption of Animal Source Foods for Nutrition in Developing Countries.The Journal of Nutrition. 133 (11) : 4054S-4061.

of swine production highlights the importance of policy and regulation to establishing and protecting public health standards.[57]

Soil Contamination

Manure has traditionally been used as a highly efficient fertilizer. It is not only a rich source of nutrients to replenish soil used for crops, but it also sustains many physical soil properties such as structure and moisture retention, and prevents soil erosion.[58] However, when soil is subjected to repeated over-applications of manure, as often occurs when storage and weather considerations rather than agronomic interests determine timing and rates of application,[59] the accumulation of macronutrients such as nitrogen, phosphorous and potassium can exceed the uptake ability of plants leading to leaching and run-off of nutrients and contaminants.[60]

Manure can contain a variety of potential contaminants including pathogens, growth hormones, antibiotics, animal blood, copper sulphate,[61] heavy metals, and chemicals used as additives to the manure or to clean

57 Steinfeld H. 2003. Economic Constraints on Production and Consumption of Animal Source Foods for Nutrition in Developing Countries.The Journal of Nutrition. 133 (11) : 4054S-4061.

58 Martinez J, Dabert P, Barrington S, and Burton C. 2009. Livestock waste treatment systems for environmental quality, food safety and sustainability. Bioresource Technology. 100 : 5527-5536.

59 Hooda PS, Edwards AC, Anderson HA, and Miller A. 2000. A review of water quality concerns in livestock farming areas. The Science of the Total Environment.250 : 143-167.

60 Martinez J, Dabert P, Barrington S, and Burton C. 2009. Livestock waste treatment systems for environmental quality, food safety and sustainability. Bioresource Technology. 100 : 5527-5536.

61 United States Environmental Protection Agency. 2004. Risk Management Evaluation for Concentrated Animal Feeding Operations, pp. 2. http://nepis.epa.gov/Adobe/PDF/901V0100.PDF. Accessed May, 18 2013.

equipment.[62] The fundamental consequence stemming from soil pollution is the interaction between the soil compartment with air and water compartments. Once soils become nutrient saturated, nitrates and other compounds can leach into ground or surface waters. In other cases, the complex processes of nitrification, de-nitrification, and breakdown or transformation of organic matter allows contaminants to volatilize and enter the air compartment.[63]

Contamination and Depletion of Critical Water Resources

Ground and surface water resources are highly susceptible to pollution from IFAP effluent. The contaminants that can be found in water sources contaminated by IFAP effluent are nutrients such as nitrogen, phosphorous, potassium,[64, 65] pathogens,[66] veterinary pharmaceuticals (including antimicrobials),[67,68,69] heavy metals,[70] and hormones.[71, 72, 73, 74] In the

62 Lopez Alonso M, Benedito JL, Miranda M, Castillo C, Hernandez J, and Shore RF. 2000. The Effect of Pig Farming on Copper and Zinc Accumulation in Cattle in Galicia (North-Western Spain).The Veterinary Journal.160 : 259-266.

63 Martinez J, Dabert P, Barrington S, and Burton C. 2009. Livestock waste treatment systems for environmental quality, food safety and sustainability. Bioresource Technology. 100 : 5527-5536.

64 Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and deHaan C. 2006. Livestock's Long Shadow: Environmental Issues and Options, pp. 136. http://www.fao.org/docrep/010/a0701e/a0701e00.HTM. Accessed May 18, 2013.

65 Jongbloed AW and Lenis NP. 1998. Environmental concerns about animal manure. Journal of Animal Science.76 : 2641-2648.

66 Gerba CP and Smith JE. 2005. Sources of Pathogenic Microorganisms and Their Fate During Land Application of Wastes. Journal of Environmental Quality.34 : 42-48.

67 Boxall A, Kolpin D, Holling-Sorensen B, and Tolls J. 2003. Are Veterinary Medicines Causing Environmental Risks? Environmental Science and Technology. 37(15) : 286A-294A.

68 Campagnolo ER, Johnson KR, Karpati A, Rubin CS, Kolpin DW, Meyer MT, Esteban JE, Currier RW, Smith L, Thu KM, McGeehin M. Antimicrobial residues in animal waste and water resources proxima to large-scale swine and poultry feeding operations. The Science of the Total Environment.299 : 89-95.

U.S, the agricultural sector, including IFAP, is the largest source of contamination in lakes, rivers, and reservoirs,[75] and in the livestock farming areas of the U.K., nutrient loss and farm effluents are the leading cause of surface and ground water quality degradation.[76]

The presence of coliform bacteria in water indicates that it has been contaminated with either human or animal sewage.[77] Burkholder et al (1997) detected fecal coliform bacteria, anoxic conditions (low oxygen levels), high ammonium concentrations, and phosphorus as far as 30 kilometres from an IFAP effluent spill.[78] Improper disposal of animal carcasses and abandoned

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69 Kolpin D, Furlong E, Meyer M, Thurman M, and Zaugg S. 2002. Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in U.S. Streams 1999-2000: A National Reconnaissance. Environmental Science and Technology.36 : 1202-1211.

70 Jongbloed AW and Lenis NP. 1998. Environmental concerns about animal manure. Journal of Animal Science.76 : 2641-2648.

71 Hanselman TA, Graetz DA, and Wilkie AC. 2003. Manure-Borne Estrogens as Potential Environmental Contaminants: A Review. Environmental Science and Technology. 37(24) : 5471-5478.

72 Nichols DJ, Daniel TC, Edwards DR, Moore PA, and Pote DH. 1998. Use of grass filter strips to reduce 17β-estradiol in runoff from fescue-applied poultry litter. Journal of Soil and Water Conservation. 53(1) : 74-77.

73 Raman DR, Williams EL, Layton AC, Burns RT, Easter JP, Daugherty AS, Mullen MD, and Sayler GS. 2004. Estrogen Content of Dairy and Swine Wastes. Environmental Science and Technology.38 : 3567-3573.

74 Folmar LC, Denslow ND, Rao V, Chow M, Crain A, Enblom J, Marcino J, and Guillette LJ. 1996. Vitellogenin Induction and Reduced Serum Testosterone Concentrations in Feral Male Carp (Cypriuscarpio) Captured Near a Major Metropolitan Sewage Treatment Plant. Environmental Health Perspectives. 104(10) : 1096-1101.

75 United States Environmental Protection Agency. 2004. Risk Management Evaluation for Concentrated Animal Feeding Operations, pp. 4. http://nepis.epa.gov/Adobe/PDF/901V0100.PDF. Accessed May, 18 2013.

76 Hooda PS, Edwards AC, Anderson HA, and Miller A. 2000. A review of water quality concerns in livestock farming areas. The Science of the Total Environment.250 : 143-167.

77 Gaikwad GL, Gupta P, and Wate SR. 2011.Bio-control of waterborne pathogens using Lactobacillus spp. Environmental Monitoring and Assessment.

78 Burkholder JM, Mallin MA, Glasgow HB, Larsen M, McIver MR, Shank GC, Deamer-Melia N, Briley DS, Springer J, Touchette BW, and Hannon EK. 1997. Impacts to a Coastal River and

livestock facilities also have the potential to contribute to the degradation of water quality.[79] Rainfall can contribute to nutrient losses.[80]

According to a 2012 report, South Asia has water sanitization coverage of only 41%,[81] and water associated diseases contribute to the top ten causes of death in the region.[82] Even in India, wastewater treatment plants are decentralized and have no government support.[83]

When present in surface waters, nitrogen and phosphorous contribute to the process of eutrophication.[84,85,86] Eutrophication can also

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Estuary from Rupture of a Large Swine Waste Holding Lagoon. The Journal of Environmental Quality. 26(6) : 1451-1466.

79 Burkholder J, Libra B, Weyer P, Heathcote S, Thorne PS, and Wichman M. 2007.Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality.Environmental Health Perspectives. 115(2) : 308-312.

80 Esse PC, Buerkert A, Hiernaux P, Assa A. 2001. Decomposition of and nutrient release from ruminant manure on acid sandy soils in the Sahelian zone of Niger, West Africa.Agriculture, Ecosystems and Environment.83 : 55-63.

81 United Nations Children's Fund and the World Health Organization. 2012. Progress on Drinking Water and Sanitation, pp. 17. http://www.unicef.org/media/files/JMPreport2012.pdf. Accessed May 18, 2013.

82 Chourey J and Prakash A. 2010. Good Evidences, Bad Linkages: A Review of Water and Health in South Asia. Asian Journal of Water, Environment and Pollution. 7(1) : 5-17.

83 Patankar M, Patwardhan A, and Verbong G. 2010. A promising niche: waste to energy project in the Indian dairy sector. Environmental Science and Policy.13 : 282-290.

84 Howarth RW and Marino R. 2006. Nitrogen as the limiting nutrient for eutrophication in coastal marine ecosystems: Evolving views over three decades. Limnology and Oceanography. 51(1) : 364-376.

85 Pew Commission on Industrial Farm Animal Production. 2008. Putting Meat on the Table: Industrial Farm Animal Production in America, pp. 25. http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Industrial_Agriculture/PCIFAP_FINAL.pdf. Accessed May 13, 2013.

86 Burkholder J, Libra B, Weyer P, Heathcote S, Thorne PS, and Wichman M. 2007.Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality.Environmental Health Perspectives. 115(2) : 308-312.

lead to the proliferation of cyanobacteria,[87, 88] a type of algae that produces microcystins, which are known neuro- and hepatotoxins.[89]

Additionally, nitrates can have direct effects on human health. The World Health Organization (WHO) has set the guideline value for drinking water nitrate concentrations at 50mg/L,[90] although nitrate levels exceeding this limit have been documented in Punjab, south-western Haryana, Rajasthan, and Kashmir, India.[91, 92, 93, 94] In Rajasthan concentrations of almost 500mg/L, ten times the WHO standard, are not unusual.[95] Nitrate pollution is projected to be a potential problem for Bangladesh in the future as well.[96]

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87 Pew Commission on Industrial Farm Animal Production. 2008. Environmental Impact of Industrial Farm Animal Production, pp. 19. http://www.ncifap.org/_images/212-4_EnvImpact_tc_Final.pdf. Accessed May 13, 2013.

88 Schindler DW. 1990. Experimental Perturbations of While Lakes as Tests of Hypotheses concerning Ecosystem Structure and Function. Oikos. 57(1) : 25-41.

89 Burkholder J, Libra B, Weyer P, Heathcote S, Thorne PS, and Wichman M. 2007.Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality.Environmental Health Perspectives. 115(2) : 308-312.

90 World Health Organization. 2011. Nitrate and nitrite in drinking-water. http://www.who.int/water_sanitation_health/dwq/chemicals/nitratenitrite2ndadd.pdf. Accessed May 18, 2013.

91 Singh B and Sekhon GS. 1976. Nitrate Pollution of Groundwater from Nitrogen Fertilizers and Animal Wastes in the Punjab, India. Agriculture and Environment.3 : 57-67.

92 Kakar YP. Nitrate Pollution of Ground Water in Southern and South-Western Haryana, India. Quality of Groundwater, Proceedings of an International Symposium, Noordwijkerhout, The Netherlands, March 1981.

93 Suthar S, Bishnoi P, Singh S, Mutiyar PK, Nema AK, Patil NS. 2009. Nitrate contamination in groundwater of some rural areas of Rajasthan, India. Journal of Hazardous Materials.171 : 189-199.

94 Dar IA, Dar MA, and Sankar K. 2010. Nitrate contamination in groundwater of Sopore town and its environs, Kashmir, India. Arabian Journal of Geoscience.3 : 267-272.

95 Gupta SK, Gupta RC, Seth AK, Gupta AB, Basin JK, and Gupta A. 2000.Methaemoglobinaemia in areas with high nitrate concentration in drinking water.The National Medical Journal of India. 13(2) : 58-61.

96 Majumder RK, Hasnat MA, Hossain S, Ikeue K, Machida M. 2008.An exploration of nitrate concentrations in groundwater aquifers of central-west region of Bangladesh.Journal of Hazardous Materials.159 : 536-543.

Non-point-source from fertilizer application and point-sources such as IFAP facilities are two of three main sources of nitrate pollution.[97] The nitrate safety levels of 50mg/L in drinking water was set as a measure to prevent methemoglobinemia, a potentially fatal condition commonly known as blue baby syndrome.[98, 99, 100]Research conducted in India found that while infants were highly susceptible to the disease, under the high nitrate concentrations present in the region, individuals over the age of 18 were also highly likely to develop methemoglobinemia.[101]

Exposure to nitrate concentrations exceeding 50mg/L can also cause increased thyroid gland volume[102, 103] and frequency of subclinical thyroid disorders.[104] The presence of nitrates in drinking water has also been implicated as a potential promoter of insulin-dependent diabetes mellitus

97 Dar IA, Dar MA, and Sankar K. 2010. Nitrate contamination in groundwater of Sopore town and its environs, Kashmire, India. Arabian Journal of Geoscience

98 Hooda PS, Edwards AC, Anderson HA, and Miller A. 2000. A review of water quality concerns in livestock farming areas. The Science of the Total Environment 250: 143-167.

99 Ward MH, deKok TM, Levallois P, et al. 2005. Workgroup Report: Drinking-Water Nitrate and Health—Recent Findings and Research Needs. Environmental Health Perspectives 113(11): 1607-1614.

100 World Health Organization. 2011. Nitrate and Nitrite in Drinking-water: Background document for development of WHO Guidelines for Drinking-water Quality, p. 16. http://www.who.int/water_sanitation_health/dwq/chemicals/nitratenitrite2ndadd.pdf. Accessed June 22, 2013.

