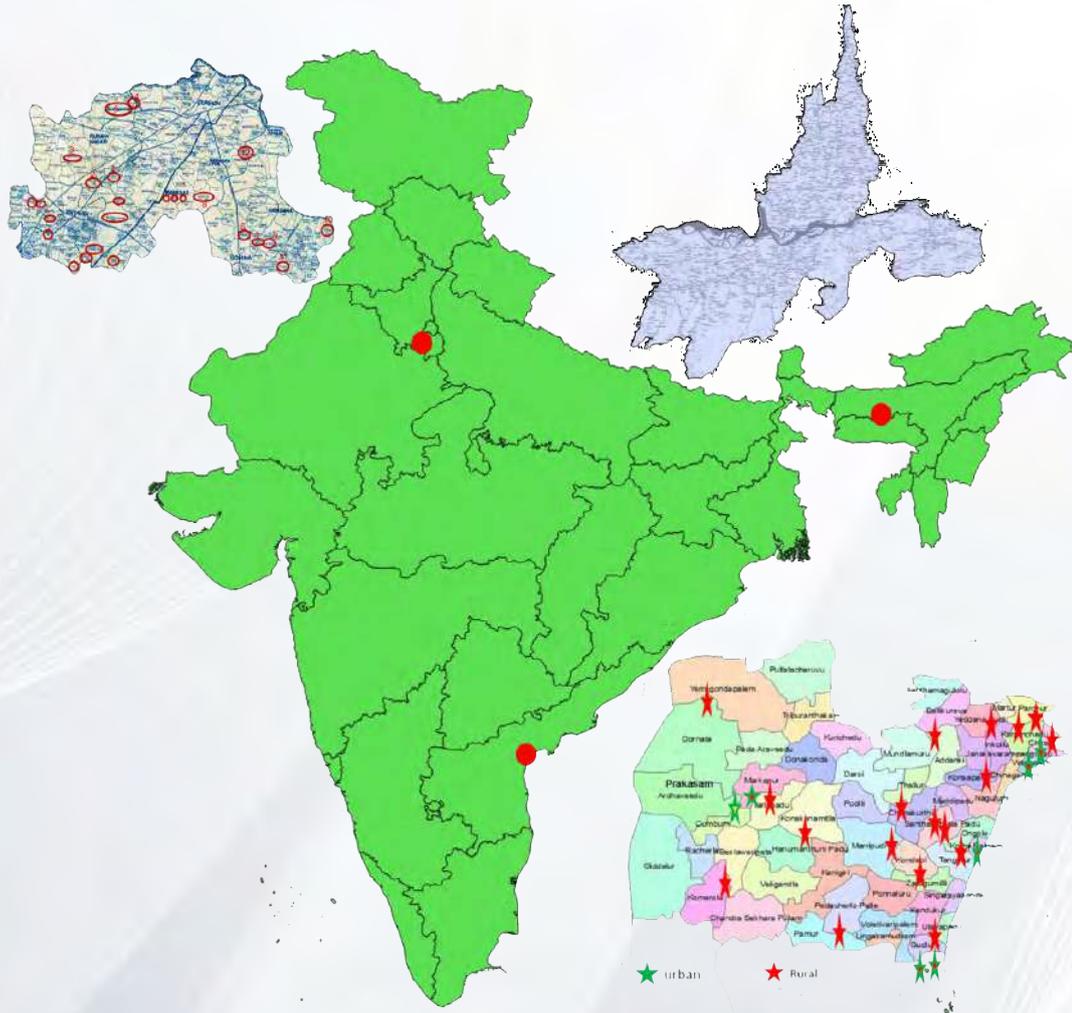# Multi–centric Collaborative Study on the Impact of Environmental Changes and Ultra Violet Radiation (UVR) Exposure on Ocular Health in India

Project Report (2010–2016)

Submitted to

Indian Council of Medical Research, New Delhi

Principal Investigator

Dr. Radhika Tandon

Professor of Ophthalmology

Dr. Rajendra Prasad Centre for Ophthalmic Sciences

All India Institute of Medical Sciences, New Delhi 110029, India

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Multi–centric Collaborative Study on the Impact of Environmental Changes and Ultra Violet Radiation (UVR) Exposure on Ocular Health in India

Project Report (2010 - 2016)

Data analysis and report writing & editors:

Dr. Radhika Tandon

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Submitted to

Indian Council of Medical Research, New Delhi

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Annexure2   : Lists of tables of study done at RIO Guwahati

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Abbreviations

AIIMS – All India Institute of Medical Sciences

AOD - Aerosol Optical Depth

BP – Blood Pressure

BS – Blood Sugar

CCC – Central Coordinating Centre

CI – Confidence Interval

CSIR- Council of Scientific and Industrial Research

DS – Diopter Sphere

ETDRS – Early Treatment Diabetic Retinopathy Study

FUV – Fraction of UV Radiation

GUV – Global UV Flux

INR – Indian National Rupee

LogMAR- Logarithm of the Minimum Angle of Resolution

NCR – National Capital Region

NPCB- Natinoal Programme for control of Blindness

NPL- National Physical Laboratory

OSDI – Ocular Surface Disease Index

PHFI – Public Health Foundation of India

PVA – Presenting visual Acuity

RIO – Retional Institute of Ophthalmology

TBUT – Tearfilm Breakup Time

UVAF – Ultraviolet Auto Fluoresence

UVR – Ultra Violet Rays

VKC- Vernal Kerato Conjunctivitis

WHO – World Health Organization

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Acknowledgement

At the foremost, we would like to express our gratitude to the director general ICMR, for giving us the opportunity to be involved in this study on Global environmental change and ocular health as a coordinating center.

We are really thankful to the ICMR task force on Eye health & climate change and the ICMR high powered committee for providing us the constant support by providing supervision and expert comments to complete this study.

We would acknowledge a great support to Dr. RS Dhaliwal, Dr. Tanvir Kaur and their secretariat at the NCD Division of ICMR headquarters, New Delhi for their dedicated and continuous support.

We are also thankful to Dr Sachidanand, National Physical Laboratory, New Delhi for providing us the data on climatic and environmental factors.

Its our pleasure to acknowledge the contribution of our coordinating centres at Regional Institute of Ophthalmology, Guwahati and Indian Institute of Public Health, Hyderabad and the Pushpagiri Eye Institute, Hyderabad who participated in the study with great enthusiasm and provided us with the data related to the demographic information and risk factors of their area.

