SEEJPH Volume XXIV, S1,2024, ISSN: 2197-5248; Posted:04-03-2024

Integrated Healthcare and Its Analytics: A Look at AYUSH's Current State and Its Future Potentials

N. Ravichandran[1], Lubna Khan[2]

[1] *Professor, Department of Healthcare and Pharmaceutical Management, Jamia Hamdard, New Delhi-1100621*

[2] *Research Associate, Department of Healthcare and Pharmaceutical Management, Jamia Hamdard, New Delhi-110062*

KEYWORDS

AYUSH, Healthcare, data analytics, digital transformation, care and treatment, competency

ABSTRACT

Context: Healthcare costs in India have been rising at a steady rate, but the quality of treatment patients receive has not changed noticeably. In order to incorporate AYUSH, numerous strategies, programmes, and policies have been developed. A decrease in mortality rates, healthcare expenditures, and medical problems is possible with the use of modern healthcare technology. The collection of healthcare data has become much easier due to technological advancements.

Analytical problem: In today's digital world, data is crucial to healthcare. Rapid advancements in data sensing and collection have allowed healthcare systems like AYUSH and facilities to start collecting enormous amounts of patient data. To understand and build knowledge from healthcare data, advanced analytical methods are required to convert data into useful and practical information. All of these AYUSH under one roof, share certain basic similarities despite their vast diagnostic and therapeutic differences. They all use different approaches to development and finding the right metrics to measure success and standardization. The inability to see beyond the existing data sets and the lack of communication between the various AYUSH systems has led to the construction of a second data layer. This data creation is questioning existing data generation.

Analytical solutions: The use of analytical solutions to healthcare data is necessary, but the move from reactive to proactive healthcare delivery is very promising. Sensors, images, text (in the form of biological information), clinical notes, and traditional electronic records are just a few of the many sources that add to the unique wealth of healthcare data. The processing and analysis of the underlying data is made more challenging by the range of methods utilized to obtain and portray the data. A broad variety of approaches are required for the analysis of these diverse data kinds. The diversity of the data also introduces new challenges to data integration and analysis. However, the healthcare industry is just now beginning to tap into the immense potential of these integrated data analysis tools. It is increasingly difficult to achieve significant progress in data integration due to the increased complexity of health brought about by this integrated medical system. This is because medical practitioners and academics have not had enough exposure to data analytics, and computer professionals do not possess the necessary healthcare competences.

Insights: Sadly, healthcare data are not regarded as data but as information, which leaves them exposed and disconnected from real domain-specific problems. Consequently, issues are often framed with great healthcare technology but little practical relevance. In order to reduce health burden, improve AYUSH integration, and minimize inequities, it is commonly acknowledged that healthcare technologies must be utilized. Nevertheless, by carefully reviewing the most relevant contributions from each field, this research paper seeks to unite the different group of professionals. By bringing these different professionals together, we can unleash the full power of data analytic approaches. On top of that, the article's focus is on new ways of thinking about integrative health systems that would bring together AYUSH treatment.

INTRODUCTION

The escalating healthcare costs in India have necessitated a critical examination of the quality of treatment patients receive. Despite the steady rise in expenditures the quality of treatment patients receive has not changed noticeably. In order to incorporate AYUSH, numerous strategies, programmes, and policies have been developed. By incorporating AYUSH and utilizing modern healthcare technology, there is an opportunity to decrease mortality rates, reduce healthcare expenditures, and address medical issues more effectively. Health data is now being collected through various developed digital initiatives in AYUSH which are categorised under health informatic system that collects the data from the health sector and other relevant sectors, analyses the data and ensures their overall quality, relevance and timeliness, and converts the data into information for health-related decision-making (Muthappan et al., 2022).The integration of AYUSH and Allopathic medicinal system has been a topic of discussion and debate in the healthcare industry (Samal, 2015). Both systems of medicine have their own strengths and

limitations, and integrating them could potentially enhance the overall healthcare framework (Rudra et al., 2017). However, the integration process faces various challenges, including theoretical ideologies, resource allocations, professional status, and ethical considerations (Samal, 2015). This lack of effective integration of informatic system fails us to visualise the number of services that are provided to the patient and the amount of duplicity occurring. Then surveillance and monitoring are required in order to have a count on decreasing mortality and disease incidence and prevalence rate in the population which again a failure.