101 Gupta SK, Gupta RC, Seth AK, Gupta AB, Bassin JK, and Gupta A. 2000.Methaemoglobinaemia in areas with high nitrate concentration in drinking water. The National Medical Journal of India 13(2): 58-61.

102 Van Maanan JMS, van Dijk A, Mulder K, et al. 1994. Consumption of drinking water with high nitrate levels causes hypertrophy of the thyroid. Toxicology Letters 72: 365-374.

103 Radikova A, Tajtakova M, Kocan A, et al. 2008. Possible Effects of Environmental Nitrates and Toxic Organochlorines on Human Thyroid in Highly Polluted Areas in Slovakia. Thyroid 18(3): 353-362.

104 Tajtakova M, Semanova Z, Tomkova Z, et al. 2006. Increased thyroid volume and frequency of thyroid disorders signs in schoolchildren from nitrate polluted area. Chemosphere 62: 559-564.

(IDDM).[105] Parslow et al (1997) found a correlation between concentrations of at least 15 mg/L and IDDM development.[106] Other studies have found no correlation between low-level nitrate exposure and IDDM development.[107,108] Further study of concentrations in excess of 25mg/l is warranted.[109]

The carcinogenic effects of nitrates in drinking water have also been examined. Several epidemiological studies have found little conclusive evidence between cancer and nitrate concentration in drinking water,[110, 111, 112, 113]However, it is important to note that several of these studies have been conducted in areas where nitrate levels are already low. Zeegers et al (2006), for example, reported an average nitrate concentration of 1.68 mg/L in the

105 Kostraba JN, Gay EC, Rewers M. Hamman RF. 1992. Nitrate Levels in Community Drinking Waters and Risk of IDDM. Diabetes Care 15(11): 1505-1508.

106 Parslow RC, McKinney PA, Law GR, Staines A, Williams R, and Bodansky HJ. 1997. Incidence of childhood diabetes mellitus in Yorkshire northern England, is associated with nitrate in drinking water: an ecological analysis. Diabetologia 40: 550-556.

107 Van Manaan JMS, Albering HJ, de Kok TMCM, et al. 2001. Does the Risk of Childhood Diabetes Mellitus Require Revision of the Guidelin Values for Nitrate in Drinking Water? Environmental Health Perspectives 108(5): 457-461.

108 Muntoni S, Cocco P, Muntoni S, and Aru G. 2006. Nitrate in Community Water Supplies and Risk of Childhood Type 1 Diabetes in Sardinia, Italy. European Journal of Epidemiology 21(3): 245-247.

109 Van Manaan JMS, Albering HJ, de Kok TMCM, et al. 2001. Does the Risk of Childhood Diabetes Mellitus Require Revision of the Guidelin Values for Nitrate in Drinking Water? Environmental Health Perspectives 108(5): 457-461.

110 Weyer PJ, Cerhan JR, Kross BC, et al. 2001. Municipal drinking water nitrate level and cancer risk in older women: the Iowa Women's Health Study. Epidemiology 12(3): 327-338.

111 Zeegers MP, Selen RFM, Kleinjans JCS, Goldbohm RA, and van den Brandt PA. 2006. Nitrate Intake Does Not Influence Bladder Cancer Risk: The Netherlands Cohort Study. Environmental Health Perspectives 114(10): 1527-1531.

112 Eichholzer M and Gutzwiller F. 1998. Dietary Nitrates, Nitrites, and N-Nitroso Compounds and Cancer Risk: A Review of the Epidemiologic Evidence. Nutrition Reviews 56(4): 95-105.

113 Barret JH, Parslow RC, McKinney PA, Law GR, and Forman D. 1998. Nitrate in Drinking Water and the Incidence of Gastric, Esophageal, and Brain Cancer in Yorkshire, England. Cancer Causes & Control 9(2): 153-159.

region where they conducted their study.[114] A 2010 publication by the WHO International Agency for Research on Cancer (IARC) concluded that while the carcinogenic effects of nitrates in the current literature are inconclusive, the studies are limited because of the low levels of nitrates examined and that under certain conditions that alter nitrate metabolism (such as vitamin C deficiency) nitrate ingestion is "probably carcinogenic."[115, 116] One study conducted on populations consuming water nitrate concentrations upwards of50mg/L found positive correlations between nitrate concentration and bladder, gastric, and prostate cancers.[117]

The neural tube defect anencephaly has also been correlated with nitrate concentrations above 45 mg/l.[118] Several studies from high nitrate regions of India have also found positive correlations between the presence

114 Zeegers MP, Selen RFM, Kleinjans JCS, Goldbohm RA, and van den Brandt PA. 2006. Nitrate Intake Does Not Influence Bladder Cancer Risk: The Netherlands Cohort Study. Environmental Health Perspectives 114(10): 1527-1531.

115 World Health Organization International Agency for Research on Cancer. 2010. Ingested Nitrate and Nitrite and Cyanobacterial Peptide Toxins, p 325. http://monographs.iarc.fr/ENG/Monographs/vol94/index.php. Accessed June 22, 2013.

116 Grosse Y, Baan R, Straif K, Secretan B, El Ghissassi F, and Cogliano V. 2006 Carcinogenicity of nitrate, nitrite, and cyanobacterial peptide toxins. http://oncology.thelancet.com 7: 628-629.

117 Morales-Suarez-Varela MM, Llopis-Gonzalez A, and Tejerizo-Perez ML. 1995.Impact of Nitrates in Drinking Water on Cancer Mortality in Valencia, Spain. European Journal of Epidemiology 11(1): 15-21.

118 Croen LA, Todoroff K, and Shaw GM. 2001.Maternal Exposure to Nitrate from Drinking Water and Diet and Risk of Neural Tube Defects.American Journal of Epidemiology. 153(4): 325-331.

of high water nitrate concentrations and recurrent stomatitis,[119] respiratory tract infections,[120] and diarrhoea.[121]

Water can also be a source of pathogens,[122] especially in developing countries.[123] Water that is contaminated with human or animal feces serves as a source of bacteria, viruses, protozoa, and helminthes.[124] Of these, the diseases most likely to disperse away from IFAP facilities and affect human populations beyond farm-workers include cryptosporidiosis, giardiasis, campylobacteriosis, salmonellosis, colibacillosis, leptospirosis, listeriosis, and yersiniosis.[125]

High concentrations of animals, such as occurs in IFAP facilities, increases the possibility for pathogen spread both within the herd and to

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119 Gupta SK, Gupta RC, Seth AK, et al. 1999. Epidemiological Evaluation of Recurrent Stomatitis, Nitrates in Drinking Water, and Cytochrome b5 Reductase Activity. The American Journal of Gastroenterology. 94(7): 1808-1812.

120 Gupta SK, Gupta RC, Gupta AB, Seth AK, Bassin JK, and Gupta A. 2000. Recurrent Acute Respiratory Tract Infections in Areas With High Nitrate Concentrations in Drinking Water. Environmental Health Perspectives 108(4): 363-366.

121 Gupta SK, Gupta RC, Gupta AB, et al. 2001.RecurentDiarrhea in Children Living in Areas with High Levels of Nitrate in Drinking Water. Archives of Environmental Health: An International Journal 56(4): 369-373.

122 Mac Kenzie WR, Hoxie NJ, Proctor ME, et al. 1994. A Massive Outbreak in Milwaukee of Cryptosporidium Infection Transmitted through the Public Water Supply. The New England Journal of Medicine.331 : 161-167.

123 Gaikwad LG, Gupta P, and Wate SR. 2011.Bio-control of waterborne pathogens using Lactobacillus spp. Environmental Monitoring and Assessment. http://link.springer.com/article/10.1007/s10661-011-2447-2.

124 *Ibid.*

125 United States Environmental Protection Agency. 2004. Risk Management Evaluation for Concentrated Animal Feeding Operations, pp. 29. http://nepis.epa.gov/Adobe/PDF/901V0100.PDF. Accessed May, 18 2013.

other species as well,[126] and the large amount of waste produced in conjunction with a lack of waste management regulation increases the probability that waste will be improperly managed and introduced to the environment.[127] Without proper treatment, microorganisms will only be disseminated more readily into the environment during storage, application as fertilizer, or disposal. To prevent bacterial contaminants from entering the drinking water supply, conventional water treatment is needed.[128] Additionally,protozoan cysts tend to be resistant to standard water filtration,[129] thus in areas where *Cryptosporidium* or *Giardia* has been documented (such as West Bengal, India[130, 131]), filtration through sand filters should beconsidered to remove the pathogens.[132]

One factor that can worsen the human health outcomes of bacterial pathogen contamination is the widespread use of antibiotics in livestock. The

126 Gilchrest MJ, Greko C, Allinga DB, Beran GW, Riley DG, and Thorne PS. 2007.The Potential Role of Concentrated Animal Feeding Operations in Infectious Disease Epidemics and Antibiotic Resistance.Environmental Health Perspectives. 115(2) : 313-316.

127 United States Environmental Protection Agency. 2004. Risk Management Evaluation for Concentrated Animal Feeding Operations, pp. 29. http://nepis.epa.gov/Adobe/PDF/901V0100.PDF. Accessed May, 18 2013.

128 *Ibid.*

129 Mac Kenzie WR, Hoxie NJ, Proctor ME, Gradus MS, Blair KA, Peterson, DE, Kazmierczak, JJ, Addiss DG, Fox KR, Rose JB, and Davis JP. 1994. A Massive Outbreak in Milwaukee of Cryptosporidium Infection Transmitted through the Public Water Supply. The New England Journal of Medicine.331 : 161-167.

130 Khan SM, Debnath C, Pramanik AK, Xiao L, Nozaki T, and Ganguly S. 2010. Molecular characterization and assessment of zoonotic transmission of Cryptosporidium from dairy cattle in West Bengal, India. Veterinary Parasitology 171: 41-47.

131 Khan SM, Debnath C, Pramanik AK, Xiao L, Nozaki T, and Ganguly S. 2011. Molecular evidence for zoonotic transmission of Giardia duodenalis among dairy farm workers in West Bengal, India.Veterinary Parasitology.178 : 342-345.

132 United States Environmental Protection Agency. 2004. Risk Management Evaluation for Concentrated Animal Feeding Operations, pp. 29. http://nepis.epa.gov/Adobe/PDF/901V0100.PDF. Accessed May, 18 2013.

use of antibiotics as growth promoters in livestock is in part responsible for the evolution of antibiotic resistant bacterial populations, which can then leach into waterways.[133] Aquatic ecosystems have been shown to act as reservoirs of antibiotic resistant bacteria and antibiotic resistance genes and can even aid in transmission of antibiotic resistant genes between bacteria.[134] A 2007 study in Turkey identified fifty-five antibiotic resistant strains of *Escherichia coli* in drinking water,[135] and Vignesh et al (2012) identified a high frequency of antibiotic resistance in four genera (including *E. coli* and *Salmonella*) due to water contamination off the southern coast of India.[136] The concern associated with antibiotic resistant strains of bacteria is that conventional antibiotics can no longer be used for treatment.[137]

In arid locations IFAP can place stress on the local water supply through both pollution and the large volume of water usage. Twenty-seven percent of the global water footprint comes from use of water in animal agriculture, while only four percent of the footprint comes from home use of

133 Khachatourians GG.1998. Agricultural use of antibiotics and the evolution and transfer of antibiotic-resistant bacteria.Canadian Medical Association Journal 159(9): 1129-1136.

134 Biyela PT and Bezuidenhout CC. 2004.The role of aquatic ecosystems as reservoirs of antibiotic resistant bacteria and antibiotic resistance genes. Water Science and Technology 50(1): 45-50.

135 Alpay-Karaoglu S, Ozgumus OB, Sevim E, Kolayli F, Sevim A, and Yesilgil P. 2007. Investigation of antibiotic resistance profile and TEM-type β-lactamase gene carriage of ampicillin-resistant Escherichia coli strains isolated from drinking water. Annals of Microbiology 57(2): 281-288.

136 Vignesh S, Muthukumar K, and James RA. 2012. Antibiotic resistant pathogens versus human impacts: A study from three eco-regions of the Chennai coast, southern India. Marine Pollution Bulletin 64: 790-800.

137 Khachatourians GG.1998. Agricultural use of antibiotics and the evolution and transfer of antibiotic-resistant bacteria.Canadian Medical Association Journal 159(9): 1129-1136.

water.[138] Three thousand five hundred liters of water are required to produce one kilogram of grain fed broiler chicken, and, on average, the production of one kilogram of animal protein requires 100 times more water than the production of one kilogram of vegetable protein.[139]

Water resources in South Asia tend to be unequally distributed in space and time.[140] Scarcity and pollution of surface waters in South Asia means that countries rely heavily on ground water sources, which are responsible for up to 80% of the water supply in rural India.[141] However, these groundwater sources are becoming increasingly scarce and water resources are generally mismanaged.[142] In regions of South Asia such as the Ganges River Basin in India and Bangladesh, where water disputes have already become contentious,[143] further use and pollution of water resources by the developing livestock sector may exacerbate existing water issues.

IFAP contamination of water resources should be a serious consideration for South Asian countries, as exceedingly high nitrate levels

138 Hoekstra AY. 2012. The hidden water resource use behind meat and dairy. Animal Frontiers. 2(2) : 3-8.

139 Pimentel D and Pimental M. 1996.Food, energy and society, pp. 100. (Niwot, CO: University Press of Colorado).

140 Chourey J and Prakash A. 2010. Good Evidences, Bad Linkages: A Review of Water and Health in South Asia. Asian Journal of Water, Environment and Pollution. 7(1) : 5-17.

