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Review Article

Reimagining India's national health system (NHS)

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ABSTRACT

In the light of the poor performance of the National Health System as a whole, the article argues the case for the urgent re-imagination and recalibration of the roles of legally approved, health knowledge systems. The article suggests that the analysis of ten years' retrospective clinical data (around 100 million records) from the most reputed Allopathic and Ayurveda clinical establishments may serve as a reliable source of information on the actual performance of different knowledge systems. This strategy for evidence generation, argues the author, is perhaps more realistic than analysis of fragmented clinical and preclinical data from trials and experiments. The article also reviews the quality of evidence and societal performance of western medicine during the last 70 years. The plural health seeking behaviour of millions of citizens, suggest that in the 21st century, a creative, functional, reliable form of integrative healthcare is imperative.

1. Introduction

A comprehensive re-imagination of India's National Health System is a serious exercise. The exercise would benefit from a review of the historical genesis of India's medical heritage and its evolution up to the 19th century because such a review would throw light on the reason for its plural legacy. Ideally, a comprehensive re-imagination of any National Health System needs to cover several inter-related dimensions [1]. These dimensions are philosophy of healthcare, knowledge content, institutional delivery, infrastructure, human resources, governance, finances, community participation, values and ethics and finally the emerging cross-sectoral links of the health system with the social and natural environment, embodied in evolving concepts like "One Health and Planetary Health" [2]. This article does not attempt such a comprehensive re-imagination of the National Health System. It has a limited focus on only its knowledge content.

The article narrates the history of Ayurveda in India. The focus on Ayurveda is not because other older indigenous health systems like Yoga and Siddha and subsequently Swa-Rigpa and much later Unani are unimportant in the history of medicine in India. It is because of the author's limited understanding of their history. The author would like to be excused by readers for this gap in covering the complete history of medicine in India.

The article will present a critique of the quality of evidence underlying western biomedicine which is better known in discerning circles in the US and Europe where it has its origin but is generally brushed under the carpet by commercial forces. In light of inherent strengths of indigenous systems of healthcare, the poor quality of evidence and societal performance of western medicine during the last 70 years or so, the article will argue the case for the urgent re-imagination and recalibration of India's National Health System in the 21st century.

2. History of Ayurveda in Asia, Middle-East and Europe

This history of Ayurveda is revealing. It will enlighten readers on the gaps in the global history of medicine which is largely eurocentric. From an Indian perspective it is observed that historians have not systematically documented the geographical spread of Ayurveda from 5th century BCE to 17th century CE [3,4]. This history will also throw light on Ayurveda's unbroken continuity and evolution for over four millennia to this date.

From the framented scholarship on history of medicine, it is known that Ayurveda spread both to the East and West of the Indian sub-continent post 5th century BCE. However, the global influence of Ayurveda has not yet been introduced in active scholarship on history of medicine. The impact in the East is visible

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even today[1] [5–9]. The influence in the West continued till around 17th century CE [10]. The first major encounter with the West viz., the Middle-East and parts of Europe started when Cyrus, Darius (5th century BCE)and Alexander (3rd century BCE) invaded the Indian sub-continent [11]. Around the same time Ayurveda also spread with much deeper impact to the East [7,12,13]. The carriers of Ayurveda to the West were physicians and scholars taken by Persian and Greek invaders to foreign lands [14]. Subsequently Ayurveda continued to spread to the middle east via Islamic invaders and trade [15–17]. In the East, Ayurveda spread to countries like China, Mongolia, Burma, Thailand, Japan, Vietnam, Cambodia, Tibet, Nepal, and Sri-Lanka, through practising Buddhist monks trained in Ayurveda and over the centuries via., scholars who studied in Indian Universities like Nalanda and Taxashila [18]. The impact in the East is visible today in the form of traditional Chinese medicine, KAMPO (Japan), Ayurwet (Thailand), Swa-rigpa (Tibet) and in Nepal and Sri-Lanka. All of these countries still have living health traditions that have been deeply influenced by Ayurveda. In the Middle-East it is evident but unclear how Vedic influence on Zoroastrian traditions (6 – 7th century BCE) took place in pre-Islamic Persia [15,19,20].[2] The Parsis in India and abroad who are the carriers of pre-Islamic Zoroastrian traditions appear to be *agnihotris*.[3] In Europe the Greek humoral theory appears to be the first outcome of early encounters with Indian knowledge traditions [14]. After the initial and direct encounter with Persia and Greece, the knowledge transfer to the West continued through curious Islamic rulers[4] who translated several medical manuscripts into Arabic and Persian and through trade via both sea and land (silk route) up to the 19th century.

