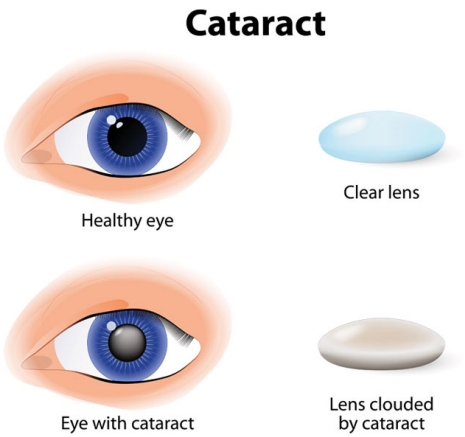
Jefferson

Data Merging Technique in Cataract Patients in Telangana for Enhancing Public Awareness of Visual Impairment



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Harnessing Data for the Benefit of Society

Dr. Les Sztandera, PhD
Dr. Amna Alalawi

Background

Visual impairment is a critical issue in the underdeveloped world, its burdens include financial and health burdens on families and society. The major reasons for visual impairment are due to cataract and refractive error.

Jefferson partnered with LV Prasad Eye Institute (LVPEI) in India to harness data for the benefit of managing the complex issue of visual impairment and reasons that lead to blindness in the state of Telangana.

The Electronic Medical Record (EMR) of LVPEI was used as the main data set to examine patients' records and information.

Publicly available climatic variables were obtained and aligned to the dataset through a process called column mutation, and then examined by Microsoft Power BI to present findings and new insights.

Significance of the Research

Being able to understand that we now live in a VUCA world requires taking a holistic approach to studying patients' demographic and social influence in the development of diseases, in this case, ocular diseases.

The era of 'big data' in healthcare, even though provides information about patients worldwide, creates a challenge in terms of transforming that data into information that can be leveraged in research. Therefore, date merging technique is one way that simplifies taking complex information into information that will yield to new knowledge.

The focus of the research is to study the socio-demographic and climatic factors that affect the development of cataract in Telangana through data merging technique to create awareness of the complexity of visual impairment and propose ways for better management.

Data Merging Technique

Data merging is a creative technique used in big data analysis and is considered a model in strategic leadership thinking.

It helps in integrating and applying strategy to resolve complex problems.

It can draw a blueprint for effective decisions, especially when harnessing data in healthcare to clarify ambiguity on complex issues.

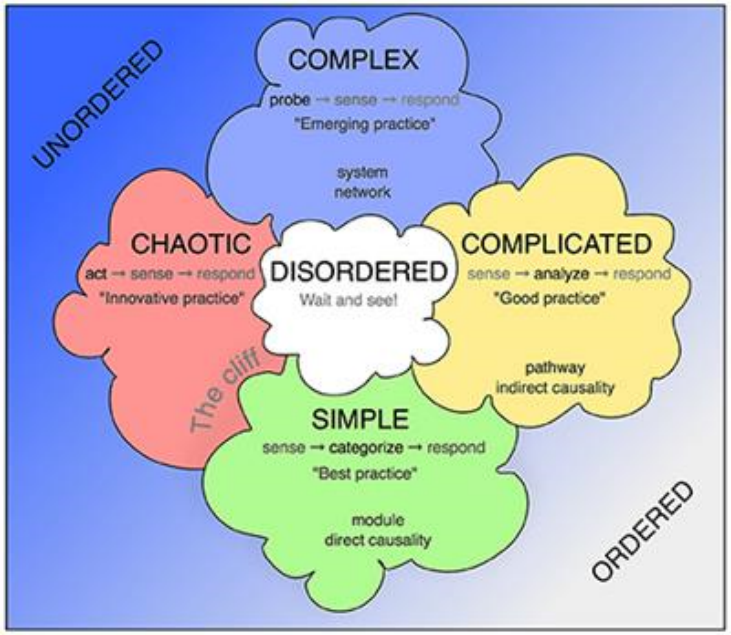
https://www.ontotext.com/knowledgehub/fundamentals/dikw-pyramid/

Research Questions

1. Can data merging techniques be applied to EMRs to generate new knowledge shedding light on correlations between the development of cataracts and socio-demographic and environmental factors?