141 Tripathi SK. 2000. Address by Shri S.K. Tripathi, Secretary, Department of Drinking Water Supply, Ministry of Rural Development, Government of India. http://www.mdws.gov.in/hindi/sites/upload_files/ddwshindi/files/pdf/New%20Microsoft%20Office%20Word%20Docume nt.pdf.Accessed May 18, 2013.

142 Chourey J and Prakash A. 2010. Good Evidences, Bad Linkages: A Review of Water and Health in South Asia. Asian Journal of Water, Environment and Pollution. 7(1) : 5-17.

143 Pimentel D, Houser, J, Preiss E, White O, Fang H, Mesnick L, Barsky T, Tariche S, Schreck J, and Alpert S. 1997. Water Resources: Agriculture, the Environment, and Society. BioScience. 47(2) : 97-106.

and waterborne pathogens have been shown to pose a serious health risk to humans in the region. Additionally, in India and other developing countries, groundwater for agricultural and domestic use is rising and placing these water resources under increasing stress. Drought has been common in much of India over the last decade, especially in areas such as Andhra Pradesh, Karnataka, Maharashtra, Madhya Pradesh, and Rajasthan, and drops in groundwater level and quality have been remarkable.[144] Future policies in the region should aim at conserving both the quantity and quality of water resources.

Airborne Contaminants and Pathogens

A 2012 air quality and human health effects study by Yale University ranked India as having the worst air quality in the world.[145,146] Following immediately behind India were Bangladesh, Nepal, and Pakistan, respectively.[147] Of the 32 Indian cities monitored by the Indian government's Central Pollution Control Board, 27 cities have particulate matter 10 (PM_{10}) concentrations over four times the WHO's Air Quality Guideline value of 20

144 Negrel Ph, Pauwels H, Dewandel B, Gandolfi JM, Mascre C, and Ahmed S. 2011. Understanding groundwater systems and their functioning through the study of stable water isotopes in a har-rock aquifer (Maheshwaram watershed, India). Journal of Hydrology 397: 55-70.

145 Timmons H and Vyawahare M. 2012.New York Times. February 1. http://india.blogs.nytimes.com/2012/02/01/indias-air-the-worlds-unhealthiest-study-says/.

146 Emerson,JW. Hsu A, Levy MA, de Sherbinin A, Mara V, Esty DC, and Jaiteh M. 2012. 2012 Environmental Performance Index and Pilot Trend Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. http://epi.yale.edu/dataexplorer/indicatorprofiles?ind=eh.air.

147 Emerson,JW. Hsu A, Levy MA, de Sherbinin A, Mara V, Esty DC, and Jaiteh M. 2012. 2012 Environmental Performance Index and Pilot Trend Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. http://epi.yale.edu/dataexplorer/indicatorprofiles?ind=eh.air.

$\mu g/m^3$. The cities of Delhi, Kanpur, and Ludhiana are notably high, with concentrations of 198, 209, and 251$\mu g/m^3$, respectively.[148] The WHO estimated in 2008 that globally more than a million deaths could be prevented by meeting Air Quality Guideline values.[149] This overwhelming pollution problem is due, in large part, to the immense population (India alone has a population of over one billion people[150]) with a growing number of vehicles, a heavy reliance on coal power, a large, urban, brick-making industry, and the burning of biomass.[151, 152] While the contribution of IFAP to air pollution is largely overshadowed by other air pollution sources in South Asia, the effects of the growing industry on air quality should be accounted for in future air quality policy measures.

The decomposition of IFAP wastes such as manure, waste feed, and bedding dust produces air emissions. The generation of these air emissions can be affected by the type of housing in which animals are confined, the type of animals used, waste management systems, and weather conditions.

148 World Health Organization. 2010. Database: outdoor air pollution in cities. http://www.who.int/phe/health_topics/outdoorair/databases/en/index.html. Accessed May 23, 2013.

149 World Health Organization. 2008. Burden of disease associated with urban outdoor air pollution for 2008. http://www.who.int/phe/health_topics/outdoorair/databases/burden_disease/en/index.html.Accessed May 23, 2013.

150 Emerson,JW. Hsu A, Levy MA, de Sherbinin A, Mara V, Esty DC, and Jaiteh M. 2012. 2012 Environmental Performance Index and Pilot Trend Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy. http://epi.yale.edu/dataexplorer/indicatorprofiles?ind=eh.air.

151 Timmons H and Vyawahare M. 2012.New York Times. February 1. http://india.blogs.nytimes.com/2012/02/01/indias-air-the-worlds-unhealthiest-study-says/.

152 Guttikunda A and Jawahar P. 2012. Urban Air Pollution and Co-Benefits Analysis for Indian Cities, pp1, 21. http://www.urbanemissions.info/images/UEI/publications/SIM-39-2012-Air-Pollution-in-Six-Indian-Cities.pdf. Accessed May 23, 2013.

The prominent airborne contaminants produced by IFAP operations include ammonia, nitrous oxide, methane, carbon dioxide, hydrogen sulphide, volatile organic compounds (VOCs), and particulate matter (PM).[153] Of these compounds, nitrous oxide, methane, and carbon dioxide are significant greenhouse gases implicated in global climate change.[154,155] Animal agriculture alone is responsible for 18% of global greenhouse emissions,[156] thus the production of these gases is not without consequence.

The two most hazardous chemical compounds produced by IFAP are ammonia and hydrogen sulphide. The largest source of ammonia in most regions is from livestock waste management practices.[157, 158, 159] Urine and uric acid are major sources of ammonia, but additional ammonia can be produced during microbial decomposition of organic wastes.[160] India is one of the

153 United States Environmental Protection Agency. 2004. Risk Management Evaluation for Concentrated Animal Feeding Operations, pp. 63. http://nepis.epa.gov/Adobe/PDF/901V0100.PDF. Accessed May, 18 2013.

154 United States Environmental Protection Agency. 2004. Risk Management Evaluation for Concentrated Animal Feeding Operations, pp. 63. http://nepis.epa.gov/Adobe/PDF/901V0100.PDF. Accessed May, 18 2013.

155 Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and deHaan C. 2006. Livestock's Long Shadow: Environmental Issues and Options, pp. 5. http://www.fao.org/docrep/010/a0701e/a0701e00.HTM.Accessed May 18, 2013.

156 Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and deHaan C. 2006. Livestock's Long Shadow: Environmental Issues and Options, pp. 271. http://www.fao.org/docrep/010/a0701e/a0701e00.HTM. Accessed May 18, 2013.

157 Ryer-Powder JE. 1991. Health Effects of Ammonia. Plant/Operations Progress 10(4): 228-232.

158 Lee Y-H and Park S-U. 2002. Estimation of Ammonia Emission in South Korea.Water, Air, and Soil Pollution. 135: 23-37.

159 Yamaji K, Ohara T, and Akimoto H. 2004.Regional-specific emission inventory for NH3, N2O, and CH4 via animal farming in South, Southeast, and East Asia. Atmospheric Environment 38 7111-7121.

160 United States Environmental Protection Agency. 2004. Risk Management Evaluation for Concentrated Animal Feeding Operations, pp. 63. http://nepis.epa.gov/Adobe/PDF/901V0100.PDF. Accessed May, 18 2013.

largest producers of ammonia in the world, second only to China, producing 1.3 mega-tonnes annually, while Pakistan and Bangladesh together produce approximately 0.5 mega-tonnes.[161] Cattle produce the largest proportion of ammonia in India, followed by buffalo. [162] In the region, the Ganges delta appears to contain the highest concentrations of atmospheric ammonia,[163] and in India, Uttar Pradesh, Madhya Pradesh, and West Bengal have the highest ammonia emissions from livestock.[164]

The high solubility of ammonia in water means that it is rapidly absorbed into the human upper airways, potentially damaging the airway epithelium, and is known to act as an eye and respiratory irritant, even at the typical concentrations found in livestock facilities (less than 100ppm). Exposure to concentrations over 150 ppm can cause scarring of the upper and lower airways. The inflammatory responses to ammonia exposure can lead to reactive airway dysfunction syndrome and persistent airway hyper-

161 Yamaji K, Ohara T, and Akimoto H. 2004.Regional-specific emission inventory for NH3, N2O, and CH4 via animal farming in South, Southeast, and East Asia. Atmospheric Environment 38 7111-7121.

162 Aneja VP, Schlesinger WH, Erisman JW, Behera SN, Sharma M, and Battye W. 2012.Reactive nitrogen emissions from crop and livestock farming in India.Atmospheric Environment. 47: 92-103.

163 Yamaji K, Ohara T, and Akimoto H. 2004.Regional-specific emission inventory for NH3, N2O, and CH4 via animal farming in South, Southeast, and East Asia. Atmospheric Environment 38 7111-7121.

164 Aneja VP, Schlesinger WH, Erisman JW, Behera SN, Sharma M, and Battye W. 2012.Reactive nitrogen emissions from crop and livestock farming in India.Atmospheric Environment. 47: 92-103.

responsiveness. Very high concentrations can cause eye and chemical burns, and 500 ppm can be fatal.[165]

Hydrogen sulphide is a potentially lethal, colourless gas that in an agricultural setting is produced by the bacterial decomposition of proteins or other organic matter containing sulphur. The most prominent agricultural production of hydrogen sulphide occurs in liquid manure, such as those used in swine and dairy production of developed countries. Much like ammonia, it can act as an eye and respiratory irritant. It can be identified by its rotten egg odour and because it is heavier than air it can accumulate in low-lying areas. When found in concentrations under 10ppm hydrogen sulphide is not harmful; however, if slurries are agitated concentrations can reach as high as 1000 ppm. At concentrations over 150 ppm, hydrogen sulphide may impair sense of smell, limiting detection of the gas. Because it is a chemical asphyxiate, both chronic and acute exposure above 100 ppm can cause loss of consciousness, shock, acute respiratory distress syndrome, pulmonary edema, coma, and death.[166]

Volatile organic compounds (VOCs) are produced during bacterial fermentation of IFAP wastes and include compounds such as acetone, benzene, chloroform, formaldehyde, and methanol.[167] Additionally, vociferous compounds are ubiquitous to IFAP, and in developed countries

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165 United States Environmental Protection Agency. 2004. Risk Management Evaluation for Concentrated Animal Feeding Operations, pp. 64. http://nepis.epa.gov/Adobe/PDF/901V0100.PDF. Accessed May, 18 2013.

166 *Ibid.*

167 *Ibid.*

odor has been cited as having multiple negative effects on the quality of life of the surrounding community.[168][169] According to Schiffman et al (2000) the most common symptoms include eye, nose, and throat irritation, headache, nausea, diarrhea, hoarseness, sore throat, cough, chest tightness, nasal congestion, palpitations, shortness of breath, stress, drowsiness, and alterations in mood.[170] These symptoms can be even more persistent in sensitive individuals, such as those with asthma, and may exacerbate existing medical conditions.[171]

Particulate matter (PM) may be composed of animal bedding, fecal matter, litter, feed materials, animal by products such as skin cells or feathers, and the products of microbial action on feces and feed, bacteria, fungi, viruses, metals, and hormones.[172] PM can absorb and contain gases, odorous compounds, and microorganisms.[173] Thorne et al (2009) found that much of the PM observed in and near animal housing was comprised of bioaerosols

168 Wing S, Horton RA, Marshall SW, et al. 2008. Air Pollution and Odor in Communities Near Industrial Swine Operations. Environmental Health Perspectives. 116(10): 1362-1368.

169 Schiffman SS, Walker JM, Dalton P, Lorig TS, Raymer JH, Shusterman D, and Williams M. 2000.Potential Health Effects of Odor from Animal Operations, Wastewater Treatment, and Recycling of Byproducts. Journal of Agromedicine.7(1) : 7-81.

170 Schiffman SS, Walker JM, Dalton P, Lorig TS, Raymer JH, Shusterman D, and Williams M. 2000.Potential Health Effects of Odor from Animal Operations, Wastewater Treatment, and Recycling of Byproducts. Journal of Agromedicine.7(1) : 7-81.

171 *Ibid.*

172 United States Environmental Protection Agency. 2004. Risk Management Evaluation for Concentrated Animal Feeding Operations, pp. 66. http://nepis.epa.gov/Adobe/PDF/901V0100.PDF. Accessed May, 18 2013.

173 Cambra-Lopez M, Andre JAA, Zhao Y, Calvet S, and Torres AG. 2008. Airborne particulate matter from livestock production systems: A review of an air pollution problem. Environmental Pollution.158 :1-17.

including bacteria and endotoxins.[174] Levels of PM are typically high in livestock houses, and are particularly high in intensive pig and poultry houses.[175]

While it has long been known that livestock farmers exposed to high PM concentrations have a higher prevalence of respiratory diseases,[176] PM can also negatively affect the health of nearby residents when emitted into the environment. PM penetrates deep into the lungs, and can irritate the respiratory tract, reduce respiratory disease resistance, and deliver pathogenic and non-pathogenic microorganisms to the respiratory tract.[177]

Bioaerosol PM is recognized as a vector for endotoxins and many microorganisms, including bacteria and fungi.[178, 179, 180] Endotoxin, a compound derived from the outer membrane of bacteria such as *Escherichia*

174 Thorne PS, Ansley AC, and Perry SS. 2009.Concentrations of Bioaerosols, Odors, and Hydrogen Sulfide Inside and Downwind from Two Types of Swine Livestock Operations.Journal of Occupational and Environmental Hygiene. 6(4) : 211-220.

175 Cambra-Lopez M, Andre JAA, Zhao Y, Calvet S, and Torres AG. 2008. Airborne particulate matter from livestock production systems: A review of an air pollution problem. Environmental Pollution.158 :1-17.