In the end we are really thankful to our entire staff of clinical team and data operators for completing this study without complaining regarding any hardships in weather.

Dr Radhika Tandon   **Dr Praveen Vashist**

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1. **Title of the Project:**

   Multi–centric Collaborative Study on the impact of Environmental Changes and Ultra Violet Radiation (UVR) exposure on ocular health in India

2. **Principal Investigator and Chief Coordinator:**

   Dr.Radhika Tandon
   Professor of Ophthalmology
   Dr. Rajendra Prasad.Centre, AIIMS
   All India Institute of Medical Sciences (AIIMS)

   Principal Investigator (Delhi):
   Dr.Radhika Tandon
   Professor of Ophthalmology
   Dr. Rajendra Prasad.Centre, AIIMS
   All India Institute of Medical Sciences (AIIMS)

   Co-Principal Investigator:
   Prof. Praveen Vashist
   Professor of Community Ophthalmology
   Dr. Rajendra Prasad.Centre, AIIMS
   All India Institute of Medical Sciences (AIIMS)

   Co-Investigators
   Dr Noopur Gupta
   Assistant Professor Ophthalmology
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   All India Institute of Medical Sciences (AIIMS)

   Principal Investigator (Guwahati):
   Prof. Dr. C.K. Barua (Retired)
   Regional Institute of Ophthalmology
   Guwahati Medical College

   Dr Dipali C. Deka
   Director and HOD, Regional Institute of Ophthalmology
   Guwahati Medical College
   Guwahati-781032

   Co-Investigators:
   None

   Principal Investigator (Prakasam):
   Prof. Dr. GVS Murthy
   IIPH, Prakasam
   Hyderabad

   Principal Investigator (NPL, Delhi):
   CSIR-National Physical Laboratory,
   Dr. K. S. Krishnan Road, New Delhi -110012

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3. **Implementing Institution and other collaborating Institutions:**

Dr. Rajendra Prasad Centre for Ophthalmic

Sciences, AIIMS, New Delhi **(Coordinating centre)**

Collaborating centre:

National Physical Laboratory, Delhi

Regional Institute of Ophthalmology

Guwahati Medical College

Guwahati-781032

Indian Institute of Public Health, Hyderabad

Pushpagiri Vitreo Retina Institue, Hyderabad, PHFI, Hyderabad

4. **Date of commencement:**

1st Feb 2010

5. **Duration:**

5 years 6 months

6. **Date of completion:**

30th June 2016

7. **Objectives as approved:**

Mentioned ahead

8. **Deviation made from original objectives if any, while implementing the project and reasons thereof.**

After the discussion in High power committee meeting in 2012 the title of the study underwent change from Multi–centric Collaborative Study on the impact of Global warming and Ultra Violet Radiation(UVR) exposure on ocular health in India to:

Multi–centric Collaborative Study on the impact of Environmental changes and Ultra Violet Radiation(UVR) exposure on ocular health in India.

Also the objective 3 of the study underwent change from to correlate and compare the existing data on prevalence of eye diseases with available measurements of UVR and

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suspended particles in the initial first year of the project and subsequently plan a long term monitoring mechanism to:

To <u>collect</u> the existing data on prevalence of eye diseases with available measurements of UVR and suspended particles in the initial first year of the project and subsequently plan a long term monitoring mechanism.

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Background

The human body is exposed to terrestrial sunlight that contains UVB (280–315nm), UVA(315–400nm), visible(400–800 nm) and infrared (IR) (800nm–1mm) radiation. The short wavelength of the solar UV wavelengths incident on the Earth surface is generally between 290 and 295nm. Exposure to the short UV wavelengths causes damage and necrosis of corneal epithelium and also biochemical changes in lens protein. Numerous studies in literature have shown an association of cataract with ultraviolet light. Outdoor workers are exposed frequently to a large range of ultraviolet radiation (UVR), not only does the exposure but the number of hours of exposure along with use of protective head gears has shown a very important role in the development of cataract in these people.[1-3]

Present knowledge is limited, though it is well understood that this is an important area for research. Several authors have reported findings confirming the association of environment and ocular health and the important studies are highlighted with a brief description of important findings. In a study done by Delcourt et al,[4] for light exposure and risk of various type of lens opacities, it was found that sunlight played a role in the development of cortical cataract. Similarly in a study done by Tang et al[5] and Seah et al[6] for the association of outdoor activity and age related cataract significant association was observed between sunlight and cortical cataract.

Shah et al[7] in a study done for dry eye prevalence reported a significant OR was found between dry eye and participants with higher sun exposure, smoking and excessive windy conditions. Marmamulla et al8 reported a significant association between pterygium and participants with higher sun exposure and smoking.

In a study done by Kelly et al,[9] a review of various studies was done for relationship between cataract and smoking it was found that smoking has a significant association with cataract more with nuclear cataract. In a study done by Pokhrel et al[10] reported a significant association of unfueled solid fuel with cataract.

Overall it can be said that a comprehensive study was lacking and that too in a large population from the Indian subcontinent. The present study aimed to complete the gap in knowledge and fulfill the unmet need to provide reliable data on the subject.

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Objective

i)   To estimate the UVR in in National capital region (NCR) and Northeast region and Southern region of the country.

ii)   To study the effect of environmental factors and UV A & B radiation, suspended particles on the prevalence and/or exacerbation of eye diseases like cataract, dry eye, pterygium, and vernal keratoconjunctivitis in Delhi and northeast region and southern region of the country.

ii)   To collect the existing data on prevalence of eye diseases with available measurements of UVR and suspended particles in the initial first year of the project and subsequently plan a long term monitoring mechanism.

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Glance of photographs for the work done during the project

Unique ID for Participant

Visit at RIO Guwahati by Dr. Radhika Tandon (PI) and Dr. Praveen Vashist (CO-PI) of coordinating centre Dr. RPC, AIIMS

Training for Risk Assessment Interview at Prakasam by Dr. R.P. Centre

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Blood Glucose and Blood Pressure Measurement

Clinical Examination

UV Photography Instrument

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Prakasam Centre Team visit at Dr. R.P. Centre, AIIMS

Dr. R.P. Centre Team Visit at Guwahati Centre for monitoring

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9. **Experimental work giving full details of experimental set up, methods adopted, data collected supported by necessary tables, charts, diagrams and photographs.**

   Details of Experimental work (including methods, photographs)

   Tables are given in detail in results below

METHODS ADOPTED

9.1. Methodology for objective-I (National physical laboratory, Delhi):

- Use of satellite based UV data to infer possible trend in the UV irradiance at the Indian locations, particularly at Delhi, Guwahati and a coastal location (Chennai).