Despite the diverse diagnostic and therapeutic approaches available within AYUSH, there exist dissimilarities that blockade their development and integration. In order to ensure the effective integration of AYUSH and allopathy, it is crucial to have a comprehensive surveillance and monitoring system in place for collecting and analysing data related to the utilization of AYUSH services and their outcomes. There is a significant data gap when it comes to incidence and prevalence rates, continuous epidemiological transformation and outdated data again creating a difficulty and raising doubts in planning and policy generation. Rapid technological advancements in data sensing and collection have allowed healthcare systems like AYUSH and facilities to start collecting enormous amounts of patient data. Ayush system itself doesn't show effective integration. However, the absence of effective communication between AYUSH systems has led to the creation of a secondary data layer, questioning the legitimacy of existing data sets. Data gathering and collection in Ayush system is only generating health informatics data without considering the need for comprehensive analysis and interpretation of the collected data. This lack of effective analysis hinders the ability to extract useful and practical information from the collected data. As a result, the potential benefits of data-driven decision-making and evidence-based practice in AYUSH healthcare systems are not fully realized.

Analytical problem

The integration of AYUSH practices into the broader healthcare system presents a promising avenue for improving healthcare outcomes and reducing costs. However, this integration is not without its analytical challenges. Despite the commonality in goals among various AYUSH systems, their diverse diagnostic and therapeutic approaches create a complex landscape for data analytics. The heterogeneity in data types, ranging from traditional clinical notes to sensor-generated data and images, poses a significant challenge to seamless integration and analysis among as well as within AYUSH system. For instance, in A-HMIS information is limited to prescriptions that exclude laboratory test and clinical examination details. When different medical practitioners see the same patient, they may have difficulty accessing past medical information due to a lack of linkages and data storage. As a result, they need to registered and re-registered again, while repeating tests, resulting in additional out-of-pocket expenditure for the patient. This led to poor /low-level of integration within and across the AYUSH i.e., integrative medicinal system. This lag of data and information integration of system under one roof poses challenges in terms of tracking patient transitions and can lead to repeated scanning and testing procedures when patients shift from one AYUSH system to another leading loss at both the end.

Lack of Standardization and Metrics

Absence of uniform standardized metrics in AYUSH for success and efficacy across AYUSH systems hampers effective data analysis, medical practitioners within the AYUSH domain often lack exposure to advanced data analytics technique. To ensure consistency and accuracy in assessing the impact of treatments and interventions on patient outcomes. Fig 1 provides the statistical data of everyday which includes patient registration, practitioner using A-HMIS and bed occupancy.

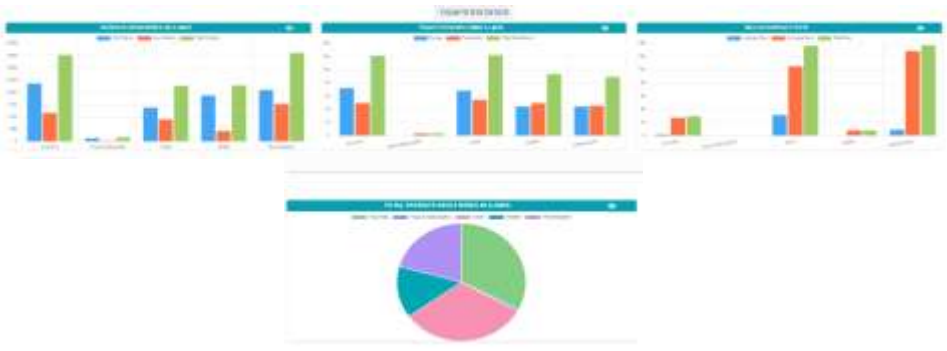

Fig1: statics of patient registration, practitioner using A-HMI, bed

Source: Ministry of AYUSH. Govt. of India. https://ehr.ayush.gov.in/home

The data is just being displayed for the enhancement of website aesthetics. Furthermore, the absence of standardized metrics hinders the ability to effectively address disparities in healthcare outcomes among diverse populations. This creates variability in the quality of care and make it difficult for patients to make well-informed decisions about their healthcare options. It becomes more challenging to identify and understand the specific needs of different demographic groups and tailor interventions accordingly to ensure equitable access to quality healthcare. This complicates the allocation of resources and funding within the healthcare system. Without clear and consistent measures of health outcomes, it becomes challenging to prioritize areas for intervention and allocate resources efficiently to address the most pressing healthcare needs.