176 Charavaryamath C, Janardhan KS, Townsend HG, Willson P, and Singh B. 2005. Multiple exposures to swine barn air induce lung inflammation and airway hyper-responsiveness. Respiratory Research.6(50). http://respiratory-research.com/content/6/1/50.

177 Cambra-Lopez M, Andre JAA, Zhao Y, Calvet S, and Torres AG. 2008. Airborne particulate matter from livestock production systems: A review of an air pollution problem. Environmental Pollution.158 :1-17.

178 Andersson AM, Weiss N, Rainey F, and Salkinoja-Salonen MS. 1999. Dust-born bacteria in animal sheds, schools and children's day care centres. Journal of Applied Microbiology.86 : 622-634.

179 Curtis SE, Drummond JG, Grunloh DJ, Lynch PB, and Jensen AH. 1975. Relative and Qualitative Aspects of Aerial Bacteria and Dust in Swine Houses. Journal of Animal Science. 41(5) : 1512-1520.

180 Martin WT, Zhang Y, Willson P, Arher TP, Kinahan C, and Barber EM. 1996. Bacterial and fungal flora of dust deposits in a pig building. Occupational and Environmental Medicine.53 : 484-487.

coli and *Salmonella* spp,[181] has been found in high concentrations around IFAP areas and is known to cause lung infections and airway related inflammatory responses. Though Gram-negative bacteria may only constitute up to only five percent of the total bacteria in livestock houses, they are of particular concern since the vast majority of the identified Gram-negative bacteria are pathogenic.[182] When zoonotic pathogens attain airborne transmissibility due to adherence to PM, the health of the nearby community is threatened.[183, 184, 185]

Antibiotics are also capable of adhering to and being dispersed by PM.[186] At least one study has identified as many as five different antibiotics in

181 Seedorf J, Hartung J, Schröder M, Linkert KH, Phillips VR, Holden MR, Sneath RW, Short JL, White RP, Pederesen S, Takai H, Johnsen JO, Metz JHM, Groot Koerkamp PWG, Uenk GH, and Wathes CM. 1998. Concentrations and Emissions of Airborne Endotoxins and Microorganisms in Livestock Buildlings in Northern Europe.Journal of Agricultural Engineering Research. 70(1) : 97-109.

182 Zucker B-A, Trojan S, and Müller W. 2000.Airborne Gram-Negative Bacterial Flora in Animal Houses.Journal of Veterinary Medicine.47 : 37-46.

183 Cambra-Lopez M, Andre JAA, Zhao Y, Calvet S, and Torres AG. 2008. Airborne particulate matter from livestock production systems: A review of an air pollution problem. Environmental Pollution.158 :1-17.

184 Seedorf J, Hartung J, Schröder M, Linkert KH, Phillips VR, Holden MR, Sneath RW, Short JL, White RP, Pderesen S, Takai H, Johnsen JO, Metz JHM, Groot Koerkamp PWG, Uenk GH, and Wathes CM. 1998. Concentrations and Emissions of Airborne Endotoxins and Microorganisms in Livestock Buildlings in Northern Europe.Journal of Agricultural Engineering Research. 70(1) : 97-109.

185 Alvarado CS, Gibbs SG, Gandara A, Flores C, Hurd WW, and Green CF. 2012. The Potential for Community Exposures to Pathogens from an Urban Dairy.Journal of Environmental Health. 74(7) : 22-28.

186 Cambra-Lopez M, Andre JAA, Zhao Y, Calvet S, and Torres AG. 2008. Airborne particulate matter from livestock production systems: A review of an air pollution problem. Environmental Pollution.158 :1-17.

90% of the study's PM samples from a swine facility,[187] which could contribute to antibiotic resistance and further human health issues.

In developed countries, the air pollution emanating from IFAP facilities has been shown to be a hazard not only to IFAP workers, but also to surrounding communities. In the developing countries of South Asia, where many IFAP facilities exist in urban or peri-urban locations, this can put an even larger number of people at risk. Although there are a number of air quality issues in South Asia that may surpass the emissions from IFAP, disease-causing vectors such as bioaerosols and the growing contribution of ammonia, hydrogen sulphide, greenhouse gases, and particulate matter from IFAP must be taken into consideration in future air quality policies.

Food-borne Illness

The WHO defines foodborne diseases (FBD) as diseases that are associated with the ingestion of contaminated food.[188] Contamination can encompass not only microbial and parasitic contamination, but chemical contamination as well.[189] The burden of FBD is poorly defined in many

187 Hamscher G, Pawelzick HT, Sczesny S, Nau H, and Hartung J. 2003. Antibiotics in Dust Originating from a Pig-Fattening Farm: A New Source of Health Hazard for Farmers? Environmental Health Perpectivees. 111(13) : 1590-1594.

188 World Health Organization.2006. WHO Consultation to Develop a Strategy to Estimate the Global Burden of Foodborne Diseases, pp. 3. http://www.who.int/foodsafety/publications/foodborne_disease/burden_sept06/en/. Accessed May 23, 2013.

189 World Health Organization.2006. WHO Consultation to Develop a Strategy to Estimate the Global Burden of Foodborne Diseases, pp. 28. http://www.who.int/foodsafety/publications/foodborne_disease/burden_sept06/en/. Accessed May 23, 2013.

developing countries and on a global level.[190] However, it is known that animal source foods (ASF) are one of the most prominent vectors of FBD, especially in developing countries where little food safety measures are in place.

One of the less commonly recognized types of FBD is that of chemical contamination of food. In ASF chemical contamination is often the result of animal feed practices, a concern only recently recognized in developed countries. Of primary concern is the bioaccumulation of persistent organic pollutants (POPs) such as dioxins, furans, and polychlorinated bromides (PCBs) in the fat stores of food animals.[191, 192, 193]

POPs are widely used as pesticides in agricultural settings and when forage, soils, and feed of food animals is contaminated, these POPs accumulate in the animals' fat stores.[194, 195, 196] In some IFAP cases that have

190 Flint JA, Van Duynhoven YT, Angulo FJ, DeLong SM, Braun P, Kirk M, Scallan E, Fitzgerald M, Adak GK, Sockett P, Allis A, Hall G, Gargouri N, Walke H, and Braam P. 2005. Estimating the Burden of Acute Gastroenteritis, Foodborne Disease, and Pathogens Commonly Transmitted by Food: An International Review.Clinical Infectious Diseases. 41(1) : 698-704.

191 Walker P, Rhubart-Berg P, McKenzie S, Kelling K, and Lawrence RS. 2005. Invited Paper: Public health implications of meat production and consumption. Public Health and Nutrition. 8(4) : 348-356.

192 Food and Nutrition Board and Institute of Medicine. 2003. Dioxins and Dioxin-like Compounds in the Food Supply: Strategies to Decrease Exposure (Washington, D.C., USA : National Academies Press).

193 Sapkota AR, Lefferts LY, McKenzie S and Walker P. 2007. What Do We Feed to Food-Production Animals? A Review of Animal Feed Ingredients and Their Potential Impacts on Human Health.Environmental Health Perspectives. 115(5) : 663-670.

194 Walker P, Rhubart-Berg P, McKenzie S, Kelling K, and Lawrence RS. 2005. Invited Paper: Public health implications of meat production and consumption. Public Health and Nutrition. 8(4) : 348-356.

been well documented in developed countries such as the United States, animal fat is fed to food animals, thereby allowing POPs to become highly concentrated in food animal fat stores.[197, 198, 199]When these animals are used for human consumption, the POPs present in the fat stores can be carcinogenic, toxic to nervous system development in fetuses and young children,[200] cause immune and endocrine system impairment, and negatively affect reproductive organs.[201] In many tropical countries such as India, the pesticide DDT is still used to control malarial insect vectors,[202] and thus this point of entry by DDT into the human diet warrants further investigation.

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195 Food and Nutrition Board and Institute of Medicine. 2003. Dioxins and Dioxin-like Compounds in the Food Supply: Strategies to Decrease Exposure (Washington, D.C., USA : National Academies Press).

196 Sapkota AR, Lefferts LY, McKenzie S and Walker P. 2007. What Do We Feed to Food-Production Animals? A Review of Animal Feed Ingredients and Their Potential Impacts on Human Health.Environmental Health Perspectives. 115(5) : 663-670.

197 Walker P, Rhubart-Berg P, McKenzie S, Kelling K, and Lawrence RS. 2005. Invited Paper: Public health implications of meat production and consumption. Public Health and Nutrition. 8(4) : 348-356.

198 Food and Nutrition Board and Institute of Medicine. 2003. Dioxins and Dioxin-like Compounds in the Food Supply: Strategies to Decrease Exposure (Washington, D.C., USA : National Academies Press).

199 Sapkota AR, Lefferts LY, McKenzie S and Walker P. 2007. What Do We Feed to Food-Production Animals? A Review of Animal Feed Ingredients and Their Potential Impacts on Human Health.Environmental Health Perspectives. 115(5) : 663-670.

200 Walker P, Rhubart-Berg P, McKenzie S, Kelling K, and Lawrence RS. 2005. Invited Paper: Public health implications of meat production and consumption. Public Health and Nutrition. 8(4) : 348-356.

201 Sapkota AR, Lefferts LY, McKenzie S and Walker P. 2007. What Do We Feed to Food-Production Animals? A Review of Animal Feed Ingredients and Their Potential Impacts on Human Health.Environmental Health Perspectives. 115(5) : 663-670.

202 United Nations Environment Programme, World Health Organization, and Secretariat of the Stockholm Convention. 2009. National Situation Regarding DDT: India. http://www.chem.unep.ch/ddt/DDTProfiles/India.html. Accessed May 24, 2013.

Additionally, heavy metals are routinely added to animal feed in IFAP facilities.[203] A 2013 study of poultry in the United States identified arsenic, an approved animal dietary supplement, in chicken tissues and recommended that this pathway be taken into account when assessing human exposures to arsenic.[204] While these exposure pathways are likely of minor importance in developing countries, these studies outline the importance of animal feed components to human public health,[205] and should be taken into account as developing countries establish IFAP standards and guidelines.

The more widely recognized class of FBD is that of bacterial, viral, or parasitic contamination of food products. Often, these exposures result in diarrheal disease, causing 3 to 5 billion cases globally and leading to 1.8 million deaths annually. The majority of these deaths are children.[206] Diarrheal disease is a leading killer in India, surpassing mortalities from tuberculosis, HIV/AIDS, malaria, and childhood diseases such as pertussis,

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203 Lopez Alonso M, Benedito JL, Miranda M, Castillo C, Hernandez J, and Shore RF. 2000. The Effect of Pig Farming on Copper and Zinc Accumulation in Cattle in Galicia (North-Western Spain).The Veterinary Journal.160 : 259-266.

204 Nachman KE, Baron PA, Raber G, Francesconi KA, Navas-Acien A, Love DC. 2013. Roxarsone, Inorganic Arsenic, and Other Arsenic Species in Chicken: A U.S.-Based Market Basket Sample. Environ Health Perspect, May 11. http://ehp.niehs.nih.gov/wp-content/uploads/121/7/ehp.1206245.pdf. Accessed July 2, 2013.

205 Sapkota AR, Lefferts LY, McKenzie S and Walker P. 2007. What Do We Feed to Food-Production Animals? A Review of Animal Feed Ingredients and Their Potential Impacts on Human Health.Environmental Health Perspectives. 115(5) : 663-670.

206 National Centre for Disease Control, Government of India. 2009. CD Alert: Food-Borne Diseases, pp 1. http://www.ncdc.gov.in/writereaddata/linkimages/Dec_091047732317.pdf. Accessed May 23, 2013.

polio, diptheria, measles, and tetanus combined.[207] Although there are no official statistics for foodborne illness in Bangladesh, it is widely perceived to be a major problem,[208] as is likely in nearby countries such as Bhutan, Nepal, and Sri Lanka.

The major source of diarreal disease is from food and water contamination, although it remains difficult to differentiate between the two sources[209] as reporting and surveillance are poor in developing countries.[210] Major factors for susceptibility to food-borne infections include age, HIV/AIDS, and malnutrition.[211] Diarrheal diseases in infants are very common in developing countries and account for a high percentage of mortality and morbidity.[212] Emerging foodborne pathogens associated with animal source foods in South Asia include non-typhoidal salmonellosis and other *Salmonella* spp, *Campylobacter*, *Escherichia coli*, *Clostridium perfringens*, and

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207 Global Foodborne Infections Network, Centers for Disease Control and Prevention. 2011. Defeating diarrheal disease: Tracking the source of foodborne infections, pp. 1. http://www.cdc.gov/ncezid/dfwed/PDFs/factsheet-India.pdf. Accessed May 23, 2013.

208 Sadrul Huda SSM, Muzaffar AT, and Ahmed JU. 2008. The Perception on Food Quality among Urban People pp. 3. http://orp.aiub.edu/FileZone/OtherFiles/orpadmin-8589891075233560808/AIUB-BUS-ECON-2008-17.pdf. Accessed May 23, 2013.

209 Global Foodborne Infections Network, Centers for Disease Control and Prevention. 2011. Defeating diarrheal disease: Tracking the source of foodborne infections, pp. 1. http://www.cdc.gov/ncezid/dfwed/PDFs/factsheet-India.pdf. Accessed May 23, 2013.

210 Bhat RV and Rao RN. 1987. Foodborne diseases in India. The Indian Journal of Pediatrics. 54(4) : 553-562.

211 Chaudhry R. 2008. Emerging Food-Borne Bacterial Pathogens, pp. 6. http://www.ilsi-india.org/conference-in-microbiological-food-safety-management-details/Session-IV/Dr%20Rama%20Chaudhry.pdf. Accessed August, 2012.