- Measurements of UVA and UVB Global flux (direct + diffuse) in Delhi and the North East region, particularly at Guwahati were done using the prescribed equipment and procedures as per standard recommended method and standard operating practices. The surface measurement of solar global UV irradiance (direct + diffuse) has been done with WMO specifications approved Kipp and Zonen UV radiometer (CUV 4) in the range of 280 - 400 nm wavelengths. The UVA and UVB measurements were done using Kipp & Zonen make UVS-A-T and UVS-B-T radiometers. Environmental data collected from Delhi were also used to supplement the study. This information was also required to see the impact of atmospheric aerosols, surface ozone, and other trace gases etc on UV flux. The calibration of instruments and setting of standards was also done as per the requirements from Delhi center.

- The internationally recognized radiative transfer models(LOWTRAN/MODTRAN/ TUV) were also used to estimate the effects of aerosol and other parameters on radiation flux. It also verifies/supports the observations and help estimate the overall effective UV dosage in the region.

- Sample measurements of column aerosol, particulate matter (PM 2.5, PM10), ozone and other trace gases, cloud cover etc may be needed to improve and verify the model.

As one of the main objectives was to measure the UVA and UVB flux at Delhi and Guwahati, the experimental setup including structures were made as the requirements of the UV measurements at Delhi and Guwahati. For UV measurements appropriate sensors for UVB (280-315nm) and UVA (413-400nm) were procured along with data loggers

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from the established company Kipp & Zonen, the Netherlands and installed at CSIR-NPL, Delhi and Regional Meteorological Center, Guwahati. Figures 1 and 2 show the instruments installed at Delhi and Guwahati respectively.

Fig 1: The total UV (280-400nm) and UVB (280-315nm) and UVA (315-400nm) sensors installed at the CSIR-National Physical Laboratory.

Fig 2: UVB (280-315nm) and UVA (315-400nm) sensors installed at Regional Meteorological Center, Guwahati.

In order to have the integrated measurements of UV at Delhi the already existing UV sensor in the range 280-400nm at NPL was also used (shown in left panel of picture 1). Some of the other instruments used at CSIR-NPL for the present studies included MICROTOPS sunphotometer(for Aerosol Optical Depth, AOD), Aethalometer(for Black Carbon, BC measurements), Ozone-Analyser(for surface ozone measurements), High Volume Vamplers(for particulate matters) etc.

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Fig 3: Some of the other instruments used at CSIR-National Physical Laboratory, New Delhi.

Apart from the measurements made at NPL and Guwahati data were also obtained from other institutions like India Meteorological Department and also supplemented with the satellite data. The measurements of various parameters may be characterized into four major groups:

1. The radiation Flux Data:

    UV (280-400nm)

    SW (285-2800nm)

    UVA (315-400nm)

    UVB (280-315nm)

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In the present study, the trends and variability of local noon erythemal UV irradiance in the entire Indian region on temporal as well as latitudinal scales were also measured. In order to assess the impact on three different climatic regions, three different stations in central (Delhi), coastal (Chennai) and northeastern region (Guwahati) were done. In this study, the TOMS derived monthly erythemal UV irradiance at local noon data (in milli Watt per square meter) over Indian region in the period Nov 1978-Dec 2005 was used. The TOMS instrument is NASA's second-generation back-scattered UV ozone sounder, used to study ozone concentration in the Earth's atmosphere. Nimbus-7/TOMS measures the solar flux and backscattered emissions from the Earth-atmosphere system in six 1 nm wide UV channels, centered at 313, 318, 331,340, 360, and 380 nm. Field of view of the TOMS instrument is 50 x 50 km^2 in the nadir direction, increasing to 150 x 200 km^2 in the extreme off-nadir direction. Local noon orbit and a cross-track scanning feature allow a complete daily coverage of the globe except for those areas of the polar region those are in darkness throughout the day (Eck et al., 1987). The UV flux incident on the Earth's surface is considered in two steps. First, the solar UV irradiance at the ground is calculated under the clear sky conditions with a radiative transfer model based on the work of Dave (1964). The model takes into account scattering by the molecular atmosphere, absorption by ozone, reflection from the Earth's surface, and the effects of terrain altitude and the solar zenith angle (Kalliskota et al., 2000). The Erythemal Exposure data product used here was an estimate of the daily integrated ultraviolet irradiance, calculated using a model for the susceptibility of caucasian skin to sunburn or erythema. It may be interpreted as an index of the potential for biological damage due to solar irradiation, given the column ozone amount and cloud conditions on each day. TOMS and OMI together include UV and total ozone measurements from 1978 onwards and thus provide a unique dataset to analyze long-term changes in UV radiation at the surface and their relation to atmospheric ozone changes on the global scale (Ialongo et al, 2011).

In order to see the spatio-temporal variation in erythemal UV irradiance and total ozone concentration in the Indian region daily erythemal UV irradiance and ozone data in the latitude 5º N - 45º N and longitude 65º E - 95º E was used. The data was obtained at a resolution of 1.25º in longitude and 1º in latitude. In order to see the long-term climatology of ozone and erythemal UV irradiance the daily data were first used to obtain

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the monthly average values during the period 1978 - 2005. The monthly averaged data were then used to obtain the average monthly climatological mean for ozone and erythemal UV irradiance. In order to see the long-term trend at the three different stations, Delhi, Guwahati and Chennai, the data obtained at nearby grids centering these stations were averaged and put to statistical analysis. For Delhi(28.6°N, 77.2°E) the grid covered 27.5°N-29.5°N and 76.875°E-78.125°E; for Guwahati(26.18°N, 91.7°E) the grid covered 25.5°N-27.5°N and 90.625°E-93.125°E; and for Chennai(12.01°N, 80.2°E) the grid covered 11.5°N-13.5°N and 79.375°E-81.875°E.

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Results (Objective-I)

9.2. Trends in Erythemal UV flux and total Ozone Concentration

In order to study the trends of Erythemal UV flux at local noon and the column ozone concentration over Indian region, three different stations in central(Delhi), coastal (Chennai) and north-eastern region (Guwahati) representing three different climatic regions were used. The time series plot for Erythmal UV irradiance at noon and total column ozone for the period Nov1978 - Dec 2005 at these three stations (Delhi, Chennai and Guwahati) are shown in Figure 6. The UV and Ozone data obtained from Nimbus 7/TOMS and Earth Probe/TOMS were averaged at nearby grids centered at these stations as described earlier.