2. Does the Cynefin Framework offer potential as a means to transform raw data into a form which can be used by healthcare researchers aiming to increase early cataract detection rates in Telangana?

Cynefin Framework

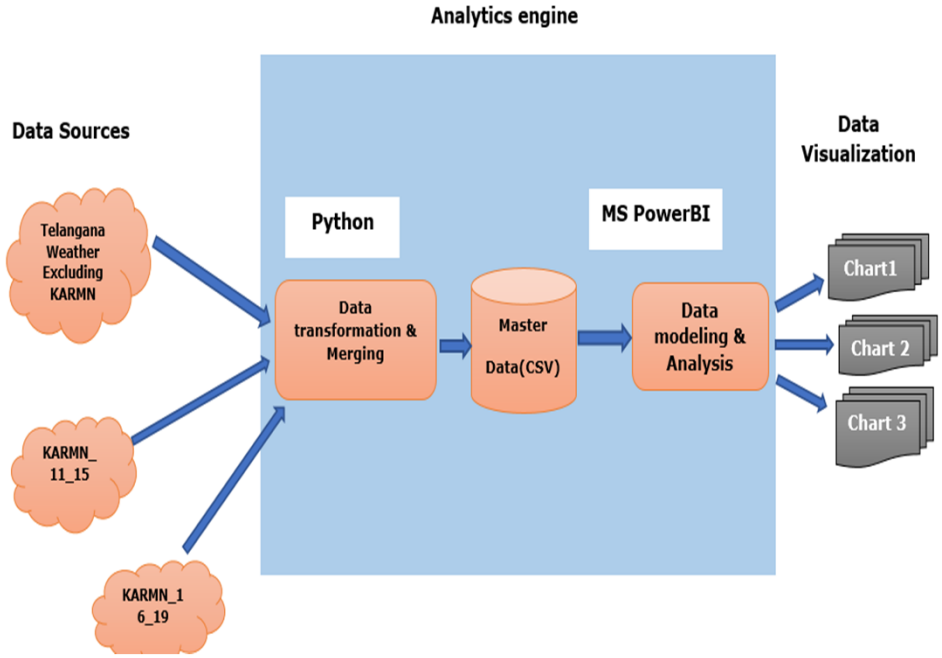


www.frontiersin.org

Methodology

The climatic variables chosen for testing were temperature, humidity, windspeed, rainfall and global radiation. Other variables were also tested on the dataset including smoking and diabetes.

Analysis was applied to both cataract patients vs. non-cataract patients as the control group. Control group was analyzed separately to shed light on important correlations to other diseases.