Data cloning and inaccuracies

Another challenge in healthcare analytics is the presence of data cloning and inaccuracies. Data cloning refers to the duplication of data within a healthcare analytics system. Inaccuracies in healthcare analytics can arise from various sources, such as errors in data entry or coding, incomplete or missing data, and inconsistent data quality across different sources. These cloning and inaccuracies can significantly impact the reliability and validity of the analytical insights derived from healthcare data. The complexity of healthcare data integration requires collaboration between healthcare professionals and computer experts. On one-end , medical practitioners and academics have not had enough exposure to data analytics and on the other computer professionals do not possess the necessary healthcare competences. AYUSH professionals do not utilise the provided statistics for decision, while they rely on the general testing report and prescribe medicine and treatment as per modern medicine standard formula and the data entered by the computer professional only follows with the numeric code, these inaccuracies and data cloning leads to excessive utilization of the resources.

Schism in service delivery

AYUSH HMIS a comprehensive IT platform and promises to effectively manage all functions of health care delivery systems and patient care in Health and Wellness centres. Its objective guarantees to reduce the chance of error and collection of data for effective implementation of AYUSH policy, reduced chance of error and to improve the documentation of AYUSH. However, on Investigating it was observed that the dashboard provides a comprehensive snapshot of the entire country's data at a glance (Fig 2). Out of total patient register till present 32% of the patient are registered under ayurveda,32% under Unani, 14% under siddha and 20% under homeopathy. On an average 3572 patient are getting register every day out of which 30% in ayurveda, 38.8% in unani,18% under siddha and 16.9% under homeopathy. It is essential to acknowledge the need for basic and essential data such as the rate of conversion of IPD patients from OPD patients and the rate or percentage of patients shifting from one AYUSH system to another. This data is necessary for understanding the specific treatment of diseases within each system and for calculating the effective rate of treatment for each medicinal system and further researching process. Without this data, it is challenging to evaluate the impact of different treatments and make informed decisions regarding patient care and overall intervention of AYUSH.

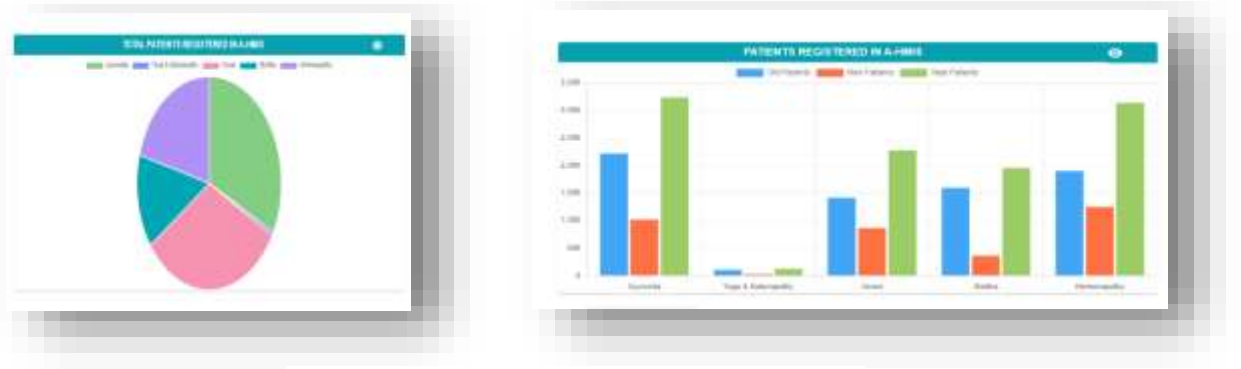

Fig 2: Total number of patient (New& old) registered under AYUSH

Source: Ministry of AYUSH, Govt. of India, https://ehr.ayush.gov.in/home

Disharmony in Service Provision

The important factors associated with service delivery provision include investigated, including financial constraints, dissatisfaction with consultation, inadequate personal attention, delayed service delivery, or recommendations for treatment and care.

Fig 3 & 4 offers an overview of the statistical view of the A-HMIS dashboard, where one can readily observe that the graph itself presents a stark contrast; while the bar graph ostensibly encompasses all the data, it paradoxically lacks any actual data points. This contrast hinders the ability to derive meaningful insights from the data and can lead to inefficiencies in patient care and treatment. On closer examination, it becomes evident that there is unavailability data on state wise view in this digital platform. Through this view one can measure/think of the quality of data this platform is collecting.