Figure 4 shows the usual monthly variability in the UV and column Ozone at all the three stations; however, no appreciable trend can be seen in the average annual UV flux or column ozone values.

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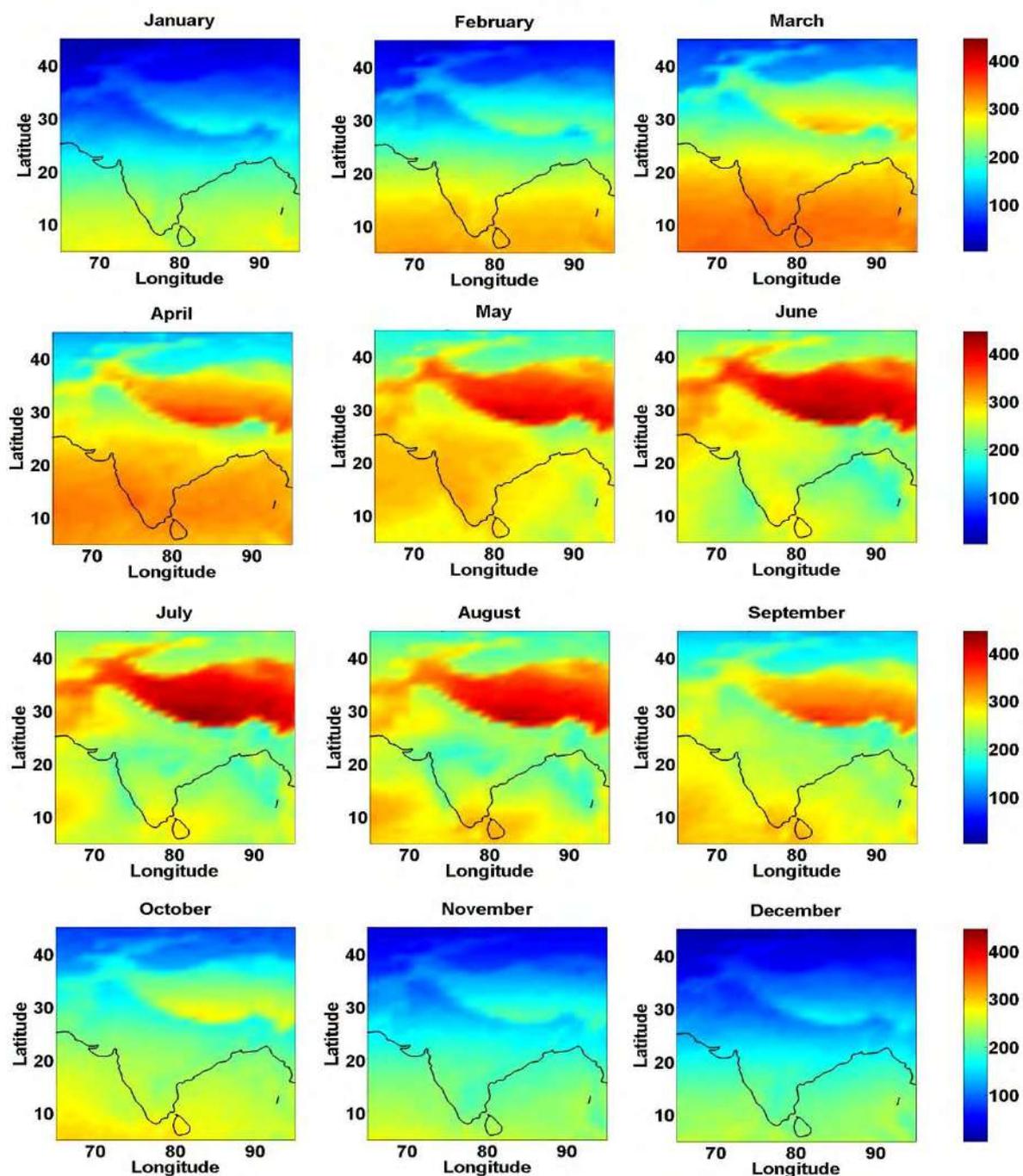
Fig 4: Spatio-Temporal variation of UV irradiance at local noon (in mWm-2) over Indian region during 1978- 2005.

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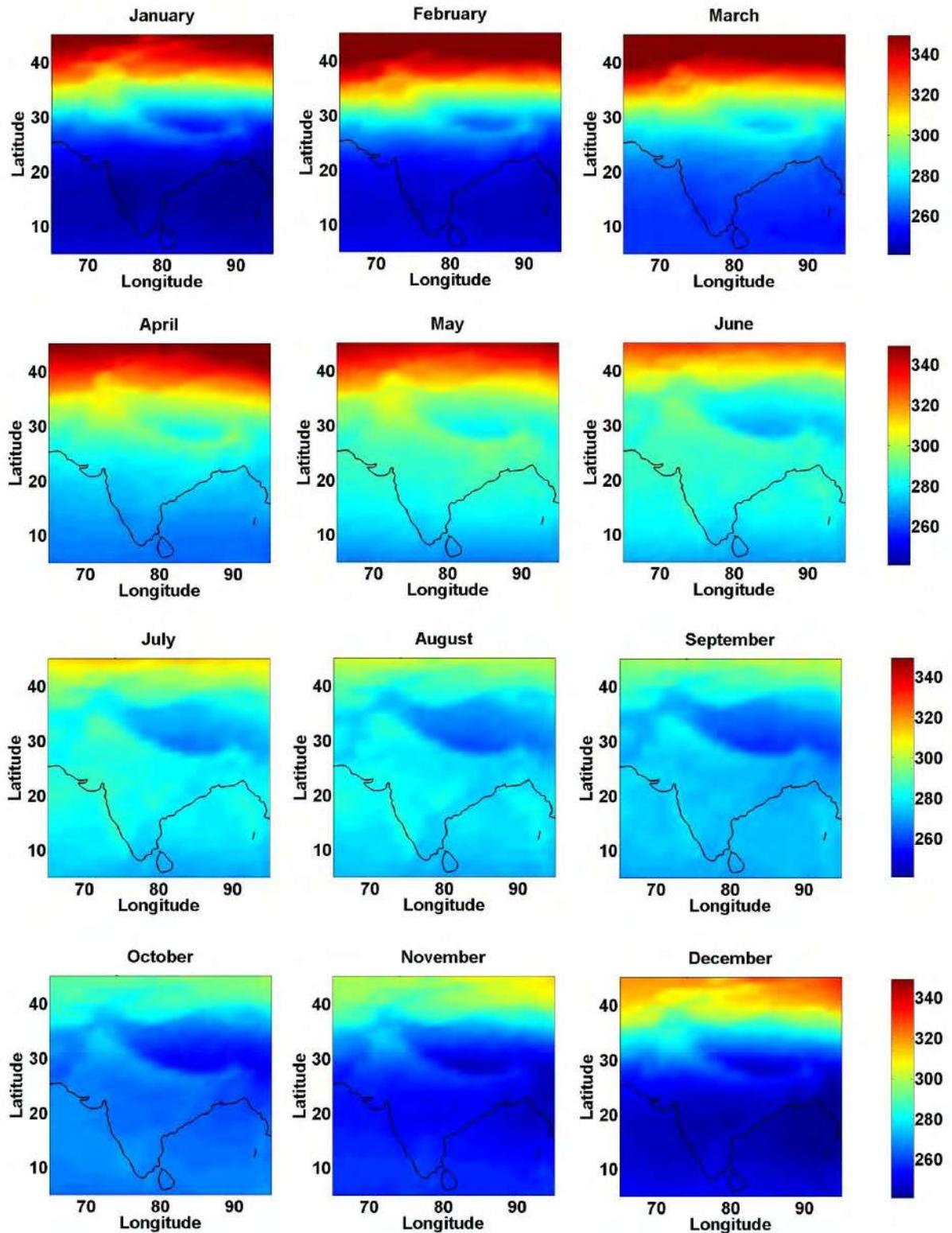
Fig 5: Spatio-Temporal variation of column Ozone (in DU) over Indian region during 1978- 2005.