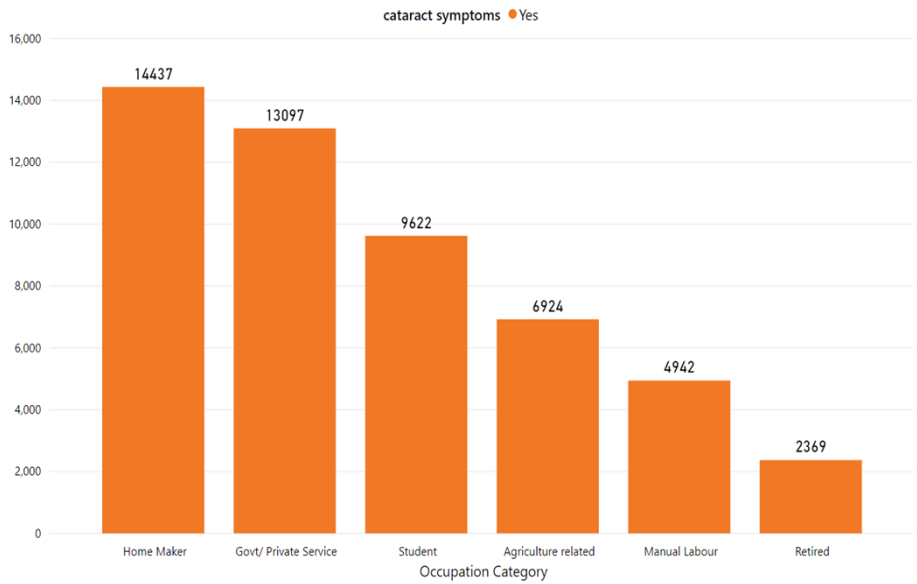


Findings

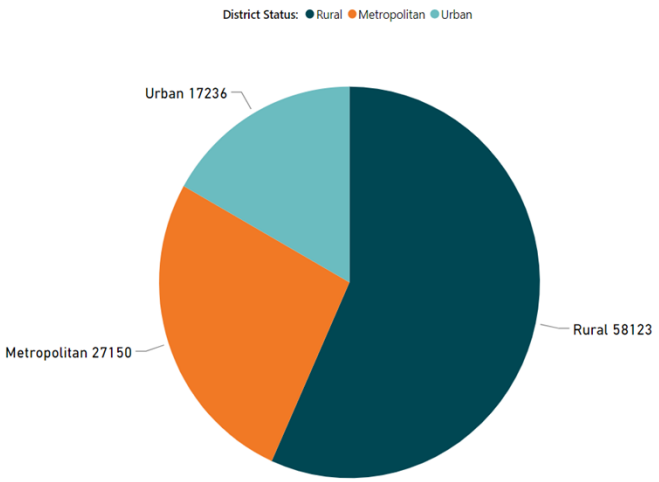
- For older adults, (ages 41-70), Cataract and Pseudophakos are the most prevalent eye diseases.
- Astigmatism, and Conjunctivitis are the most prevalent eye diseases among the youth population (ages 21-40) in Telangana.
- Paloncha is one of the highest locations where people presented themselves with eye disorders. Secondary research identified it to be a high-risk location because of the presence of the state-run thermal power plant installed in 2015 [4].
- Consistent pattern for high prevalence of cataract within the minimum ranges of temperature (20oC - ~30oC). Cataract is the most prevalent eye disease in the rainfall season.

Findings

Cataract by Occupation



Cataract by District



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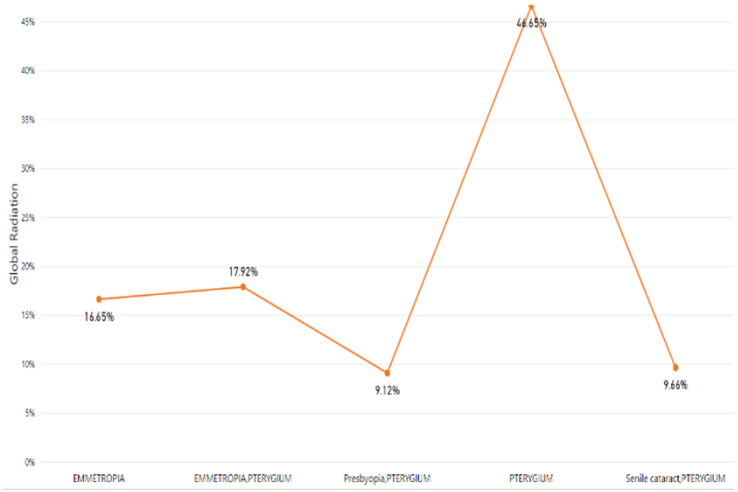
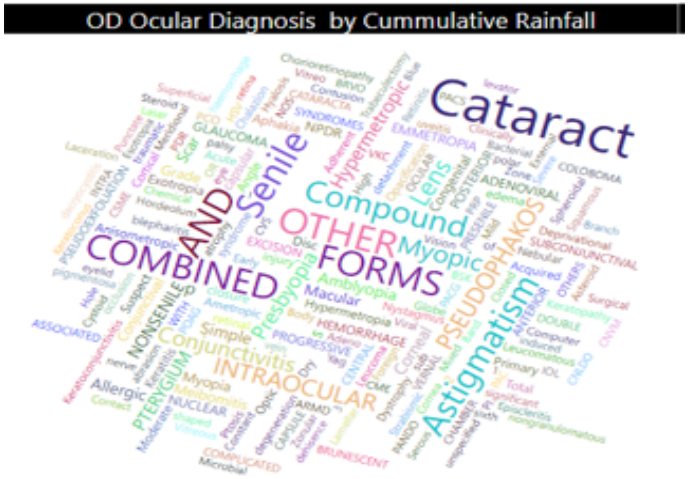
Findings