212 Bhat RV and Rao RN. 1987. Foodborne diseases in India. The Indian Journal of Pediatrics. 54(4) : 553-562.

methicillin-resistant *Staphylococcus aureus* (MRSA).[213] The *E. coli* serotype 0157:H7 is of great public health concern, as it can cause bloody diarrhoea, haemorrhagic colitis and uremic syndrome, and central nervous system dysfunctions.[214] Antibiotic resistance has been identified in *E. coli*,[215]*Salmonella* spp, *Campylobacter*, and *Staphylococcus aureus*.[216]

During the scaling up of dairy operations, the hygienic aspects of milk production are not always adequately considered[217] and strains of human pathogenic bacteria has been known to originate even from clinically healthy animals.[218] Microbes can enter milk from subclinical or clinical mastitis, from the farm environment, utensils used during storage, and transport. There are at least 21 known milk-borne diseases.[219]

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213 Chaudhry R. 2008. Emerging Food-Borne Bacterial Pathogens, pp. 11, 12, 20, 24, 28. http://www.ilsi-india.org/conference-in-microbiological-food-safety-management-details/Session-IV/Dr%20Rama%20Chaudhry.pdf. Accessed August, 2012.

214 Villi RA and Elango A. 2011. Isolation and Characterization of *Enterohaemorrhagic Escherichia coli* 0157:H7 from Dairy Related Sources in Tamil Nadu, India. Egyptian Journal of Dairy Science. 39(1) : 1-7.

215 Mathai E, Chandy S, Thomas K, Antoniswamy B, Joseph I, Mathai M, Sorensen TL, and Holloway K. 2008. Antimicrobial resistance surveillance among commensal *Escherichia coli* in rural and urban areas in Southern India.Tropical Medicine and International Health. 13(1) : 41-45.

216 Chaudhry R. 2008. Emerging Food-Borne Bacterial Pathogens, pp. 11,12, 28. http://www.ilsi-india.org/conference-in-microbiological-food-safety-management-details/Session-IV/Dr%20Rama%20Chaudhry.pdf. Accessed August, 2012.

217 Lingathurai S and Vellathurai P. 2010. Bactiorological Quality and Safety of Raw Cow Milk in Madurai, South India. WebMed Central. http://www.webmedcentral.com/article_view/1029. Accessed May 23, 2013.

218 LeJeune JT and Rajala-Schultz PJ. 2009. Unpasteurized Milk: A Continued Public Health Threat. Clinical Infectious Disease.48 : 93-100.

219 Lingathurai S and Vellathurai P. 2010. Bactiorological Quality and Safety of Raw Cow Milk in Madurai, South India. WebMed Central. http://www.webmedcentral.com/article_view/1029. Accessed May 23, 2013.

In Karachi, Pakistan, ice cream was the exposure medium for a significant number of typhoid fever (*Salmonellatyphi*) cases.[220]In India, multiple studies have examined the bacterial colonies present in different types of milk products in different locations throughout India.[221, 222, 223, 224, 225, 226]In the Warangal District of India, 28% of raw milk samples were very poor in quality, an additional 27% were just poor in quality, and only 19% were considered good in quality. Pasteurizing milk was found to greatly increase the quality of milk, but still only 82% of the samples tested were considered good quality. *Lactobacilli*, *Staphylococcus aureus*, *E. coli*, *Salmonella typhi*, and fecal coliforms were detected in the contaminated samples.[227]

In a study of 60 raw milk samples from Madurai, 90% were found to contain coliforms, 70% contained *E. coli* strains, 65% contained *E. coli*

220 Luby SP, Faizan SP, Fisher-Hoch SP, Syed A, Mintz ED, Bhutta ZA, and McCormick JB. 1998. Risk factors for typhoid fever in an endemic setting, Karachi, Pakistan. Epidemiology and Infection. 120(2) : 129-138.

221 Srujana G, Reddy AR, Reddy VK, and Reddy SR. 2011. Microbial Quality of Raw and Pasteurized Milk Samples Collected from Different Places of Warangal District, (A.P.) India. International Journal of Pharma and Bio Sciences. 2(2) : B-140-B-143.

222 Kumar R and Prasad A. 2010.Detection of *E.coli* and *Stahylococcus* in Milk and Milk Products in and around Pantnagar.Veterinary World. 3(11) : 495-496.

223 Chatterjee SN, Bhattacharjee I, Chatterjee SK, and Chandra G. 2006.Microbiological examination of milk in Tarakeswar India with special reference to coliforms.African Journal of Biotechnology. 5(15) : 1383-1385.

224 Lingathurai S and Vellathurai P. 2010. Bactiorological Quality and Safety of Raw Cow Milk in Madurai, South India. WebMed Central. http://www.webmedcentral.com/article_view/1029. Accessed May 23, 2013.

225 Villi RA and Elango A. 2011. Isolation and Characterization of *Enterohaemorrhagic Escherichia coli* 0157:H7 from Dairy Related Sources in Tamil Nadu, India. Egyptian Journal of Dairy Science. 39(1) : 1-7.

226 Warke R, Kamat A, Kamat M, and Thomas P. 2000. Incidence of pathogenic psychrotrophs in ice creams sold in some retail outlets in Mumbai, India.Food Control. 11 : 77-83.

227 Srujana G, Reddy AR, Reddy VK, and Reddy SR. 2011. Microbial Quality of Raw and Pasteurized Milk Samples Collected from Different Places of Warangal District, (A.P.) India. International Journal of Pharma and Bio Sciences. 2(2) : B-140-B-143.

0157:H7, 61.7% contained *Staphylococcus aureus*, and 13% contained *Salmonella* spp.[228]High counts of *E. coli* were found in 6 of 10 raw milk samples in Tarakeswar. *E. coli* was also isolated in 3 out of 10 pasteurized milk samples from the same region.[229] Out of 135 samples of various dairy products in Pantnagar, 14 were found to contain *S. aureus* and 11 contained *E. coli*. The highest rate of contamination was found in "Burfi" while the lowest rate was seen in ice cream. It was also found that 20% of the milk from dairy farms was contaminated, as compared to 7 percent in milk from and for a single household.[230]

Another study in Tamil Nadu tested 132 samples from dairy related sources such as manure, milk utensils, raw milk, khoa, channa, cream, cheese, and ice cream. They identified 69 *E. coli* isolates, six of which were *E. coli* O157:H7 (found in manure, milk utensils, milk, and ice cream).[231] Researchers examining ice cream in Mumbai, India found contamination with *Staphylococcus aureus* in all samples and significant contamination with *Listeria* and *Yersinia*.[232]A study in rural and urban southern India on

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228 Lingathurai S and Vellathurai P. 2010. Bactiorological Quality and Safety of Raw Cow Milk in Madurai, South India. WebMed Central. http://www.webmedcentral.com/article_view/1029. Accessed May 23, 2013.

229 Chatterjee SN, Bhattacharjee I, Chatterjee SK, and Chandra G. 2006.Microbiological examination of milk in Tarakeswar India with special reference to coliforms.African Journal of Biotechnology. 5(15) : 1383-1385.

230 Kumar R and Prasad A. 2010.Detection of *E.coli* and *Stahylococcus* in Milk and Milk Products in and around Pantnagar.Veterinary World. 3(11) : 495-496.

231 Villi RA and Elango A. 2011. Isolation and Characterization of *Enterohaemorrhagic Escherichia coli* 0157:H7 from Dairy Related Sources in Tamil Nadu, India. Egyptian Journal of Dairy Science. 39(1) : 1-7.

232 Warke R, Kamat A, Kamat M, and Thomas P. 2000. Incidence of pathogenic psychrotrophs in ice creams sold in some retail outlets in Mumbai, India.Food Control. 11 : 77-83.

antimicrobial resistance among *E. coli* strains found that 42% of commensal *E. coli* had acquired antibiotic resistance, and that in infecting strains of *E.coli* antimicrobial resistance is likely to be even more common than in commensal *E. coli*.[233]

Poultry, poultry meat and eggs also can act as a bacterial vector, particularly in the case of *Salmonella*. The prevalence of *Salmonella* in poultry is particularly troubling in India,[234,235] given that most poultry IFAP facilities are located in urban areas,[236] putting more people at risk of infection. One study characterizing the serovars present in Indian poultry identified *Salmonella gallinarum*, *pullorum*, *typhimurium*, *enteritidis*, and *worthington*. Of these, *Salmonella gallinarum* and *pullorum* are adapted to avian species and have little healthconsequences to humans; however, *Salmonella typhimurium* and *enteritidis* are of significant human health concern.[237] *S. worthington*, a unique serovar that

233 Mathai E, Chandy S, Thomas K, Antoniswamy B, Joseph I, Mathai M, Sorensen TL, and Holloway K. 2008. Antimicrobial resistance surveillance among commensal *Escherichia coli* in rural and urban areas in Southern India.Tropical Medicine and International Health. 13(1) : 41-45.

234 Suresh T, Hatha AAM, Sreenivasan D, Sangeetha N, Lashmanaperumalsamy P. 2006. Prevalence and antimicrobial resistance of *Salmonella* enteritidis and other salmonellas in the eggs and egg-storing trays from retails markets of Coimatore, South India. Food Microbiology.23 : 294-299.

235 Prakesh B, Krishnappa G, Muniyappa L, and Santhosh Kumar B. 2005.Epidemiological Characterization of Avion *Salmonella enterica* Serovar Infections in India.International Journal of Poultry Science. 4(6) : 388-395.

236 Speedy AW. 2001. The global livestock revolution: opportunities and constraints for the feed and livestock industries. Compound Livestock Feed Manufacturers Association of India, 43rd National Symposium: Growth Prospects Under Globalized Scenario in Goa, India. September 29, 2001.

237 Prakesh B, Krishnappa G, Muniyappa L, and Santhosh Kumar B. 2005.Epidemiological Characterization of Avion *Salmonella enterica* Serovar Infections in India.International Journal of Poultry Science. 4(6) : 388-395.

has been linked to numerous fatalities in new born babies,[238] was also isolated.[239]

A year-long study of eggs and egg cartons in the retail markets of Coimbatore, South India found that 7.7% of the eggs and 7.5% of the trays tested were contaminated with *Salmonella* spp, the majority of which were *S.enteritidis*. A high prevalence of multiple antimicrobial resistance was also identified, suggesting that antimicrobials are commonly used in India's egg production industry.[240]

Foodborne disease is a serious public health threat for many countries and poses a particular risk to children;[241] however, reporting and surveillance of the problem is typically low.[242] In South Asian countries dairy and poultry products are major pathways of disease exposure.[243, 244, 245, 246]

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238 Ayyagari A, Chander J, Narang A, Banerjee CK, Panigrahi D, Bhakoo ON, and Sarkar S. 1990. Outbreak of *SalmonellaWorthington* meningitis & septicaemia in a hospital at Chandigarh (north India).Indian Journal of Medical Research.91 :15-17.

239 Prakesh B, Krishnappa G, Muniyappa L, and Santhosh Kumar B. 2005.Epidemiological Characterization of Avion *Salmonella enterica* Serovar Infections in India.International Journal of Poultry Science. 4(6) : 388-395.

240 Suresh T, Hatha AAM, Sreenivasan D, Sangeetha N, Lashmanaperumalsamy P. 2006. Prevalence and antimicrobial resistance of *Salmonella* enteritidis and other salmonellas in the eggs and egg-storing trays from retails markets of Coimatore, South India. Food Microbiology.23 : 294-299.

241 National Centre for Disease Control, Government of India. 2009. CD Alert: Food-Borne Diseases, pp. 1. http://www.ncdc.gov.in/writereaddata/linkimages/Dec_091047732317.pdf. Accessed May 23, 2013.

242 Bhat RV and Rao RN. 1987. Foodborne diseases in India. The Indian Journal of Pediatrics. 54(4) : 553-562.

243 Luby SP, Faizan SP, Fisher-Hoch SP, Syed A, Mintz ED, Bhutta ZA, and McCormick JB. 1998. Risk factors for typhoid fever in an endemic setting, Karachi, Pakistan. Epidemiology and Infection. 120(2) : 129-138.

244 Prakesh B, Krishnappa G, Muniyappa L, and Santhosh Kumar B. 2005.Epidemiological Characterization of Avion *Salmonella enterica* Serovar Infections in India.International Journal of Poultry Science. 4(6) : 388-395.

While pasteurization of milk reduces the risk of bacterial contamination, several studies have indicated that bacterial pathogens are present even in pasteurized samples.[247, 248] While there are many recognized foodborne diseases in the region, *Salmonella* and *E.coli* appear to the best studied. The presence of virulent strains has been documented from various locations,[249,

245 Suresh T, Hatha AAM, Sreenivasan D, Sangeetha N, Lashmanaperumalsamy P. 2006. Prevalence and antimicrobial resistance of *Salmonella* enteritidis and other salmonellas in the eggs and egg-storing trays from retails markets of Coimatore, South India. Food Microbiology.23 : 294-299.

246 Srujana G, Reddy AR, Reddy VK, and Reddy SR. 2011. Microbial Quality of Raw and Pasteurized Milk Samples Collected from Different Places of Warangal District, (A.P.) India. International Journal of Pharma and Bio Sciences. 2(2) : B-140-B-143.

247 Srujana G, Reddy AR, Reddy VK, and Reddy SR. 2011. Microbial Quality of Raw and Pasteurized Milk Samples Collected from Different Places of Warangal District, (A.P.) India. International Journal of Pharma and Bio Sciences. 2(2) : B-140-B-143.

248 Chatterjee SN, Bhattacharjee I, Chatterjee SK, and Chandra G. 2006.Microbiological examination of milk in Tarakeswar India with special reference to coliforms.African Journal of Biotechnology. 5(15) : 1383-1385.