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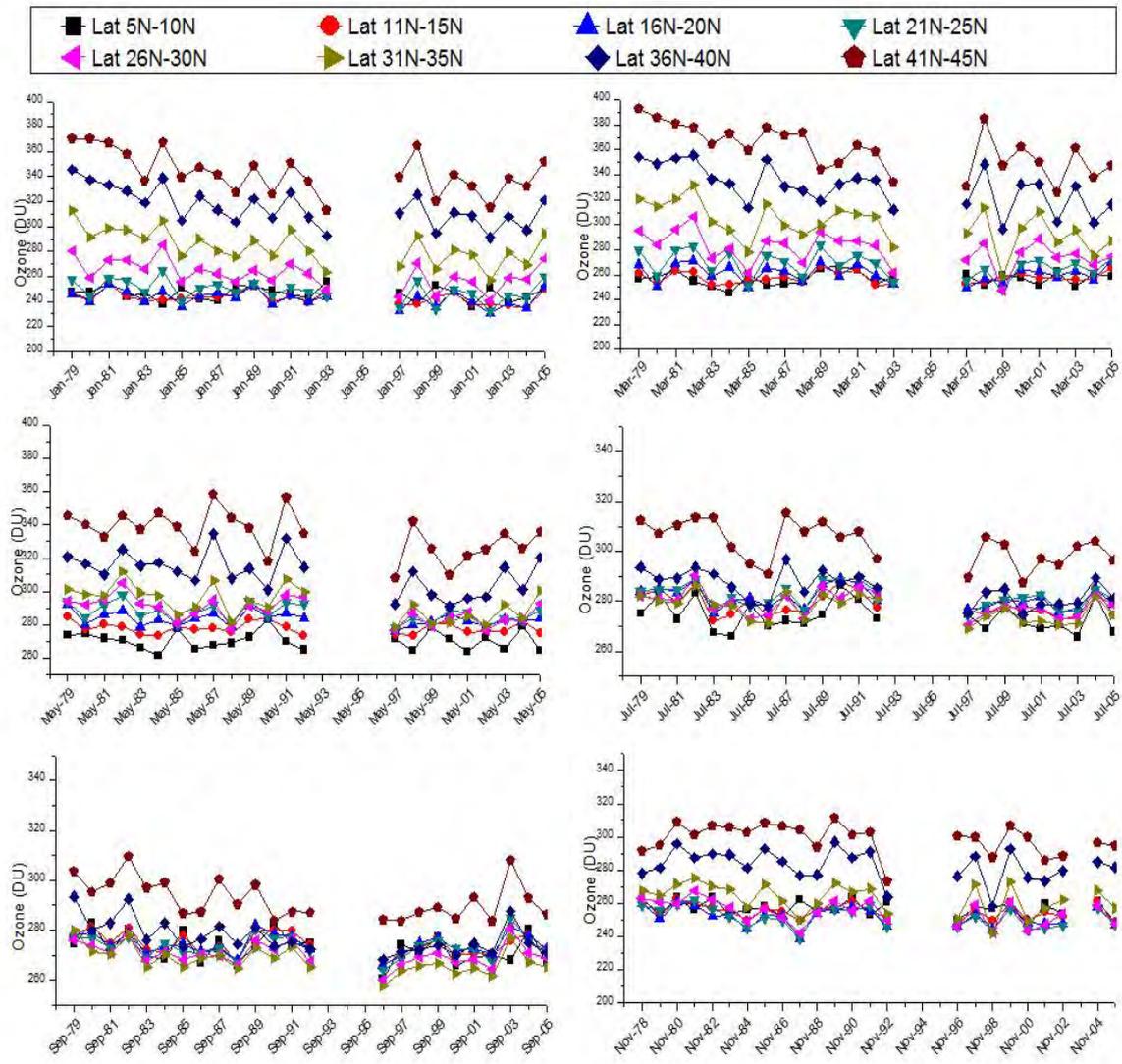
Fig 6:   Monthly averaged variation of erythemal UV flux at local noon for alternate months in the 5 deg latitude bands.