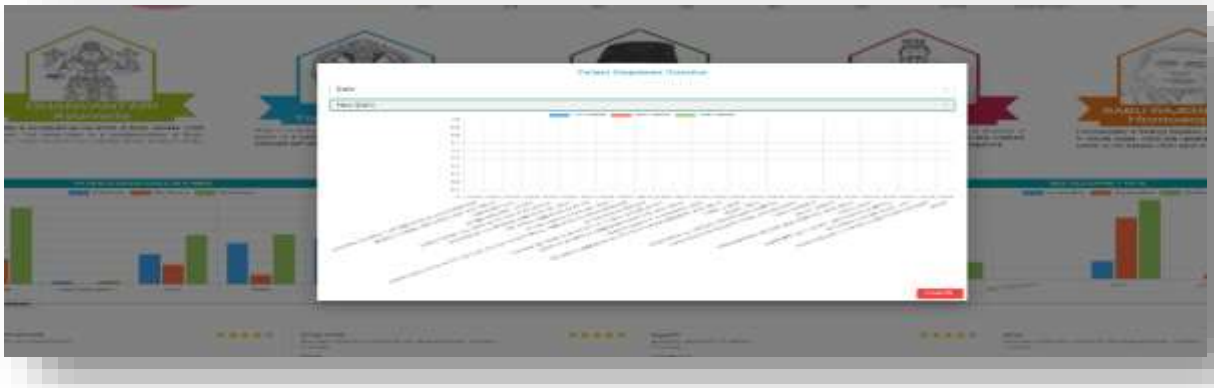

Fig3: Statical view of patient registered under state Delhi in A-HMIS

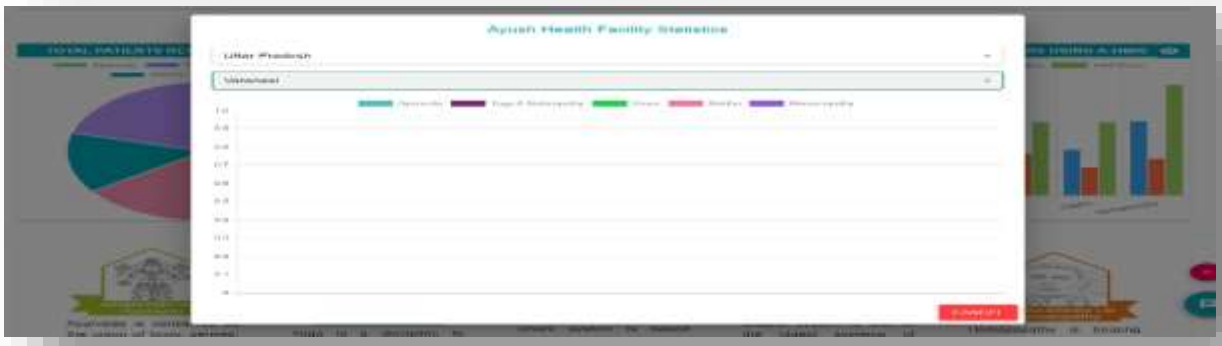

Fig 4: Statistical view of Ayush health facilities registered under A-HMIS

Source: Ministry of AYUSH, Govt. of India, https://ehr.ayush.gov.in/home

Inconsistencies

Another platform of AYUSH NAM (National AYUSH Mission) digital initiative also one of the finest digital platforms of the country in India which is launched by Ministry of AYUSH launched under Centrally Sponsored Scheme. This demonstrates a higher level of development compared to allopathic medicine, as depicted in the Fig-5 showcasing numerous components within the platform.

The information published in 2019 concerning the year 2018 reflects a perspective from five years ago. Given that the pattern of disease is inherently dynamic, the question arises: Can this data, provided by the platform, be considered a reliable source for planning in 2024 for next coming 5 years? As per Data reported in A-HMIS is expected to fulfil the various dimension of data quality. These dimensions include timeliness, completeness, consistent and correctness and to ensure timeliness, each facility is ordered to enter the data by fifth day of the following month.(*HMIS Annual 2020-21_2021-22 Report.Pdf*, n.d.) This Mid-Term Evaluation of National AYUSH Mission (NAM) report brought to the notice in existing NAM digital initiative is not coercive and consistent enough to reflect the real-time filed perspectives while not focusing on the purpose for collection and collation of the data.