249 Luby SP, Faizan SP, Fisher-Hoch SP, Syed A, Mintz ED, Bhutta ZA, and McCormick JB. 1998. Risk factors for typhoid fever in an endemic setting, Karachi, Pakistan. Epidemiology and Infection. 120(2) : 129-138.

[250, 251, 252, 253, 254, 255] especially throughout India, and antimicrobial resistant strains are now widespread.[256, 257]

Zoonotic Disease Transmission

Zoonoses are diseases that can be transmitted from animals to humans.[258] During the period from 1990 to 2000, three out of four emerging pathogens capable of causing human infection originated from animals or animal products.[259] While zoonoses can arise in wild populations (such as avian influenza), the transition from traditional farming methods to IFAP is a

250 Srujana G, Reddy AR, Reddy VK, and Reddy SR. 2011. Microbial Quality of Raw and Pasteurized Milk Samples Collected from Different Places of Warangal District, (A.P.) India. International Journal of Pharma and Bio Sciences. 2(2) : B-140-B-143.

251 Kumar R and Prasad A. 2010.Detection of *E.coli* and *Stahylococcus* in Milk and Milk Products in and around Pantnagar.Veterinary World. 3(11) : 495-496.

252 Chatterjee SN, Bhattacharjee I, Chatterjee SK, and Chandra G. 2006.Microbiological examination of milk in Tarakeswar India with special reference to coliforms.African Journal of Biotechnology. 5(15) : 1383-1385.

253 Lingathurai S and Vellathurai P. 2010. Bactiorological Quality and Safety of Raw Cow Milk in Madurai, South India. WebMed Central. http://www.webmedcentral.com/article_view/1029. Accessed May 23, 2013.

254 Mathai E, Chandy S, Thomas K, Antoniswamy B, Joseph I, Mathai M, Sorensen TL, and Holloway K. 2008. Antimicrobial resistance surveillance among commensal *Escherichia coli* in rural and urban areas in Southern India.Tropical Medicine and International Health. 13(1) : 41-45.ai et al 2008

255 Villi RA and Elango A. 2011. Isolation and Characterization of *Enterohaemorrhagic Escherichia coli* 0157:H7 from Dairy Related Sources in Tamil Nadu, India. Egyptian Journal of Dairy Science. 39(1) : 1-7.

256 Mathai E, Chandy S, Thomas K, Antoniswamy B, Joseph I, Mathai M, Sorensen TL, and Holloway K. 2008. Antimicrobial resistance surveillance among commensal *Escherichia coli* in rural and urban areas in Southern India.Tropical Medicine and International Health. 13(1) : 41-45.

257 Suresh T, Hatha AAM, Sreenivasan D, Sangeetha N, Lashmanaperumalsamy P. 2006. Prevalence and antimicrobial resistance of *Salmonella* enteritidis and other salmonellas in the eggs and egg-storing trays from retails markets of Coimatore, South India. Food Microbiology.23 : 294-299.

258 Gilchrest MJ, Greko C, Wallinga DB, Beran GW, Riley DG, and Thorne PS. 2007.The Potential Role of Concentrated Animal Feeding Operations in Infectious Disease Epidemics and Antibiotic Resistance.Environmental Health Perspectives. 115(2) : 113-316.

259 Taylor LH, Latham SM, and Woolhouse MEJ. 2001. Risk factors for human disease emergence. Philosophical Transactions of the Royal Society B. 356 :983-989.

significant factor in the increase of global disease risk.[260] All divisions of animal production, including transport, manure handling, veterinary medicine, meat processing, and animal rendering, can contribute to zoonotic disease. Animal crowding, poor hygiene, temperature and ventilation, and animal stress affect the ability of animals to resist disease,[261] and the close proximity of thousands of confined animals at IFAP facilities can lead to pathogen evolution through rapid selection and amplification.[262, 263] These pathogens can be transferred to the surrounding community through the previously discussed methods of air emissions, water pollution, consumption of animal products, and direct contact with animals or their wastes, as well as through insect vectors.[264, 265, 266] The high concentrations of humans and

260 Council for Agricultural Science and Technology. 2005. Global Risks of Infectious Animal Diseases, pp. 6. http://www.cast-science.org/publications/?global_risks_of_infectious_animal_diseases&show=product&productID=2900. Accessed May 23, 2013.

261 Gilchrest MJ, Greko C, Wallinga DB, Beran GW, Riley DG, and Thorne PS. 2007.The Potential Role of Concentrated Animal Feeding Operations in Infectious Disease Epidemics and Antibiotic Resistance.Environmental Health Perspectives. 115(2) : 113-316.

262 Otte J, Roland-Holst D, Pfeiffer D, Soares-Magalhaes R, Rushton J, Graham J and Silbergeld E. 2007. Industrial Livestock Production and Global Health Risks, pp. 8. http://www.fao.org/ag/againfo/programmes/en/pplpi/docarc/rep-hpai_industrialisationrisks.pdf. Accessed May 18, 2013.

263 Council for Agricultural Science and Technology. 2005. Global Risks of Infectious Animal Diseases, pp. 6. http://www.cast-science.org/publications/?global_risks_of_infectious_animal_diseases&show=product&productID=2900. Accessed May 23, 2013.

264 Otte J, Roland-Holst D, Pfeiffer D, Soares-Magalhaes R, Rushton J, Graham J and Silbergeld E. 2007. Industrial Livestock Production and Global Health Risks, pp. 10. http://www.fao.org/ag/againfo/programmes/en/pplpi/docarc/rep-hpai_industrialisationrisks.pdf. Accessed May 18, 2013.

265 Gilchrest MJ, Greko C, Wallinga DB, Beran GW, Riley DG, and Thorne PS. 2007.The Potential Role of Concentrated Animal Feeding Operations in Infectious Disease Epidemics and Antibiotic Resistance.Environmental Health Perspectives. 115(2) : 113-316.

266 Hald B, Skovgård H, Bang DD, Pedersen K, Dybdahl J, Jespersen JB, and Madsen Mogens. 2004. Flies and *Campylobacter* Infection of Broiler Flocks. Emerging Infectious Disease. 10(8) : 1490-1492.

animals in close proximity that occurs in urban and periurban IFAP in developing countries increases the possibility of transmission of microorganisms between individuals and populations.[267]

Eighty percent of India's population lives in close contact with animals.[268] The rate of antimicrobial resistance (AMR) in human pathogens, as well as multiple-drug resistant bacteria, is of particular concern. The use of antibiotics as growth promoters by the livestock sector has been largely implicated in the observed increase in AMR. In some cases, workers can become colonized with resistant organisms after contact with animals or wastes, and then pass these resistant strains on to the community at large.[269] In addition, many areas of the developing world struggle with issues of overcrowding, inadequate infrastructure, poor sanitation and water supply, and poverty, all of which exacerbate disease transmission.[270]

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267 Gilchrest MJ, Greko C, Wallinga DB, Beran GW, Riley DG, and Thorne PS. 2007.The Potential Role of Concentrated Animal Feeding Operations in Infectious Disease Epidemics and Antibiotic Resistance.Environmental Health Perspectives. 115(2) : 113-316.

268 Chugh TD. 2008. Emerging and re-emerging bacterial diseases in India. Journal of Bioscience. 33(4) :549-555.

269 Gilchrest MJ, Greko C, Wallinga DB, Beran GW, Riley DG, and Thorne PS. 2007.The Potential Role of Concentrated Animal Feeding Operations in Infectious Disease Epidemics and Antibiotic Resistance.Environmental Health Perspectives. 115(2) : 113-316.

270 Chugh TD. 2008. Emerging and re-emerging bacterial diseases in India. Journal of Bioscience. 33(4) :549-555.

Anthrax

Anthrax is a bacterial disease caused by *Bacillus anthracis*, a Gram-positive, spore-forming bacteria that is primarily a disease of herbivores.[271] Animals can become infected by anthrax through several means, but the uptake of spores from the environment is a primary pathway.[272] Spores are generally shed by dying or dead animals and become a major source of infection to other animals, including humans.[273] Incidence of the disease is decreasing in many developed countries, but remains a threat in many farming communities of the developing world. Anthrax spores from the carcasses of dead animals can contaminate soil and spores can survive and remain a source of infection for decades.[274] Furthermore, humans can contract anthrax through direct contact with infected animals or products.

Anthrax infection remains a significant problem in southern and eastern India.[275] However, incidence of anthrax in India may be fairly isolated

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271 World Health Organization. 2008. Anthrax in humans and animals, pp. 5. http://www.who.int/csr/resources/publications/AnthraxGuidelines2008/en/. Accessed May 23, 2013.

272 World Health Organization. 2008. Anthrax in humans and animals, pp. 9. http://www.who.int/csr/resources/publications/AnthraxGuidelines2008/en/.Accessed May 23, 2013.

273 Siddiqui MA, Khan MAH, Ahmed SS, Anwar KS, Akhtaruzzaman SM, Salam MA. 2012. Recent outbreak of cutaneous anthrax in Bangladesh: clinic-demographic profile and treatment outcome of cases attended at Rajshahi Medical College Hospital. BMC Research Notes.5(464) http://www.biomedcentral.com/1756-0500/5/464/.Accessed May 23, 2013.

274 Ahmed B-N, Sultana Y, Fatema DSM, Ara K, Begum N, Mostanzid SM, Jubayer S. 2010. Anthrax: An Emerging
Zoonotic Disease in Bangladesh.Bangladesh Journal of Medical Microbiology. 4(1) : 46-50.

275 Ahmed B-N, Sultana Y, Fatema DSM, Ara K, Begum N, Mostanzid SM, Jubayer S. 2010. Anthrax: An Emerging Zoonotic Disease in Bangladesh. Bangladesh Journal of Medical Microbiology. 4(1) : 46-50.

events because a large proportion of the population does not consume beef. Ray et al (2009) discusses several anthrax outbreaks that occurred in West Bengal, India in 2007. These outbreaks were isolated to Muslim communities following the slaughtering of cows.[276] Vijaikumar et al (2002) discuss an earlier outbreak in southern India that affected 23 people, most of whom were children. Most of the patients in this outbreak reported the death of infected animals in the nearby area. Only one of these cases was fatal.[277]

Until 2009, anthrax had not been reported in humans in neighboring Bangladesh for 25 years.[278] Outbreaks in 2010 were preceded by animal outbreaks and affected 607 people. An investigation of the outbreak indicated that it was caused by slaughter of infected cattle and selling of or eating the meat. Fortunately, this outbreak did not cause human mortality.[279]

276 Ray TK, Hutin YJ, and Murhekar MV. 2009. Cutaneous Anthrax, West Bengal, India, 2007. Emerging Infectious Diseases. 15(3) : 497-499.

277 Vijaikumar M, Thappa DM, and Karthikeyan K. 2002. Cutaneous Anthrax: An Endemic Outbreak in South India. Journal of Tropical Pediatrics.48 : 225-226.

278 Chakraborty A, Khan SU, Hasnat MA, Parveen S, Islam MS, Mikolon A, Chakraborty RK, Ahmed B-NA, Ara K, Haider N, Zaki SR, Hoffmaster AR, Rahman M, Luby SP, and Hossain MJ. 2012. Anthrax Outbreaks in Bangladesh, 2009-2010. The American Journal of Tropical Medicine and Hygiene. 86(4) : 703-710.

279 Siddiqui MA, Khan MAH, Ahmed SS, Anwar KS, Akhtaruzzaman SM, Salam MA. 2012. Recent outbreak of cutaneous anthrax in Bangladesh: clinic-demographic profile and treatment outcome of cases attended at Rajshahi Medical College Hospital. BMC Research Notes.5(464) http://www.biomedcentral.com/1756-0500/5/464/.Accessed May 23, 2013.

Brucellosis

Brucellosis affects some 500,000 people worldwide each year, making it the most common zoonosis in the world.[280] It is caused by Gram-negative bacteria that enter the host through inhalation, ingestion, or skin abrasions. Brucellosis may be transmitted from domestic animals through the processing of milk and milk products and certain animal husbandry practices. Individuals and veterinarians that work as or with livestock producers or in slaughterhouses or packing plants are at particular risk of infection through skin abrasions or inhalation. Although the disease is most common in rural areas with livestock production, the disease can also be transported to urban areas via contaminated dairy products.[281]

n India, brucellosis is increasingly a public health and veterinary consideration and has been reported in cattle, buffalo, sheep, goats, pigs, dogs, and humans.[282, 283] There is concern that an increase in intensive dairying will further exacerbate the disease transmission, as commercialization of the sector has led to an increase in transport of animals, which in turn disseminates the disease over a wider area.[284] An outbreak of

280 Pappas G, Papakimitriou P, Akritidis N, Christou L, and Tsianos EV. 2006. The new global map of human brucellosis. Lancet Infectious Disease.6 : 91-99.

281 Mantur BG and Amarnath SK. 2008.Brucellosis in India – a Review.Journal of Bioscience. 33(4) : 539-547.

282 Mantur BG and Amarnath SK. 2008.Brucellosis in India – a Review.Journal of Bioscience. 33(4) : 539-547.

283 Renukaradhya GJ, Isloor S, Rajasekhar M. 2002. Epidemiology, zoonotic aspects, vaccination and control/eradication of brucellosis in India.Veterinary Microbiology.90 : 183-195.