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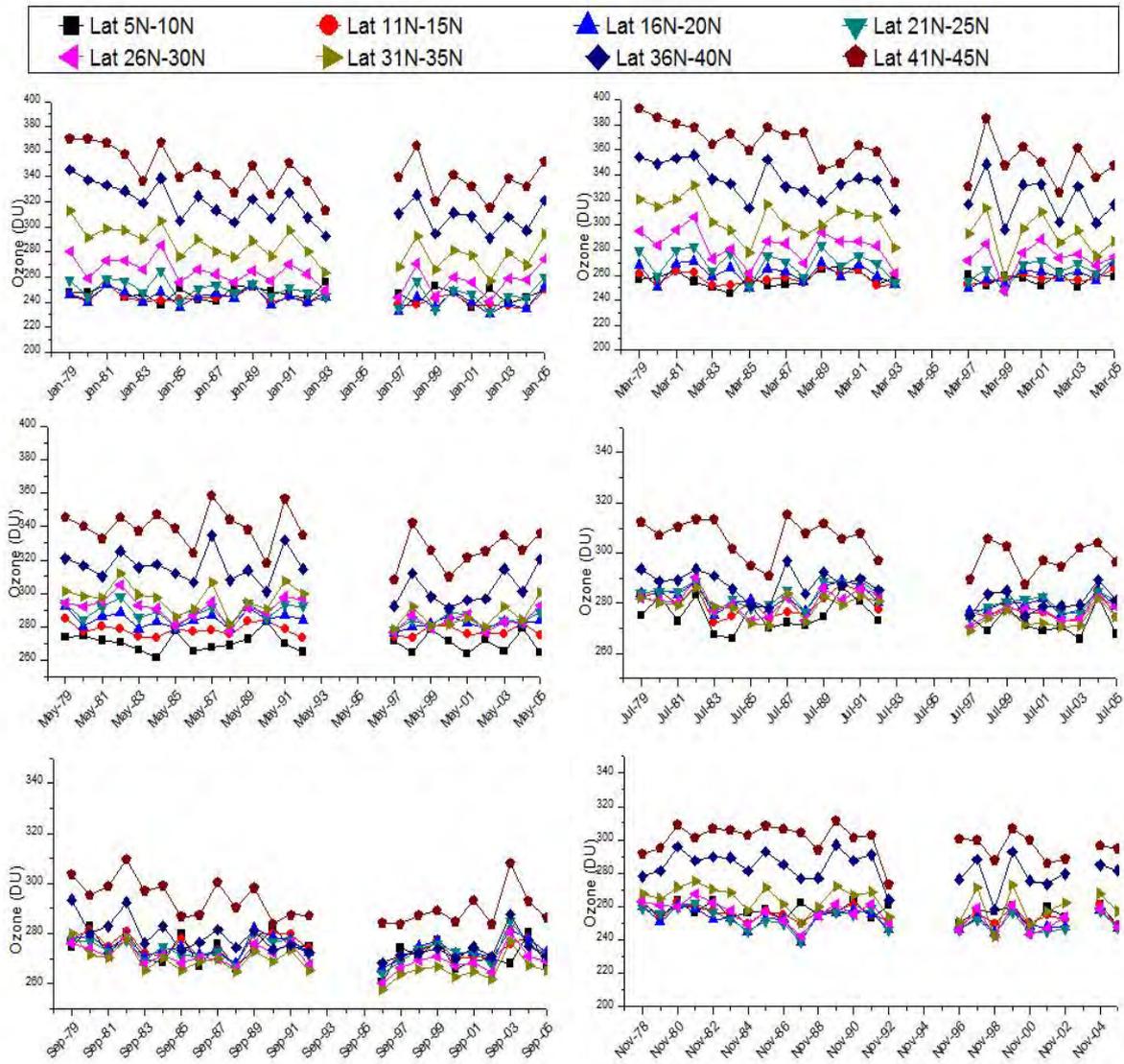
Fig 7: Long term monthly averaged variation of column ozone for alternate months in the 5 deg latitude bands.

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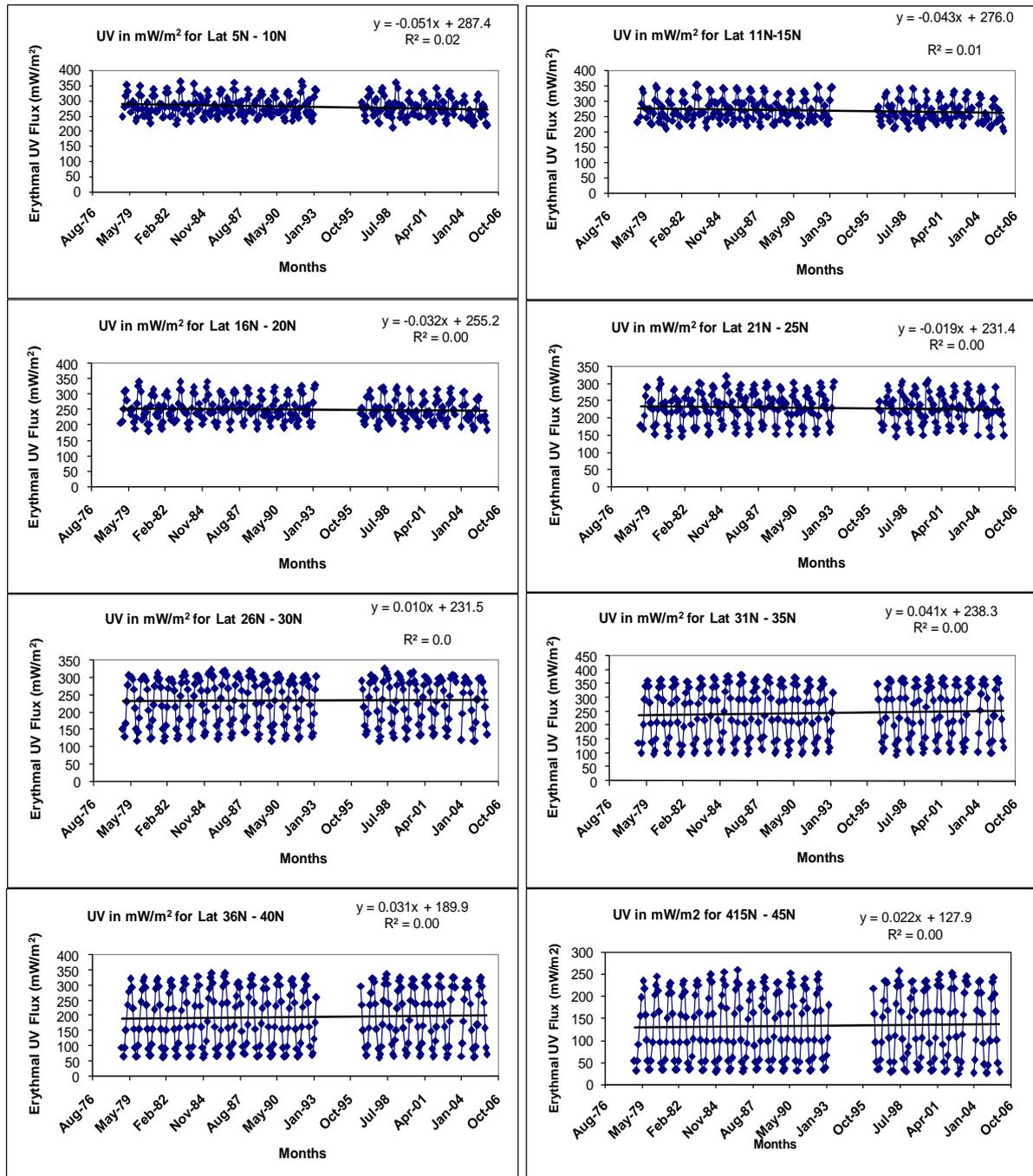
Fig 8: Local noon Erythemal flux in different latitudinal band of 5deg in the Indian region