At this stage, one would like to point out to the reader a unique and significant fact about the epistemic history of Ayurveda which will interest scholars and Indologists. This is the fact that despite its antiquity Ayurveda (1500 BCE) is a living tradition even today. The foundational Ayurveda texts are practical and realistic. They explicitly pronounced that all possible diseases can never be named [21]. Only typical diseases were described in terms of etiology, symptoms, treatment principles, and strategies. Ayurveda however emphasized that it is impossible to enumerate all possible disease manifestations or predict those that may occur in future. The Ayurveda knowledge system trains physicians to apply a dynamic (non-temporal) framework to observe and classify human phenotypes, and their health conditions in terms of the degree of perturbation: of the physiological functions (doshas), body tissues (dhatu), metabolism (agni), the sensory organs, mind and other inherent biological factors. This framework helps physicians to discover new etiologies and treatments for new diseases that may occur from time to time. Ayurveda in a similar realistic vein explicitly recognizes clinical limitations. It acknowledged that not all types of biological imbalances can be restored by a physician. It advises physicians on types of imbalances that can be reversed (sadhya), others that may be difficult to restore fully (kruch sadhya), and certain imbalances that are not curable (asadhya). It is this brilliant and realistic framework that is the core feature of the epistemology of classical Ayurveda. Its relevance is evident today from the fact that Ayurveda in the 21st century remains a functional healthcare knowledge system resting on its original foundations. This unique feature gives rise to a seemingly ridiculous question about epistemology of knowledge viz., “can principles (Siddhantas) underlying healthcare knowledge generated 3500 years ago, possess functionality today and since this appears to be the case, what is the relationship of knowledge and time?” Surely no indigenous Indian magic or miracle is involved here. The answer clearly is that Ayurveda knowledge is derived from a (holistic) perspective of nature. This perspective is perhaps made possible in a sensitive intuitive state of mind. It is a perspective from which, if any culture were to view nature, the knowledge generated in any time or space, from such a perspective, may not become obsolete with time. The perspective allows one to experiences nature in its intrinsic completeness. This kind of perspective is perhaps not possible in an analytical state of mind because analysis while is useful for understanding mechanisms that underlie whole phenomena, it dissects and breaks the whole into parts. The functionality of Ayurveda provides testimony that such a holistic epistemology and ontology exists. So what is this perspective? In Ayurvedic epistemology the relationship between the observer (purush) and the observed (prakriti), does not separate the two as in modern science. One observes nature by becoming one with it. This is the tenet of the experiential indigenous school called “sankya darshan”. The term “Darshan” implies that it is not a speculative school but an experiential one. Ayurveda further uses Yoga Darshan (again experiential) to actually help seekers to experience the inherent interconnectedness or oneness in all manifestations of nature. Its propositions are founded on a contextual scheme of indigenous logic (Nyaya) which is not an abstract, idealised logic like Aristotelian logic. The Ayurvedic texts are written in Sanskrit language which has a profound grammar. The etymology of the word Ayur-Veda is itself very significant. The root meaning of the word Veda is knowledge but the meaning of Ayu is superficially understood. The root meaning of Ayu is not merely life processes but is derived from gachati, gaman which means “change.” The term Ayurveda thus refers to dynamic knowledge of *biological changes* in life processes. The dynamic scheme for understanding *change* in the world/universe/nature is also apparent in Indian cultural and intellectual traditions across all domains of knowledge. This is evident from the deeply insightful etymology of the Sanskrit word “Jagat,” which in English language is translated as a static term viz., world or universe. Etymologically however the root meaning in Sanskrit of the word Jagat implies a “changing” (gat) phenomena (jag). A Sanskrit grammarian would spell out its etymology as gacha ti iti jagate, the universe is that, which is *constantly changing*. While the vastness and infinite diversity of forms in the universe was known, Indian knowledge traditions realized that underlying the vastness and diversity of the manifest physical and biological world was the constancy of change at multiple levels.