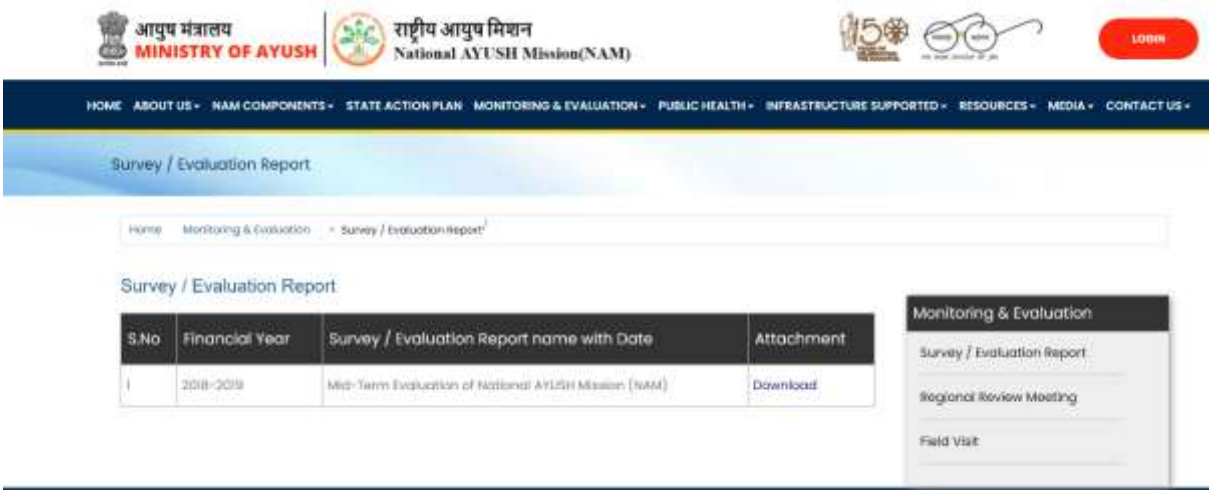

Fig 5: reflection of inconsistency of real-time data

Source: Ministry of AYUSH, Govt. of India. https://namayush.gov.in/content/survey-evaluation-report

Current state of AYUSH competency

The absence in adaptation of comprehensive healthcare operational framework, adapted modern technologies and tools to improve responsiveness and reinforcing spatial mapping measures for the provision, financing, regulation, and management of healthcare resources and infrastructure has led to stagnation of health burden. Managed care through integrated medicine also failed to display its competency (Ravichandran, n.d.). Healthcare system is not keeping pace with the evolving demands and influences, leading to untapped potential in AYUSH. Economic and social disparities hinder equitable access to AYUSH healthcare, affecting overall health outcomes or otherwise AYUSH failed to strengthen the confidence or faith of the users. The principles of patient care and evidence-based practices, foundations of primary healthcare in AYUSH, have not been fully embraced, resulting in ineffective healthcare delivery. Digital platforms have indeed revolutionized the way healthcare is accessed and delivered, especially for AYUSH systems. certain initiatives at the National level (e.g TKDL, A-HMIS, NAMASTE) are paving way for improving research and practices. Deployment of AYUSH San- Jivani application to collect millions of users data on AYUSH practices during COVID-19 pandemic demonstrated responsiveness of the digital initiatives to an emerging situation (Muthappan et al., 2022). For fulling the purpose of health data gathering on different digital health platforms, more and more data is collected and analysed which creates an increased risk of data breaches or unauthorized access to sensitive patient information. This raises significant ethical and legal concerns, especially in the era of stringent data privacy regulations. This led to disruption of patient-provider relationship if healthcare professionals become overly reliant on analytics, it may detract from the personalized and empathetic care that is crucial in building trust and rapport with patients.