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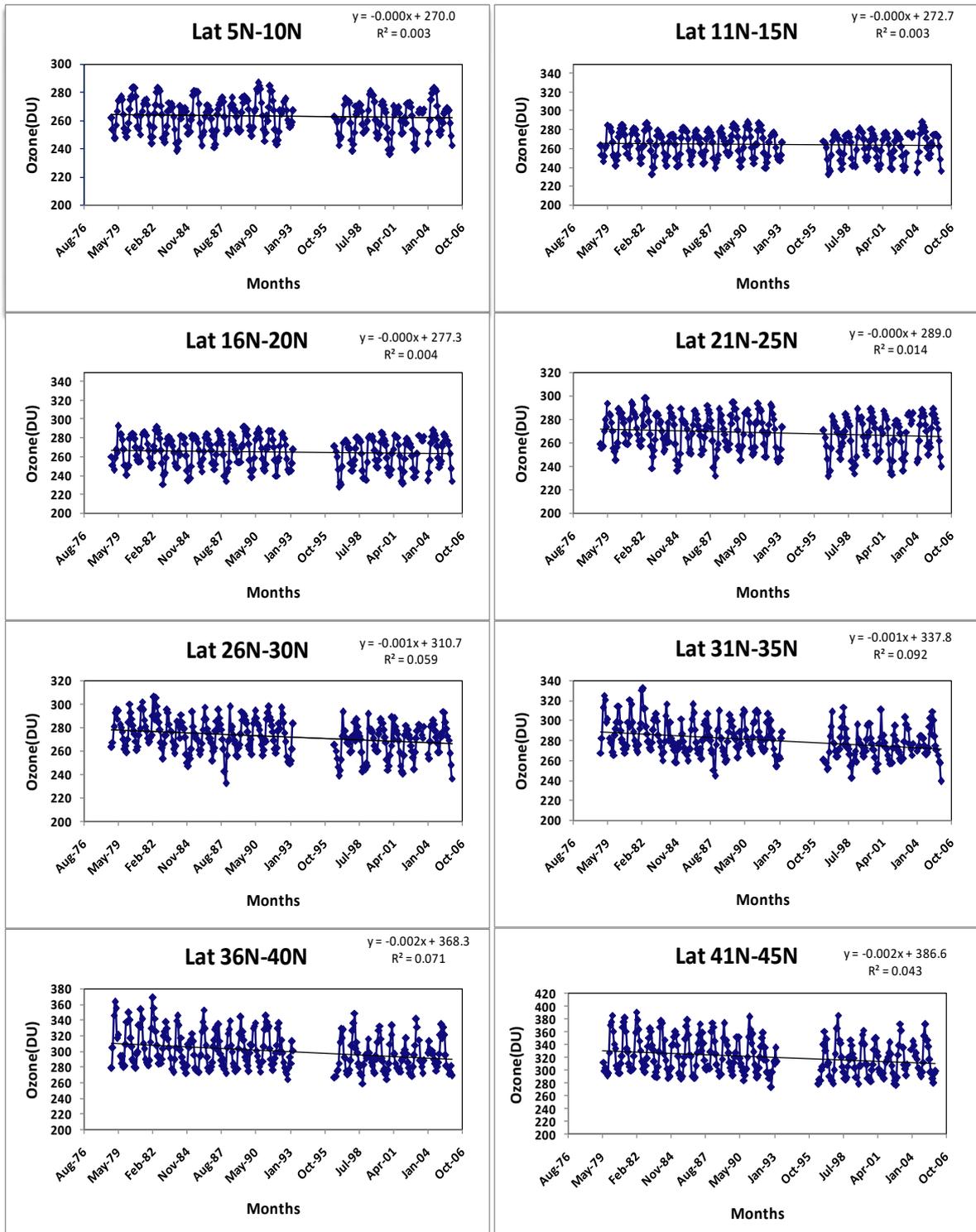
Fig 9: **Column Ozone concentration in different latitudinal band of 5 deg in the Indian region.**