The most comprehensive literary history of Ayurveda has surprisingly been written by a Dutch scholar [22] who dedicated several decades of his life to the mission. His volumes reveal that apart from the foundational texts, several supplementary works on diagnosis, treatment, epistemology, pharmacy, materia-medica (e.g., introduction of medicinal metals and minerals), and pharmacology, in the form of commentaries, critiques, and lexicons, were written up to the seventeenth century CE.

3. Insights from history

The interesting insight from this history suggests the competence of the Ayurveda knowledge system. This is firstly reflected in

[1] Buddhism first entered China during the Han Dynasty. It was introduced spread by missionaries from Parthia and the Kushan Empire of northern India during (206 BCE–220 CE). Traditional Chinese medical texts inspired by Ayurveda were written during this period. Japan's KAMPO medicine is based on Chinese medical texts written during the Han Dynasty. http://en.wikipedia.org/wiki/Chinese_Buddhism Bower manuscript: Yosamitra, 4-6th AD available in Bodleian Library, Oxford University: Sanskrit with Prakrit, written in Brahmi Skript on Birch Bark.

[2] The relationship between Chandokya Upanishad and the Zend Avasta was proposed by the late Seer of Kanchipuram Matha, Sankarcharya Sri Chandrashekhar Sarasvati.

[3] Worshipers of the sacrificial fire maintained perpetually.

[4] Todarmal, a Minister in the Court of Akbar was Commissioned to translate Ayurvedic texts. Around 800 AD Sushruta Samhita was translated into both Arabic and Persian.

the widespread global spread of Ayurveda to the West and East of the Indian subcontinent. Secondly the fact of its cultural integration, continuity and assimilation in the East till this date. Thirdly and most importantly the epistemic and ontological roots of Ayurveda that have kept it cotemporary to this day.

4. Western medicine in India

Western medicine was introduced in India by the Europeans in the 19th century. Understanding the genesis is important because it explains the reason for biomedicine occupying the centre stage in India's National Health System. This very recent history has thus far not been critically assessed by sociologists, health professionals, policy makers and lay persons. The entry of western medicine was legitimized not on merit but solely by political imposition unlike these days when entry of a medical practice and even more so an entire system of medicine, would require stringent proof of efficacy and a scheme of evidence. In 1835 of Calcutta Medical College (CMC) was established [23]. The CMC marked the entry of European medical education into India. The Colonial Government offered no state patronage to the indigenous health knowledge system despite its wide spread acceptance by civil society. In 1896, the Indian Medical Services (IMS) was formed [24]. The officers of the Indian Medical Services were mostly military surgeons of European origin who were selected in England. In 1835, with the opening of Calcutta Medical College, IMS was also gradually opened to the natives of India trained in Calcutta who were selected to serve in Subordinate Military Medical Services or as Assistant Civil Surgeons in subdivisional civil hospitals. In 1946, the Health Survey and Development Committee (Bhore Committee) was appointed by the Government of India to survey the existing health structure in the country and make recommendations for future developments. The Committee submitted its report in 1946 [25].