Future potentials and strategic trade-off

In today's healthcare landscape, there is intense advancement in digital transformation in the field of healthcare analytics. In fact, AYUSH is showing great advancements that surpass those of modern medicine. However, there is a major challenge when it comes to the purpose of collecting data and its analytical use. The data being collected does not serve its intended purpose, leading to difficulties in planning and addressing current healthcare problems and chances of error occurrence and duplicity of data is always on a high end. This lack of efficient data utilization in the AYUSH sector not only impedes evidence-based decision-making but also hinders the potential for comprehensive and integrated healthcare delivery. This hampers the development of tailored healthcare strategies and may lead to missed opportunities in leveraging the strengths of AYUSH to complement modern medicine and the integrated system itself. These issues are often framed with great healthcare technology but little practical relevance. In order to reduce health burden, improve AYUSH integration, and minimize inequities, it is commonly acknowledged that healthcare technologies must be utilized.

The integration of AYUSH into the broader healthcare system demands innovative analytical solutions to overcome existing challenges and unlock the transformative potential of data-driven decision-making. The complexity of healthcare data from diverse sources necessitates the implementation of advanced analytical methods. By leveraging the capabilities of healthcare analytical tools, AYUSH can move from a reactive to a proactive healthcare delivery paradigm.

1. *Integration of Unique Wealth of Healthcare Data*: Healthcare analytics should take care of the challenge of data heterogeneity and making it easily integrable and analysable which requires not only integrating traditional clinical notes and medical records but also handling sensor-generated data, medical images and lab reports. These are expected to reduce the out-of-pocket expenditure and improve the efficiency of the service providers.

2. *Real time data for prevention and promotion of health*: Healthcare burden could be reduced such as monitoring data will enable healthcare organizations to streamline processes, optimize resource allocation, and decision making at the right and required time. This will result in reduced wait times, smoother workflows, and better resource utilization, ultimately leading to enhanced operational efficiency and cost savings. By leveraging real-time data from medical devices and sensors, healthcare analytics can facilitate early intervention and personalized care. With the help of experts the real time data can display the IPD and OPD conversion rate in digital platform through this effective and efficiency of the system can be monitored. Real time Incidence and Prevalence rate will improve policy planning and implementation process which further account for reduction in morbidity and mortality. Conversely, the absence of empirical data of reasonable quality is affecting program design and, therefore, results. Developing country like India has ample evidence of these effects, often because of the mismatch between the burden of illness and its causal factors (Ravichandran, n.d.) which with analytical solutions would be easily identified and processes for better healthcare outcomes.

3. *Patient-Centric data metrics:* Metrics should extend beyond clinical outcomes to encompass patient-reported outcomes, quality of life, and preventive measures. Maintain integrity of the health data will reduce the percentage of error and duplication of the health data. Freedom for shifting from one system to another under integrated system will improve the reliability, accuracy for diagnostic and prognosis purpose. Timeliness means getting the information at the right time to right person and at right place will fill the exact purpose of this generated health informative data. Through the identification of inefficiencies, unnecessary procedures, and opportunities for preventive care, effective healthcare analytics tools will also reduce the cost of expenditure on health. The failure is uncertain in medical science and its unpredictable result orientation because it never had preventive and promotive thoughts instead of centred on care and treatment. With the development various advanced medical tool, results remain uncertain in medical science and its unpredictable result orientation because it never had preventive and promotive thoughts instead of centred on care and treatment. Timely and integration of captured information on cultural preferences, language proficiency, socioeconomic status, and geographical location to ensure that healthcare analytics accurately reflect the realities of all patient groups will help to maintain health equity. This approach not only enhances the credibility of AYUSH practices but also aligns with contemporary healthcare paradigms focused on patient-centred care.

4. *Data governance*: This encompasses a set of rules, protocols and standards designed to oversee the handling, utilization and safeguarding of healthcare data at every stage of its existence. This would maintain all the dimensions which include timeliness, completeness, consistent and correctness and to ensure real timeliness. Defined roles and responsibilities for data stewardship, establishing standards for data quality and integrity, enforcing compliance with regulatory requirements. By utilizing health analytics, AYUSH practitioners can gather information from various sources such as patients, clinical data, biological data, and normative data sets, and integrate them into a unified and comprehensive analytical framework. This allows for a holistic approach to healthcare, combining the strengths of both traditional and allopathic medicine. By harnessing the power of data standardization and analytical tools, AYUSH practitioners can identify population health trends, predict potential health issues, and tailor treatment plans to meet the unique needs of individual patients. Through the systematic analysis of standardized data, researchers can uncover new patterns, relationships, and treatment

outcomes, leading to the refinement and innovation of traditional and allopathic therapies. This can ultimately contribute to the continuous advancement and modernization of the AYUSH system.