284 Renukaradhya GJ, Isloor S, Rajasekhar M. 2002. Epidemiology, zoonotic aspects, vaccination and control/eradication of brucellosis in India.Veterinary Microbiology.90 : 183-195.

brucellosis was profiled in a dairy farm housing 290 cows in Himachal Pradesh, India, in 2003.[285] Slaughterhouse workers are also at an increased risk of contracting brucellosis, and a study in Delhi, India found that 25% of abattoir personnel tested positive for exposure to the pathogen.[286]

Campylobacter

Campylobactor is a diarrhea causing Gram-negative pathogen that has been on the rise in many developing countries over the last 20 years.[287,288]*Campylobacter jejuni* is the most common strain of the bacteria, followed by *Campylobacter coli*. It is estimated that *Campylobacter* affects anywhere from 5-20% of the general population of developing countries, and children under the age of five tend to have a higher incidence. One study of rural areas of northern India found that children under five were twice as likely to suffer from *Campylobacter* infections as individuals over the age of five.[289]The study found that resistance to ampicillin, ciprofloxacin, and tetracycline had increased significantly since a previous study by Prasad

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285 Chahota R, Sharma M, Katoch RC, Verma S, Singh MM, Kapoor V, and Asrani RK. 2003. Brucellosis outbreak in anorganized dairy farm involving cows and in contact human beings, in Himachal Pradesh, India. Veterinarski Archiv. 73(2) : 95-102.

286 Barbuddhe SB, Kumar P, Malika SVS, Singh DK, and Gupta LK. 2000. Seropositivity for Intracellular Bacterial Infections Among Abattoir Associated Personnels. Journal of Communicable Diseases. 32(4) :295-299.

287 World Health Organization and Food and Agriculture Organization of the United Nations. 2009. Risk Assessment of *Campylobacter* spp. in Broiler Chickens, pp. 5.http://www.who.int/foodsafety/publications/micro/MRA11_En.pdf.Accessed May 23, 2013.

288 Prasad KN, Mathur SK, Dhole TN, and Ayyagari A. 1994. Antimicrobial Susceptibility and Plasmid Analysis of*Campylobacter jejuni* Isolated from Diarrhoeal Patients and Healthy Chickens in Northern India. Journal of DiarrhoealDiseases Research. 12(4) : 270-273.\

289 Jain D, Sinha S, Prasad KN, and Pandey CM. 2005.*Campylobacter* species and drug resistance in a north Indian rural community.Transactions of the Royal Society of Tropical Medicine and Hygiene.99 : 207-214.

(1994). Multidrug resistance was identified in 30.6% of the samples tested.[290] This resistance is of concern because outbreaks with multidrug-resistant strains has the potential to cause high morbidity and mortality.[291]

The most common source of *Campylobacter* infection is from food sources such as poultry, unpasteurized dairy, and other food items that may have become cross-contaminated.[292] However, in the developing world, waterborne transmission and direct contact with animals also play a significant role.[293] One study of rural areas of northern India found those working in the agricultural sector were at increased risk.[294]

Campylobacter spp are most commonly carried by chickens, but research in the European Union shows that other domestic species, such as cattle, pigs, sheep can also be carriers. In Italy, a study of 190 water buffalo identified one infected animal.[295] The frequency of infection of poultry is of

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290 Jain D, Sinha S, Prasad KN, and Pandey CM. 2005.*Campylobacter* species and drug resistance in a north Indian rural community.Transactions of the Royal Society of Tropical Medicine and Hygiene.99 : 207-214.

291 Prasad KN, Mathur SK, Dhole TN, and Ayyagari A. 1994. Antimicrobial Susceptibility and Plasmid Analysis of*Campylobacter jejuni* Isolated from Diarrhoeal Patients and Healthy Chickens in Northern India. Journal of DiarrhoealDiseases Research. 12(4) : 270-273.

292 World Health Organization and Food and Agriculture Organization of the United Nations. 2009. Risk Assessment of *Campylobacter* spp. in Broiler Chickens, pp. 5.http://www.who.int/foodsafety/publications/micro/MRA11_En.pdf.Accessed May 23, 2013.

293 World Health Organization. 2000. The Increasing Incidence of Human Campylobacteriosis Report and Proceedings of a WHO Consultation of Experts. WHO Consultation of Experts in Copenhagen, Denmark. November 21-25.

294 Prasad KN, Mathur SK, Dhole TN, and Ayyagari A. 1994. Antimicrobial Susceptibility and Plasmid Analysis of*Campylobacter jejuni* Isolated from Diarrhoeal Patients and Healthy Chickens in Northern India. Journal of DiarrhoealDiseases Research. 12(4) : 270-273.

295 European Food Safety Authority. 2006. Trends and Sources of Zoonoses, Zoonotic Agents andAntimicrobial Resistance in the European Union in 2004, pp. 102-104. http://www.efsa.europa.eu/en/efsajournal/pub/310ar.htm. Accessed May 23, 2013.

concern given the rapid intensification of the poultry sector in South Asia, as well as the siting of these facilities near or in urban centers.

Cryptosporidium

The protozoan parasite *Cryptosporidium* is a major source of diarrheal disease globally,[296,297] and can be transmitted through fecal oral contamination or can be waterborne.[298] While four species of *Cryptosporidium* are routinely found in cattle, one species, *Cryptosporidium parvum*, has proven to be a serious pathogenic risk to humans.[299,300] A Canadian study suggests that *Cryptosporidium* species carried by dairy cattle and calves are more likely to be zoonotic, posing a more significant risk to human populations than beef cattle.[301]

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296 Smith HV, Caccio SM, Cook N, Nichols RAB, and Tait A. 2007. *Cryptosporidium* and *Giardia* as foodborne zoonoses.Veterinary Parasitology.149 : 29-40.

297 Su Yin Ng J, Eastwood K, Walker B, Durrheim DN, Massey PD, Porigneaux P, Kemp R, McKinnon B, Laurie K, Miller D, Bramley E, and Ryan U. 2012. Evidence of *Cryptosporidium* transmission between cattle and humans in northern New South Wales.Experimental Parasitology.130 : 437-441.

298 Su Yin Ng J, Eastwood K, Walker B, Durrheim DN, Massey PD, Porigneaux P, Kemp R, McKinnon B, Laurie K, Miller D, Bramley E, and Ryan U. 2012. Evidence of *Cryptosporidium* transmission between cattle and humans in northern New South Wales.Experimental Parasitology.130 : 437-441.

299 Santin M and Zarlenga DS. 2009. A multiplex polymerase chain reaction assay to simultaneously distinguish *Cryptosporidium* species of veterinary and public health concern in cattle. Veterinary Parasitology.166 : 32-37.

300 Fayer R, Santin M, Trout JM, and Greiner E. 2006.Prevalence of species and genotypes of *Cryptosporidium* found in 1-2-year-old dairy cattle in the United States.Veterinary Parasitology.135 : 105-112.

301 Dixon B, Parrington L, Cook A, Pintar K, Pollari F, Kelton D, Farber J. 2011. The potential for zoonotic transmission of *Giardia duodenalis* and *Cryptosporidium* spp. from beef and dairy cattle in Ontario, Canada.Veterinary Parasitology.175 :20-26.

In West Bengal, India, the potential for zoonotic transmission of *Cryptosporidium* has been recognized, and pathogenic species have been detected both on dairy farms and in dairy farm workers.[302] All four species of *Cryptosporidium* have been identified from dairy calves in the south Indian territory Puducherry, and states Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu.[303] A study in Calcutta, India, found *Cryptosporidium* infection in cattle, buffalo, and humans. While this indicates zoonotic transmission, the study did not determine if the strains present were pathogenic.[304] A 2012 study in Nepal found that *Cryptosporidium* was detected in cattle, water buffalo, and swamp deer, but did not detect the presence of *Cryptosporidium parvum.*[305]

The Indian Council of Agricultural Research maintains a research centre to "maximize [the] economic contribution" of mithun (*Bos frontalis*), a ruminant found in northeast India, Bhutan, and Bangladesh. The research centre found a general prevalence of pathogenic *Cryptosporidium parvum* of

302 Khan SM, Debnath C, Pramanik AK, Xiao L, Nozaki T, and Ganguly S. 2010. Molecular characterization and assessment of zoonotic transmission of *Cryptosporidium* from dairy cattle in West Bengal, India.Veterinary Parasitology.171 : 41-47.

303 Venu R, Latha BR, Basith SA, Raj GD, Sreekumar C, and Raman M. 2012.Molecular prevalence of *Cryptosporidium* spp. in dairy calves in Southern states of India.Veterinary Parasitology.188 : 19-24.

304 Chattopadhyay UK, Chowdhury D, Dasgupta CK, and Pramanik AK. 2000. Prevalence of cryptosporidiosis in man and animals in and around Culcutta. Journal of Veterinary Parasitology. 14(2) : 167-168.

305 Feng Y, Karna SR, Dearen TK, Singh DK, Adhikari LN, Shrestha A, and Xiao L. 2012. Common occurrence of a unique *Cryptosporidium ryanae* variant in zebu cattle and water buffaloes in the buffer zone of the Chitwan National Park, Nepal.Veterinary Parasitology.185 : 309-314.

56%. Alarmingly, the prevalence of the parasite was 24% higher when mithun were held in semi-intensive conditions, as compared to free-range.[306]

Cysticercosis

Cysticercosis is an infection of tissue that results from infiltration with cysts from the pork tapeworm *Taeniaesolium.* While humans are the final host for the two species *Taeniae solium* and *Taeniae saginata*, it is only when humans become the intermediate host for *T. solium* that cystercercosis occurs.[307] The worms are usually contracted by consumption of improperly cooked or raw pork that contains the eggs,[308] but Shukla et al (2010) found that participating in pig rearing was a significantly associated factor for contraction of the disease. Normally, the worms live in the human intestine; however, the tapeworm can also develop in the central nervous system. Neurocysticercosis can result in headaches, learning difficulties, epilepsy, and convulsions. Treatment is difficult and results are highly variable.[309]

Cysticercosis is common to all states of India, with the exception of Kerala, Jammu, and Kashmir, and appears to be more prevalent in northern India. Anywhere from 9-50% of patients in India that present with seizures

306 Rajkhowa S, Rajkhowa C, and Hazarika GC. 2006. Prevalence of *Cryptosporidium parvum* in mithuns (*Bos frontalis*) from India. Veterinary Parasitology.142 : 146-149.

307 World Health Organization.Taeniasis/Cysticercosis. http://www.who.int/zoonoses/diseases/taeniasis/en/. Accessed May 23, 2013.

308 Selvam SP, D'Souza PE, and Jagannath MS. 2005. Prevalence of taeniosis in persons associated with pig slaughter in Bangalore. Journal of Veterinary Parasitology. 19(1) : 63-64.

309 World Health Organization.Taeniasis/Cysticercosis. http://www.who.int/zoonoses/diseases/taeniasis/en/. Accessed May 23, 2013.

are found to be infected with neurocysticercosis,[310] and one study of a pig farming region in northern India found a prevalence of the parasite in close to 18.6% of the population.[311] Additional studies of persons associated with pig slaughter in Bangalore found a *Taenia* spp. infection rate of 12-16%.[314] In Nepal, pig-raising farmers can have rates of taeniasis infection ranging up to 50%.[312]

Escherichia coli

E. coli is a bacterium that is often found in the gut of humans and other animals. While most strains of *E. coli* are harmless, certain strains, such as enterohaemorrhagic causing *E. coli* O157:H7, is responsible for severe cases of foodborne disease. Cattle, as well as sheep, goats, and deer, are reservoirs of the strains of enterohaemorrhagic *E. coli* serotype O157:H7. The bacteria is most often transmitted through the consumption of contaminated foods such as undercooked ground meat products, raw milk, or faecal contaminated water and other foods.[313]

310 Rajshekhar V. 2004.Epidemiology of *Taenia solium* Taeniasis/Cysticercosis in India and Nepal.Southeast Asian Journal of Tropical Medicine and Public Health.35 : 247-251.

311 Prasad KN, Prasad A, Gupta RK, Pandey CM, and Singh U. 2007.Prevalence and associated risk factors of *Taeniasolium* taeniasis in a rural pig farming community of north India.Transactions of the Royal Society of Tropical Medicineand Hygiene.101 : 1241-2347.

312 Rajshekhar V, Joshi DD, Doanh NQ, van De N, and Xiaonong Z. 2003. *Taenia solium* taeniosis/cysticercosis in Asia: epidemiology, impact and issues. Acta Tropica.87 : 53-60.

313 World Health Organization.2011. Enterohaemorrhagic Escherichia coli (EHEC). http://www.who.int/mediacentre/factsheets/fs125/en/. Accessed May 23, 2013.

Giardia

Giardia is a type of diarrhea-causing parasitic protozoa that inhabits and is typically transmitted through water.[314] Its concentration is directly related to faecal bacteria levels[315] and it is extremely difficult to destroy *Giardia* cysts and oocysts using traditional water treatment methods.[316]A review by Hunter and Thompson(2005) found that while the presence of *Giardia* in water supplies could be the result of contamination by animal wastes, zoonotic transmission (directly from animal to human), is a less important pathway for infection. In contrast, a 2011 study of *Giardia duodenalis* in dairy farm workers of West Bengal, India, indicated that there appeared to be significant potential risk of zoonotic transmission of the parasite between workers and cattle.[317]

Highly Pathogenic Avian Influenza (HPAI)

Between 2003 and 2004, the virus H5N1 highly pathogenic avian influenza (HPAI) first appeared in Southeast Asia.[318] The virus spread to

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314 World Health Organization. 2002. Protozoan parasites (*Cryptosporidium, Giardia, Cyclospora*), pp. 70,72,79. http://www.who.int/water_sanitation_health/dwq/admicrob5.pdf. Accessed May 23, 2013.

315 LeChevallier MW, Norton WD, Lee RG. 1991. Occurrence of Giardia and Cryptosporidium spp. in surface water supplies. Applied and Environmental Microbiology. 57(9) : 2610-2616.