I quote relevant excerpts from this report because its recommendations have a striking similarity even after 75 years to the present policy discourses on the subject.[5] "*In considering the question of the place which the indigenous systems of medical treatment should occupy in any planned organization of medical relief and public health in the country, we are faced with certain difficulties. We realize the hold that these systems exercise not merely over the, illiterate masses but over considerable sections of the intelligentsia. We have also to recognize that treatment by practitioners of these systems is said to be cheap, and it is claimed that the empirical knowledge, that has been accumulated over centuries has resulted in a* fund *of experience of the properties and medicinal use of minerals, herbs and plants which is of some value. Further, the undoubted part that these systems have played in the long distant past in influencing the development of medicine and surgery in other countries of the world has naturally engendered a feeling of patriotic pride in the place they will always occupy in any world history of the rise and development of medicine. This feeling has not been without its effect on the value which is attached by some to the practice of these systems.*

We are unfortunately not in a position to assess the real value of these systems of medical treatment as practiced today as we have been unable, with the time and opportunities at our disposal, to conduct such an investigation into this problem as would justify clear-cut recommendations. We do not, therefore, propose to venture into any discussion in regard to the place of these systems in organized State medical relief in this country. We do, however, say quite definitely that there are certain aspects of health protection which, in our opinion, can be secured wholly or at any rate largely, only through the scientific system of medicine. Thus public health or preventive medicine, which: must play an essential part in the future of medical organization, is not within the purview of the indigenous systems of medical treatment as they obtain at present. This in no way reflects upon these systems. It has, however, to he recognized that great improvements have taken place in the field of public health as the' result of the many discoveries of science which are and can be implemented only through the scientific system of medicine and through personnel trained in such a system It is also to be recognized frankly that the indigenous- systems of medical treatment do not at present deal with such vital aspects of medicine as obstetrics, gynecology advanced surgery and some of the specialties. Above all it is necessary that we should keep prominently before our eyes the intimate relation between science and the advancement of medicine. No system of medical treatment, which is static in conception and practice and does not keep pace with the discoveries and researches of scientific workers the world over, can hope to give the best available ministration to those who seek its aid.

We feel that it would be unfair and unjust merely because some other method of treatment is said to be cheaper, to deny to anyone in this country the benefit of the scientific system and of the daily growing volume of research and achievement in the wide world of science.

We have recommended the establishment of a Chair of History of Medicine in the proposed All-India Medical Institute and have suggested that one of its functions should be the study of these systems in view of the importance of investigating the extent, to which they can contribute to the sum total of medical knowledge".

Since the 1920's several National Reports and Policies starting with the recommendation of the Indian National Congress (1920), the Mudaliar Committee (1961), Srivastava Report (1975), the Janata Party Health Manual (1977), the ICSSR-ICMR report on Health for all (1981), The National Health Policies (1983 and 2017), have all explicitly recommended an *integrative system of healthcare* involving indigenous health systems. Despite these policy recommendations, even in 2022, the National Health Budget allocated 95% of the budget to western biomedicine and around 5% to indigenous systems. This skew is justified on the same ground as was articulated in 1946 by the Bhore Committee.

5. Analysis of why recommendations of National Committee Reports and Health Policies have not translated into practice

Despite available information on historiographic records, events, factual circumstances surrounding the above mentioned reports and policies, the author is of the view that analysis of such circumstantial data, will not yield adequate understanding of poor policy translation. It appears that the underlying reason why policies have not translated is essentially epistemic and political.