Pterygium in Relation to Global Radiation



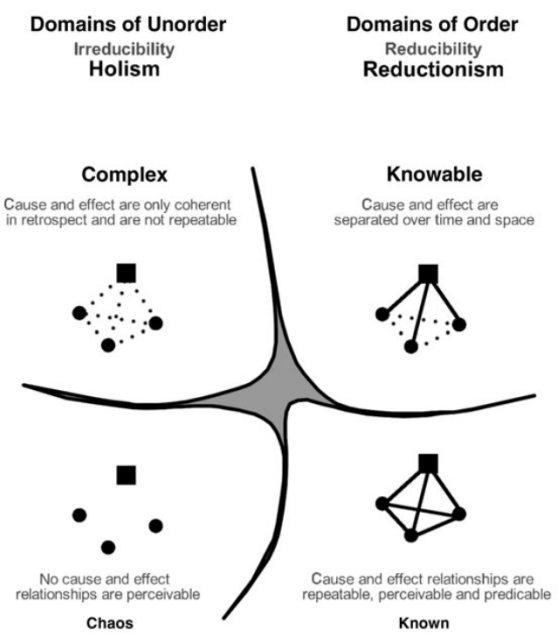
Cataract in Rainfall



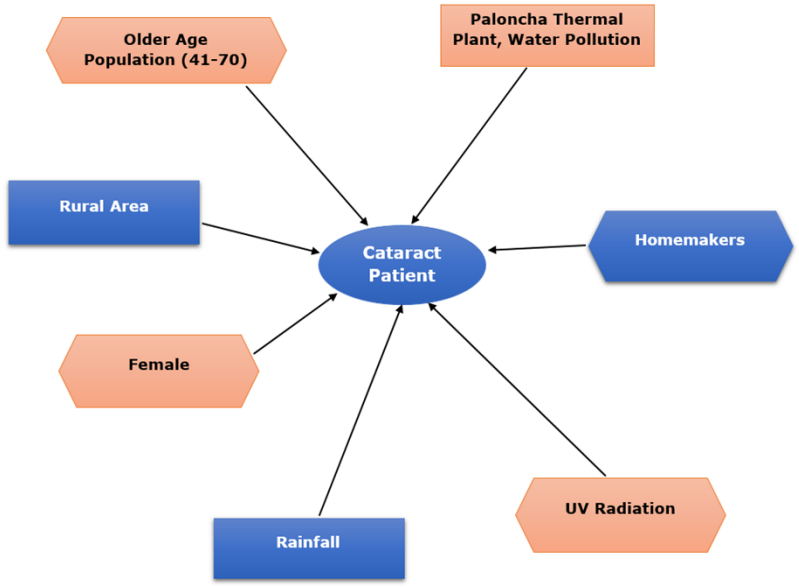
Pterygium shows to be most prevalent at over 46% of the total global radiation value. The analysis was done on a patient basis and not a disease basis, as the data showed that one patient can develop more than one disease.

Research Questions Answered

Cause and Effect Relationship in Medical Complexities



Influence Diagram



Conclusion

- The healthcare EMR system is large and complex, one that does not naturally lend itself to easy analysis, design or even understanding.

- The mission of data merging is to try to improve societal outcomes by developing, integrating, and using appropriate analytical tools in these new approaches, to offer healthcare practitioners the opportunity to design better patient-care policies and well-targeted regulations to lower the burdens of the economic and social problems associated with diseases, such as cataracts.

- Besides creation of awareness, this study also recommends ophthalmologists' understanding of all factors that influence cataracts to help patients deviate away from high-risk situations that can cause eye disorders.