316 Gibson CJ, Haas CN, and Rose JB. 1998. Risk assessment of waterborne protozoa: current status and future trends. Parasitology. 117(7) : 205-212.

317 Khan SM, Debnath C, Pramanik AK, Xiao L, Nozaki T, and Ganguly S. 2011. Molecular evidnce for zoonotic transmission of *Giardia duodenalis* among dairy farm workers in West Bengal, India.Veterinary Parasitology. 178: 342-5.

318 Food and Agriculture Organization of the United Nations (FAO). 2011. Approaches to Controlling, Preventing and Eliminating H5N1 Highly Pathogenic Avian Influenza in Endemic Countries, pp. v. http://www.fao.org/docrep/014/i2150e/i2150e.pdf. Accessed May 23, 2013.

Europe, the Middle East, Africa, and South Asia, killing over 300 people in its wake.[319] While most countries have eradicated H5N1 HPAI, the virus is now thought to be endemic to at least six countries, including India and Bangladesh, with sporadic outbreaks occurring in Nepal and Bhutan, as well as other countries outside of South Asia.[320] The FAO has identified several factors that have inhibited elimination of the disease in these countries, the first of which is the largely unregulated structure of the poultry sector which is spurred by rapidly increasing demand for poultry products.[321]

The first cases of H5N1 HPAI in Bangladesh were reported in 2007 and in West Bengal, India in 2008.[322] The virus has been identified in these regions each year since, and parts of the Ganges Delta covering Bangladesh and Pakistan are now considered to be endemically infected.[323] Since 2005, Afghanistan, Bangladesh, India, and Pakistan have reported cases of H5N1 HPAI infection, and the virus also appeared in Nepal in 2009 and Bhutan in

319 FAO. 2011. Approaches to Controlling, Preventing and Eliminating H5N1 Highly Pathogenic Avian Influenza in Endemic Countries, pp. v. http://www.fao.org/docrep/014/i2150e/i2150e.pdf. Accessed May 23, 2013.

320 FAO. 2011. Approaches to Controlling, Preventing and Eliminating H5N1 Highly Pathogenic Avian Influenza in Endemic Countries, pp. v. http://www.fao.org/docrep/014/i2150e/i2150e.pdf. Accessed May 23, 2013.

321 FAO. 2011. Approaches to Controlling, Preventing and Eliminating H5N1 Highly Pathogenic Avian Influenza in Endemic Countries, pp. v. http://www.fao.org/docrep/014/i2150e/i2150e.pdf. Accessed May 23, 2013.

322 FAO. 2011. Approaches to Controlling, Preventing and Eliminating H5N1 Highly Pathogenic Avian Influenza in Endemic Countries, pp. v. http://www.fao.org/docrep/014/i2150e/i2150e.pdf. Accessed May 23, 2013.

323 FAO. 2011. Approaches to Controlling, Preventing and Eliminating H5N1 Highly Pathogenic Avian Influenza in Endemic Countries, pp. v. http://www.fao.org/docrep/014/i2150e/i2150e.pdf. Accessed May 23, 2013.

2010.[324] Eighty-five percent of the cases reported in Bangladesh as of 2010 were related to commercial poultry operations.[325] "Stamping out" has and remains the main method for controlling the spread of the virus, and entails detection of infected poultry and culling of the entire flock.[326] More than one million birds were destroyed after India's first outbreak in 2006 alone.[327]

Leptospirosis

Leptospirosis, a bacterial disease transmitted through contact with infected urine from rats, livestock, or dogs,[328] was once thought to be a rare disease in India.[329] However, it is suggested that the disease was simply underreported because of lack of disease detection.[330,331] Disease severity can vary from flu-like symptoms to kidney damage, liver failure, respiratory

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324 FAO. 2011. Approaches to Controlling, Preventing and Eliminating H5N1 Highly Pathogenic Avian Influenza in Endemic Countries, pp. v. http://www.fao.org/docrep/014/i2150e/i2150e.pdf. Accessed May 23, 2013.

325 FAO. 2011. Approaches to Controlling, Preventing and Eliminating H5N1 Highly Pathogenic Avian Influenza in Endemic Countries, pp. v. http://www.fao.org/docrep/014/i2150e/i2150e.pdf. Accessed May 23, 2013.

326 FAO. 2011. Approaches to Controlling, Preventing and Eliminating H5N1 Highly Pathogenic Avian Influenza in Endemic Countries, pp. v. http://www.fao.org/docrep/014/i2150e/i2150e.pdf. Accessed May 23, 2013.

327 Mehta R and Nambiar RG. 2008. The Poultry Industry in India. Poultry in the 21st Century: Avian Influenza and Beyond: Proceedings of the International Poultry Conference in Bangkok, Thailand.

328 World Health Organization. 2010. Leptospirosis Burden Epidemiology Reference Group (LERG). http://www.who.int/zoonoses/diseases/lerg/en/index.html. Accessed May 23, 2013.

329 Muthusethupathi MA, Shivakumar S, Suguna R, Jayakumar M, Vijayakumar R, Everard C, and Carrington DG. 1991. Leptospirosis in Madras – A Clinical and Serological Study. Journal of the Association of Physicians of India. 43(7): 456-8.

330 World Health Organization. 2010. Leptospirosis Burden Epidemiology Reference Group (LERG). http://www.who.int/zoonoses/diseases/lerg/en/index.html. Accessed May 23, 2013.

331 Muthusethupathi MA, Shivakumar S, Suguna R, Jayakumar M, Vijayakumar R, Everard C, and Carrington DG. 1991. Leptospirosis in Madras – A Clinical and Serological Study (1990-91). Journal of the Association of Physicians of India. 43(7) : 456-458.

distress, meningitis, or death.[332] While there are few published reports of *Leptospira*, one study by Natarajaseenivasan (2011) found that leptospirosis was a major problem at dairy farms in Tamilnadu, India. This study found that the seroprevalence of the disease was 87% in cattle and 76% in farm workers, showing that transmission from cows to humans at dairy farms is probable.[333]

Nipah Virus

Nipah Virus (NiV) is a highly pathogenic virus capable of causing fatal inflammation of the brain.[334] In 1998 and 1999 the first outbreak of NiV was identified in Malaysia and Singapore. In this outbreak 265 human cases and 105 deaths were recorded. The majority of these cases were linked with close contact to sick pigs, and the outbreak was curbed after over one million pigs were culled and all movement of pigs was stopped.[335] As of February 2012, no cases of NiV have occurred in Malaysia or Singapore since this

332 World Health Organization. 2010. Leptospirosis Burden Epidemiology Reference Group (LERG). http://www.who.int/zoonoses/diseases/lerg/en/index.html. Accessed May 23, 2013.

333 Natarajaseenivasan K, Vedhagiri K, Sivabalan V, Prabagaran SG, Sukumar S, Artiushin SC, and Timoney JF. 2011. Seroprevalance of *Leptospira borgpetersenii* serovar javanica infection among dairy cattle, rats and humans in the Cauvery River Valley of southern India. Sutheast Asian Journal of Tropical Medicine and Public Health. 42(3) : 679-686.

334 Lo MK, Lowe L, Hummel KB, Sazzad HMS, Gurley ES, Hossain MJ, Luby SP, Miller DM, Comer JA, Rollin PE, Bellini WJ, and Rota PA. 2012. Characterization of Nipah Virus from Outbreaks in Bangladesh, 2008-2010. Emerging

335 Chua KB, Bellini WJ, Rota PA, Harcourt BH, Tamin A, Lam SK, Ksiazek TG, Rollin PE, Zaki SR, Shieh W-J, Goldsmith CS, Gubler DJ, Roehrig JT, Eaton B, Gould AR, Olson J, Field H, Daniels P, Ling AE, Peters CJ, Anderson LJ, and Mahy BWJ. 2000. Nipah Virus: A Recently Emergent Deadly Paramyxovirus. Science.288 : 1432-1435.

initial outbreak.[336] However, between 2001 and 2007 NiV was introduced into human populations 23 times,[337] and outbreaks occurred in India first in 2001, and later in 2007.[338,339]

The outbreaks in Bangladesh are different from the initial human cases in Southeast Asia, involving foodborne and human-to-human transmission.[340,341] The outbreaks in Bangladesh and India have had a mortality rate of roughly 70%, whereas the outbreak in Singapore and Malaysia had a mortality rate of only 40%.[342] The exposure pathway associated with NiV infection in Bangladesh was found to be drinking raw date palm sap.[343,344] Fruit bats are known carriers of NiV and frequently

336 Lo MK, Lowe L, Hummel KB, Sazzad HMS, Gurley ES, Hossain MJ, Luby SP, Miller DM, Comer JA, Rollin PE, Bellini WJ, and Rota PA. 2012. Characterization of Nipah Virus from Outbreaks in Bangladesh, 2008-2010.

337 Luby SP, Hossain J, Gurley ES, Ahmed B-N, Banu S, Khan SU, Homaira N, Rota PA, Rollin PE, Comer JA, Kenah E, Ksiazek TG, and Rahman M. 2009. Recurrent Zoonotic Transmission of Nipah Virus into Humans, Bangladesh, 2001-2007. Emerging Infectious Diseases. 15(8) : 1229-1235.

338 Arankalle VA, Bandyopadhyay BT, Ramdasi AY, Jadi R, Patil DR, Rahman M, Majumdar M, Banerjee PS, Hati AK, Goswami RP, Neogi DK, and Mishra AC. 2011. Genomic Characterization of Nipah Virus, West Bengal, India. Emerging Infectious Diseases.17(5) : 907-909.

339 Chadha MS, Comer JA, Lowe L. Rota PA, Rollin PE, Bellini WJ, Kziazek TG, and Mishra AC. 2006.Nipah Virus-associated Encephalitis Outbreak, Siliguri, India.Emerging Infectious Diseases. 12(2) : 235-240.

340 Gurley ES, Montgomery JM, Hossain MJ, Bell M, Azad AK, Islam MR, Molla MAR, Carroll DS, Ksiazek TG, Rota PA, Lowe L, Comer JA, Rollin P, Czub M, Grolla A, Feldmann H, Luby SP, Woodward JL, and Breiman RF. 2007. Person-to-Person Transmission of Nipah Virus in a Bangladeshi Community.Emerging Infectious Diseases. 13(7): 103-37.

341 Luby SP, Rahman M, Hossain J, Blum LS, Husain MM, Gurly E, Khan R, Ahmed B-N, Rahman S, Nahar N, Kenah E, Comer JA, and Ksiazek TG. 2006. Foodborne Transmission of Nipah Virus, Bangladesh.Emerging Infectious Diseases. 12(12) : 1888-1984.

342 Lo MK and Rota PA. 2008. The emergence of Nipah virus, a highly pathogenic paramyxovirus. Journal of Clinical

343 Rahman MA, Hossain MJ, Sultana S, Homaira N, Khan SU, Rahman M, Gurley ES, Rollin PE, Lo MK, Comer JA,Lowe L, Rota PA, Ksiazek TG, Kenah E, Sharker Y, and Luby SP. 2012. Date

contaminate the collecting vessels for palm sap, and thus it is suggested that the virus has been transmitted to humans from fruit bats via palm sap. It is important to note that the Malaysia pig outbreak is thought to have been caused by transmission of NiV to pigs from bats.[345] Therefore, it is possible that NiV could be transmitted to pig populations in Bangladesh and India in the same manner. If the virus were to reach large, confined pig populations, the virus could rapidly spread among pigs and to humans.

Conclusion

IFAP has far-reaching implications for human health, particularly for those who work in or live near these types of operations. The wastes created on these farms can contaminate water, air, and animal products with a panoply of toxins and pathogens detrimental to human health. While the effects of these farming systems have been well studied in developed countries where they have been in use for several decades, developing regions of the world, such as South Asia, should be aware of the potential issues that arise with increasing incursion of this type of farming.

Palm Sap Linked to Nipah Virus Outbreak in Bangladesh, 2008. In: Institute of Medicine (US), Improving Food Safety Through a One Health Approach: Workshop Summary (Washington, D.C.: National Academies Press).

344 Luby SP, Rahman M, Hossain J, Blum LS, Husain MM, Gurly E, Khan R, Ahmed B-N, Rahman S, Nahar N, Kenah E, Comer JA, and Ksiazek TG. 2006. Foodborne Transmission of Nipah Virus, Bangladesh.Emerging Infectious Diseases. 12(12) : 1888-1984.

345 Luby SP, Rahman M, Hossain J, Blum LS, Husain MM, Gurly E, Khan R, Ahmed B-N, Rahman S, Nahar N, Kenah E, Comer JA, and Ksiazek TG. 2006. Foodborne Transmission of Nipah Virus, Bangladesh.Emerging Infectious Diseases. 12(12) : 1888-1984.

South Asia is facing a rapid intensification of animal agriculture that will magnify existing water and air quality issues, and increase the prevalence of foodborne pathogens and zoonotic diseases. Many of the countries of South Asia have little to no disease surveillance or power to regulate animal agriculture in such a way to attenuate these problems. It is therefore imperative that South Asian countries use the experiences of developed countries to create policies that stem the spread of IFAP. South Asian countries should act proactively to safeguard and promote public health against the many detrimental effects of industrialized farm animal production. Some actions that should be considered by South Asia to at least mediate the impacts include:

- Countries of dairy products instituted.

Despite the fact that the increasing intensification of farm animal production is well documented in South Asia, research regarding the implications of IFAP on human health in South Asia is limited, and virtually no studies on community health surrounding IFAP facilities exist. It is clear that research, policy infrastructure, and regulations are desperately needed in this field in order to protect human populations in South Asia.

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