It is etymologically clear that Ayurveda and biology both carry equivalent meaning viz., the study of "changes" in life processes. Their difference is epistemic. The western atomic and cellular perspective is certainly, in the context of civilizational evolution, the most recent insightful and functional way of viewing nature. Chemistry and biology have provided deep insights into molecular level changes in the biological system. In Indian knowledge systems, nature and biological change has been viewed from changes that occur in the state of *panchmahabhutas.* It is natural to expect that knowledge systems like Biology and Ayurveda constructed on such different perspectives (foundations) will not look alike in terms of principles, structures, concepts, categories and methods. Only at the level of goals they are in fact essentially similar. The rejection of Ayurveda in policy and professionals circles, is apparently on the ground that it appears to be unscientific. It is difficult however for observers to explain why it is

[5] The author is privileged to be a member of NITI Ayog committee on integrative healthcare. Arguments for admitting Ayurveda are similar to the discussion in 1946.

clinically proficient. A trial and error explanation appears unviable to explain functionality of such a huge corpus of knowledge across multiple fields from pharmacology to pharmacy and diagnostics to clinical management. In fact Ayurveda is not a science in the western sense of the term because unlike western science its genesis is not founded on a molecular view of nature. The question to be considered and pondered over is, *is there only one truth*? Furthermore, does western science hold the singular monopoly of interpretation of nature in terms of that *one truth.*

Due to political domination of European knowledge in the modern world, scientists in the colonised countries perhaps hold an erroneous belief that European sciences comprise the only universal way of understanding biological and physical change [26]. However, it may be argued and demonstrated that other cultural knowledge systems may also possess universal attributes and capacity to study and apply their knowledge of biological change in a different (non-atomic-molecular) framework. The test of a non-mainstream knowledge system should not be in its conformity to a singular method, principles, or set of concepts, however profound, but, by evaluating if its theory and practice (in its own framework) can consistently be applied to transform and solve real life problems [27,28].

Perhaps in the health sector a relook at ground realities may change the epistemic and political outlook of policy makers and professionals.

6. Ground Realities: Societal performance of the Indian National Health System (NHS) 1947–2022

It may be stated upfront that this article assumes poor performance of National Health System as a whole. The reader is perhaps aware that the content of NHS is largely western biomedicine and marginally Ayurveda and other indigenous systems including homeopathy and naturopathy. One obvious source for this assumption of non-performance is the publicly available data which indicates that even after 70 years, the State has been unable to deliver Universal Health Coverage (UHC) and around 63% [28] of the population continues to spend *out of pocket* with no protection from the State. The responsibility for UHC is largely that of biomedicine because the AYUSH health services in rural and urban India are offered on negligible scale.

7. The performance of Ayurveda

It must be pointed out at the very outset that State supported AYUSH role in delivery of health services is very marginal because for decades indigenous systems have received less than 3% of the national health budget and only in the last five years, the allocation has risen to around 5–6%. The budget in 2021–2022 is around Rs 3000cr/pa. In absolute terms the budget today is much larger than the average budget for more than the past 20 years when its size varied between Rs 200–500 cr/yr.

A review of the “budget lines” of the government Department/ Ministry since 1995 to 2022 (27 years) reveals that they have remained largely unchanged for over two decades. This indicates that there has been no strategic vision or change in goals since 1995. The budget lines since inception reveal consistently that the largest proportion of investment is towards health services followed by areas like medical education, research, medicinal plants with marginal investments in other areas like industry, public health, international cooperation and few other miscellaneous areas. A brief overview of the Government performance in each of these areas is outlined below.

8. Health services and manufacturing

In State health services across the country there are today around 27,000 dispensaries and around 4000 small hospitals. These services are sub-critically supported by both the Central and State governments. Since 2005 these services have been linked to the National Rural Health Mission (NRHM), National Health Mission (NHM) and now Ayushman Bharat Health and Wellness Centres (AB-HWCs). While information at State and unit levels is probably available of their specific clinical services, their geographical catchment areas and the populations they serve, the AYUSH performance data has not been aggregated at the State or national level to analyse gaps or impact on the health sector on any meaningful parameters. In some States like Kerala and southern States they appear to function more effectively than in other States but there are anecdotal reports of public benefits even in States like Gujarat and HP.