5. *Cultivating a Culture of Data Literacy*: To bridge the competency gap between healthcare and data science professionals, cultivating a culture of data literacy is paramount. AYUSH practitioners and computer experts must acquire a foundational understanding of each other's domains. Training initiatives, workshops, and collaborative projects can foster a shared language, ensuring effective communication and collaboration in implementing data analytics solutions within AYUSH practices. Establishing a culture of data literacy within the AYUSH system can also promote interdisciplinary collaboration. By bringing together expertise from both healthcare and data science domains, AYUSH practitioners can leverage their clinical knowledge with the analytical skills of computer experts to develop advanced analytical models tailored to the specific needs of AYUSH practices. This collaborative approach not only enhances the effectiveness of healthcare analytical tools but also fosters a culture of innovation and continuous improvement within the AYUSH system. By gaining a deeper understanding of the intricacies of traditional and allopathic medicine, as well as the complexities of healthcare data, they can customize data analytical tools to capture and analyse specialized datasets relevant to AYUSH practices. Health Education and Communication aim of communication should be to influence individual behaviour by providing timely and accurate information and knowledge, motivation through persuasive communication, and self-efficiency health education and the communication system is essential to the success of health care and its provision of services and effective communication strategies. Ravichandran, N. (2021). *Post COVID-19: Modernizing India's Healthcare Infrastructure*. 1–21.

CONCLUSION

Healthcare data are not regarded as data but as information, which leaves them exposed and disconnected from real domain-specific problems. With the increasing demand for holistic and integrated approaches to healthcare, traditional systems like AYUSH are gaining prominence. The ultimate goal of the healthcare system is to improve public health while eliminating disparities, prejudice, and inequity. By analysing the current state of AYUSH and its integration with conventional healthcare, we have shed light on the potential for leveraging advanced analytics to improve patient outcomes, optimize treatment protocols, and enhance the overall effectiveness of integrated healthcare systems. The proposed analytical solutions, ranging from data standardisation, integration and advanced analytics to interdisciplinary training and collaborative platforms, provide a roadmap for overcoming these challenges and unlocking the full potential of AYUSH integration.

In the current field of integrated healthcare and by utilizing health analytics, AYUSH and other medical practitioners can gather information from various sources such as patients, clinical data, biological data, and normative data sets, and integrate them into a unified and comprehensive analytical framework. By leveraging advanced analytics techniques and technology solutions to address data cloning and inaccuracies, healthcare organizations can gain a deeper understanding of these factors and their interplay. This deeper understanding, in turn, empowers organizations to drive meaningful improvements in patient care and operational efficiency, ultimately fulfilling the overarching goal of healthcare analytics.

In essence, the journey from the current state of AYUSH integration towards future is not just a of convergence of systems; it is a convergence of perspectives, knowledge, and a shared commitment to advancing healthcare for the benefit of all and the wealth of data being generated could be watched live. In the data driven decision world healthcare always being the dynamic one as pattern of the disease can only be predicted by observing and analysing the data set error and cloning free data can bring a revolution and transformation in the integrated world of healthcare. With standard integration of healthcare system and data analytic approaches we can unleash the potential of AYUSH system.

REFERENCES

HMIS Annual 2020-21_2021-22 Report.pdf. (2021).Published by Ministry of AYUSH,Govt. of India.

Muthappan, S., Elumalai, R., Shanmugasundaram, N., Johnraja, N., Prasath, H., Ambigadoss, P., Kandhasamy, A., Kathiravan, D., & Ponnaiah, M. (2022). AYUSH digital initiatives: Harnessing the power of digital technology for India's traditional medical systems. *Journal of Ayurveda and Integrative Medicine*, *13*(2), 100498. https://doi.org/10.1016/j.jaim.2021.07.014

Ravichandran, N. (2021). *Post COVID-19: Modernizing India's Healthcare Infrastruture*. 1–21.

Rudra, S., Kalra, A., Kumar, A., & Joe, W. (2017). *Utilization of alternative systems of medicine as health care services in India : Evidence on AYUSH care from NSS 2014*. 1–20.

Samal, J. (2015). Role of AYUSH doctors in filling the gap of health workforce inequality in rural India with special reference to National Rural Health Mission: A situational analysis. *AYU (An International Quarterly Journal of Research in Ayurveda)*, *36*(1), 5–9.