The private sector health services in the whole country which receive no State funding, appear to perform much better than tax payer funded health services. This is evident from the fact that in 2022, the estimated size of the domestic Ayurveda sector segment in manufacturing and health services, is of the order of Rs 100000cr/pa. This sector is self-financing and is rapidly growing largely to meet middle and upper middle class consumer demands.

The Government budget is minuscule (Rs 3000cr) in comparison with the annual turnover of the private sector. It is obvious that the government annual budget can hardly impact an enterprise more than 30 times its size unless deployed strategically.

9. Education Sector

The education sector in AYUSH comprises around 400 UG and around 100 PG colleges. This sector is largely privately funded. Central and State Governments however do support a small fraction of wholly government funded educational institutions and provide marginal/partial grant–in - aid to few private institutions. Since the seventies when AYUSH systems received legal status there has been no innovation in education demonstrated by either government or non-government institutions. Such innovation could only be spearheaded by national regulatory bodies like CCIM and now renamed as the National Commission. The regulators have however framed minimum standards for medical education. Surgery originated in India and spread globally. Today the west is the leader in surgery. Ayurveda has not innovated in surgery for 200 years. Its surgical foot is crippled and needs to relearn from the west.

There is however zero encouragement from policy makers and regulators for supporting Centers of Educational Excellence in medicine and surgery, that they can develop new models of education, that far exceed minimum standards. New regulatory policies could be used to seed such bold educational innovation.

10. Research

The Research track record of Ayurveda has been poor. There are three main reasons for this.

Firstly, research funding in the AYUSH sector, is monopolised and almost exclusively given to government managed research councils. These councils do not attract the best research talent because they are managed in bureaucratic ways, are not collegial or collaborative and lack the research culture necessary for world class research. The non-Government research sector in universities, research institutions for the last 27 years, has been ignored. It will

shock readers to learn that they across the country the expenditure on extramural research ranges from a disgracefully pathetic Rs 1–10 cr/pa.

A second reason for poor research in Ayurveda, that must be immediately conceded, is the absence of a contemporary research culture in Ayurveda medical education. This is the responsibility of regulatory bodies and the lacunae is not limited to AYUSH, but is equally present in biomedical institutions as well.

A third reason is the complexity in designing Ayurveda clinical and preclinical studies. The clinical designs are complex because they need to be powered by algorithms to decide targeted clinical interventions. This is because Ayurveda is essentially a *variability health science*. Its scheme of diagnosis (dash-vid-pariksha) and treatment (dosh-vichar) is based on a disease/health classification system that recognizes variability in patients and is comparatively much more refined than standard bio-medical classification of health conditions. It therefore needs to be applied using algorithms to address variable factors. Even in respect of experimental pharmacology or preclinical research, where one has the advantage of going from the clinic to the lab, testing of Ayurveda interventions need complex bio-assays designed to mimic interconnected biological processes. Such holistic bio-assay models do not exist.

11. Medicinal plants, public health and international cooperation

The medicinal plants investments are managed by National Medicinal Plant Board (NMPB) in the form of small grants to State government bodies, industry, farmers, and NGOs. NMPB appears to have had some impact on improving the supply chain of medicinal plants to three sets of stake holders viz., householders, physicians and industry. Rigorously designed impact assessment studies need to be undertaken to appreciate the impact of NMPB.

Public health is poorly funded and receives negligible support and appears to have had no impact on public health in India.

International cooperation appears to be an unfocused area with unclear goals. Operationally it is visible in the form of impressive MoUs with several countries. However, the international cooperation program appears to be ineffective because it has not resulted in actual opening of the door in foreign countries for either AYUSH health services, drugs or medical education. A few promising international research programs with foreign collaborators have been supported. The flip side of these research collaboration is that there has been little investment into collaborative research from the foreign countries themselves.

12. Summing up (role of AYUSH)

Given limited government resources Rs 3000 cr/yr, the question to ask is. can this governments spend, too small to move a sector that is growing at more than 30 times the governments annual budget be used differently, to seed innovations in research, education, health services, wellness science and public health and thus leveraged for growth of Ayurveda in the 21st century.

13. The case of biomedicine

What about the mainstream western biomedicine? Biomedicine has been allocated 98–97% of the national health budget since 1947. Its performance on delivering UHC is poor. Unlike data deficiency on performance in AYUSH health services, performance data aggregated over the years at the State and National level is available, to analyse gaps and impacts. Data on parameters like infant and maternal mortality, malnutrition, anemia, malaria, cancers, TB, respiratory disorders, etc while varying across regions have registered marginal improvements over time. However, the overall picture is one of relatively poor performance.

The most critical sources of outcomes of clinical practice in the biomedical segment of the national health system, need to be derived not from India because policy makers, scientists and professionals have not yet undertaken sufficiently critical analysis. The performance needs to be inferred from American reports on the actual practice of bio-medicine. This is because bio-medicine has originated in the West and its leadership is largely located in the United States. India is only the passive recipient of western developments in medicine and surgery and is usually twenty years behind in adoption. The US has generated extensive reports [29–53] on the limitations of bio-medical practice on a range of critical issues like adverse drug reaction that lead to hospitalization. US data shows that this is the highest cause for hospitalization in the US followed by respiratory diseases and cancers. Other problems plaguing the US health system are unnecessarily medical and surgical procedures and iatrogenic deaths and mal-nutrition (due to processed and denatured food grown in non-organic agricultural systems). This malfunctioning is happening despite the USD 1.6 trillion spend which correspondence to 14% of its GNP.

Indian bio-medical professionals and scientists looking westwards for inspiration, are yet to take a critical look at the actual performance of bio-medicine in India.

Another science based source to appreciate the limitations of biomedicine can be inferred from the scientific processes that underlie clinical and experimental pharmacology. These limitations are reflected in the quality of evidence in bio-medicine. In respect of experimental pharmacology, the enormous innovation in identifying a range of sensitive invitro and invivo bioassays must be acknowledged and respected. However, it is well known that the laboratories with the best scientific infrastructure, measure results derived from fragmented invitro and invivo bioassays of biological processes. These assays today are not sophisticated enough to mimic the complexity and interconnectedness of the human biome. The results of such tests therefore while indicative of potential activity cannot be simply extrapolated to predict the results of lab experiments on human biological system. Futuristic projects like “body on a chip” are trying to create complex interconnected bioassays that can mimic the human biome. But we are still at least two decades away.

With regard to clinical pharmacology, statisticians are aware that clinical evidence is a nuanced term. This is because there are grades in quality of evidence. It may surprise readers to know that practising clinicians are not sufficiently aware that a large number of extant practices are based on low quality of evidence [54]. Today at the frontiers of evidence theory, there is a growing rejection of the assumption that Randomised Clinical Trials (RCTs) represent the golden standard of evidence [55]. This reconsideration about the value of RCTs is firstly due to their small sample sizes (due to their prohibitive cost) which do not sufficiently represent the target population segment. Even more importantly clinical trials throw up doubtful conclusions due to the recent realisation in an emerging biological era that recognizes complexity and variability in the human biome. The inclusion criteria and parameters for the best designed trials do not capture the intra-specific variability within a given health conditions. Thus the extant schemes of international disease classification used in RCTs are gross and therefore erroneously accept heterogeneous populations to be homogeneous. The error in design of clinical trials gets further flawed because the trials test the effectiveness of uniform interventions on heterogeneous groups. The results from such trials are therefore naturally incomplete and in fact misleading. Yet biomedical sciences and pharma industry justify their global monopoly in National healthcare services,

pharmaceuticals, medical education and in research priorities based on results from such limiting clinical data.

The relatively poor performance, narrated above applies only to the non -surgical or medicine segment of the health system. However, there is little doubt that the biomedical system has a proven global track record of advanced knowledge, skills and sophisticated tools to deal with the most complex of Surgeries. Similarly, there is little doubt of Biomedicine's competence to deal with acute and emergency health conditions. It's role in surgery and emergency medicine should certainly be an essential feature in any reimagining of India's National Health System. Another area of strength which must be duly recognized is the advanced and rapidly evolving diagnostic tools designed to measure key biological parameters of health and disease. These diagnostic tools are in fact also routinely used by Ayurveda Physicians, especially for prognosis and for assessing outcomes of their own treatments alongside Ayurvedic parameters.

To sum up the author suggests that in the light of its overall societal performance (in India and globally) and weak evidence-base, the National Health System requires a re-imagination and recalibration of roles of both bio-medical and Ayurveda.

14. Roadmap for reimagining and recalliberation of NHS

The article has outlined the history and the complex epistemic and political reasons for the gross under and over estimation of Ayurveda and biomedicine respectively. The skew is evident in their current dominant and marginalised roles. The author has attempted to lay the foundations for a case to seriously reimagine and recalliberate India's National Health System in the 21st century.

The recalliberation of India's National Health System should not be arbitrary. It is proposed that it ought to be based on a rigorous analysis of retrospective clinical *performance* of the last 10 years of "real world clinical practice or practice based medicine". The extant theories and methods like RCTs for generating reliable "evidence based medicine" are increasingly being critiqued at the frontiers because of the non-representative environments in which they are tested. Removing bias by randomisation and placebos in an unreal environment does not add to reliability of outcomes. Therefore today the idea of generating evidence from analysis of large scale, multi centric and retrospective practice is gaining ground as a more reliable strategy for evidence.

The author proposes retrospective clinical practice data of 10 years needs to be collected from around 100 reputed clinical establishments of both modern medicine and Ayurveda. The sample size of ten years retrospective data for biomedicine and Ayurveda is expected to be large. It maybe of the order of around at 50–100 million clinical records for both systems. The aim underlying the suggestion is to analyse such ground level, multi-centric data (using AI and ML) of *Ayurveda and* biomedicine, in order to undertake an objective review of their respective roles in the re-imagination of India's health system. The recalibration study based on PBE is the first step. The study needs rigor and care in design and analysis. It can be completed in eighteen months.

The reader may be expected to ask what the future of healthcare should look like in the 21st century? The changes on configuration, weightages of different health knowledge system should be guided by the analysis of retrospective performance data is the author's considered suggestion. It is assumed however that the country's health system will continue to remain plural.

In Asian region China is reported to have the most pronounced model of integrative healthcare. It follows a cafeteria approach in healthcare establishments. It also has definite cross referral guidelines across TCM and biomedicine. The practitioners of TCM and Biomedicine are trained in their respective knowledge domains with perhaps some overlap.

The Indian government introduced an integrative model of "health service delivery" in the form of NHRM in 2005. The model seeded a practice of co -posting and co-location of all State healthcare services. This model continues to be part of NHM (2014) and AB-HWCs (2021). The Indian model however does not work on the ground firstly because its operations are under dual administrative control of both the AYUSH and the mainstream Health Ministries. Secondly the current model is handicapped because the medical education system does not have integrative elements and particularly biomedical education is totally insulated. In AB-HWCs there is total absence of referral guidelines across systems. Furthermore, there is no unified National Health Research agenda. Seven entities, 5 AYUSH councils, ICMR and the Department of Health Research set their own respective research priorities with no cross-talk.

Civil society must motivate Governments in public interest, to take judicious decisions about an integrative healthcare strategy. The strategy needs to address changes in medical education, health research and health service delivery system. It needs to seriously consider revitalization of community knowledge rooted in the great Indian traditions of ecosystem specific "Lok Swasthya Paramparas". The plural health seeking behaviour of millions of citizens, suggest that in the 21st century, a creative, functional, reliable form of integrative healthcare is imperative.

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