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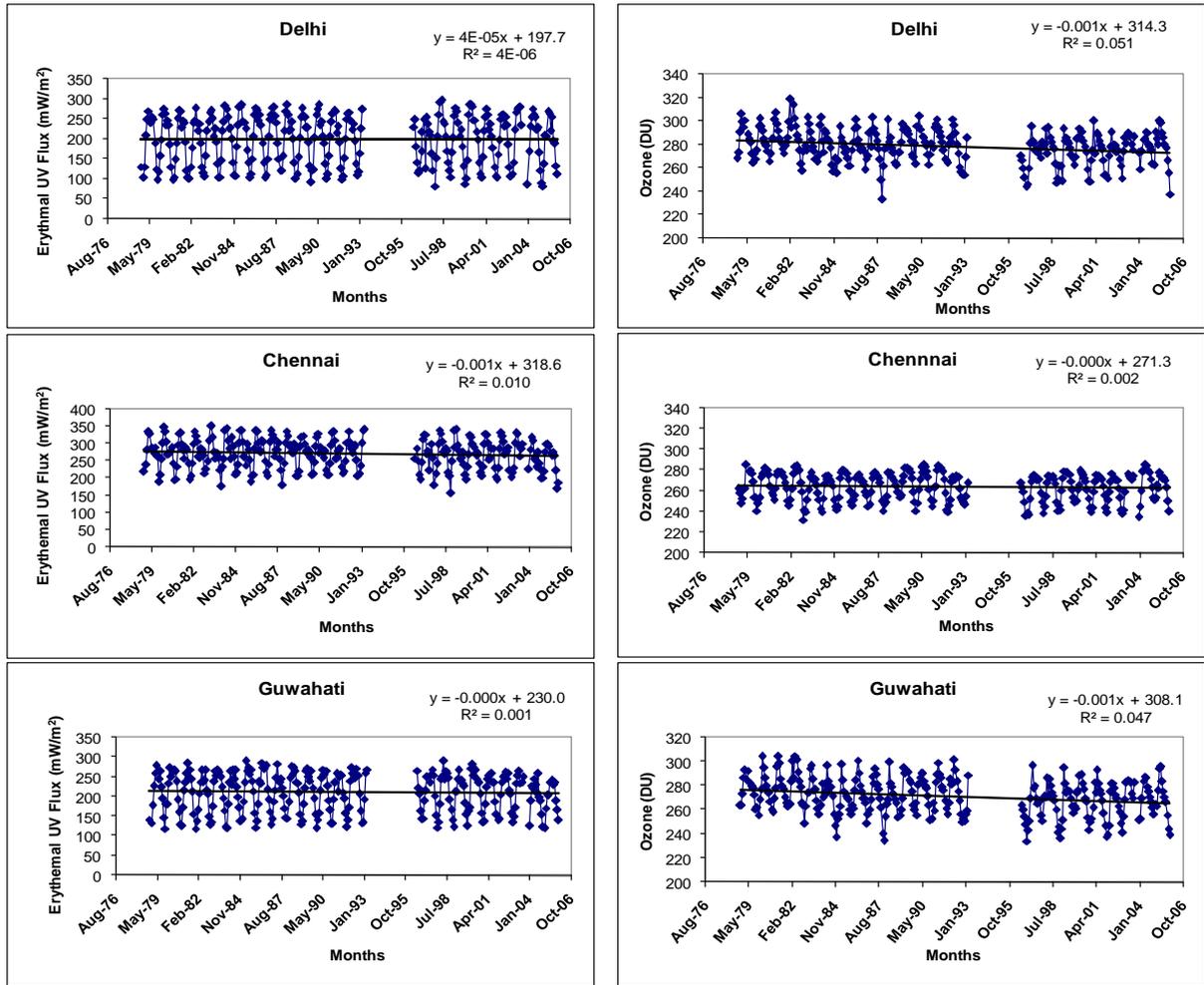
Fig 10: Time series of UV Erythemal flux at local noon and column Ozone concentration over Delhi, Guwahati & Chennai

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In order to see the trends more precisely we first detrended the time series of anomalies in monthly mean of erythemal UV irradiance and column Ozone during the study period at all the three sites, Delhi, Chennai and Guwahati. The time series were deseasonalized by removing the climatological monthly means from the respective monthly means. The detrended time series for both erythemal UV irradiance and column Ozone are shown in Figure 8. The trend analysis of the two time series were done using the software SPSS, a widely used program for statistical analysis. In addition to the bivariate statistics like, mean, t-test, correlation etc, it also gives the prediction or linear regression for the data. The details of the statistical parameters for UV irradiance and ozone at the three stations have been tabulated in Tables 2 and 3. It shows regression coefficient, standard error, level of statistical significance, and results of t-test. Since the p-values for the regression slope are well below any conventional level(<0.01), the regression seems to be statistically significant.

9.3. Surface measurements of UV at all Centers:

The UV erythemal irradiance at the surface did not show any appreciable long term (Nov 1978-Dec 2005) change at the sites selected. The actual UV irradiance measured at the surface of the earth does show a distinctive monthly and seasonal variability. These measurement or values are also affected by various other conditions and also depends upon several other factors such as (i) changes in solar zenith angle, (ii) clouds, (iii) aerosols, and (iv) surface ozone and SO_2 concentrations. This was recognized as an important phenomenon and a strategy was worked out for taking care of such confounders, In view of this measurements at Delhi were made for total UV flux(280-400nm) at surface since April 2010 and separate UVB(280-315nm) and UVA(315-400nm) components since September 2012. At Guwahati the measurements for UVA and UVB started since January 2013 and we had also proposed similar measurements from Prakasam/Visakhapatnam, a coastal site.

9.3.1. Surface measurements of UV at Delhi:

The measurements at Delhi show considerable variation in total UV flux during different seasons in addition to its day to day variability(shown in Figure10) which depends largely upon solar zenith angle, clouds and aerosols. During the period(July 2009 to February 2013), the daily average values ranges from ~0.1Wm^{-2}(Nov 26, 2010) to as high as

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~20Wm^{-2}(July 16, 2009). A weak decreasing trend is also discernible from the figure. This might be associated with increasing trend in the pollutants. The monthly average variation during the same period is shown in figure 11, which shows minimum UV during December, gradually increasing to peak during July. The average monthly UV flux varies in the range 4Wm^{-2} to 11Wm^{-2}. A typical diurnal variation of UV flux is shown in figure 12 which shows peak values during noon time. Diurnally, the flux show a Gaussian variations with peaks at around local noon (~50Wm^{-2} in June and <20Wm^{-2} in December). In order to see the complete picture of the variation of UV flux over Delhi, a contour showing UV flux during the entire period of observation is shown in figure 13.
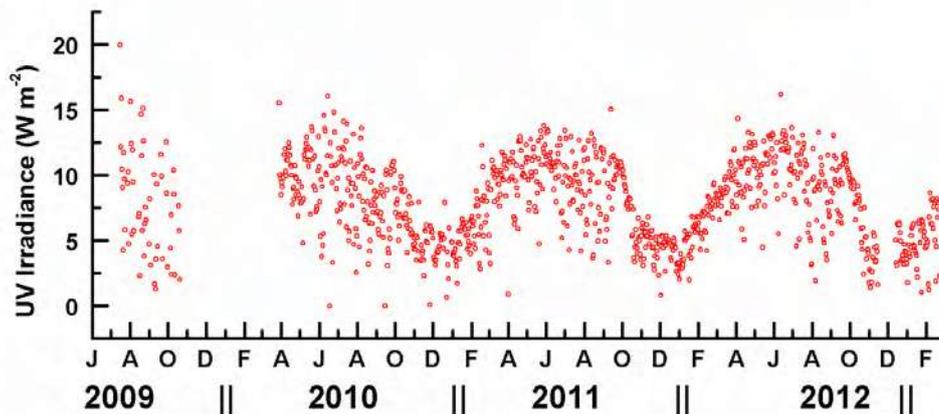
Fig 11: Figure 10: Daily averaged total UV (280 - 400 nm) flux at Delhi during Aug 2009 to Feb 2013.
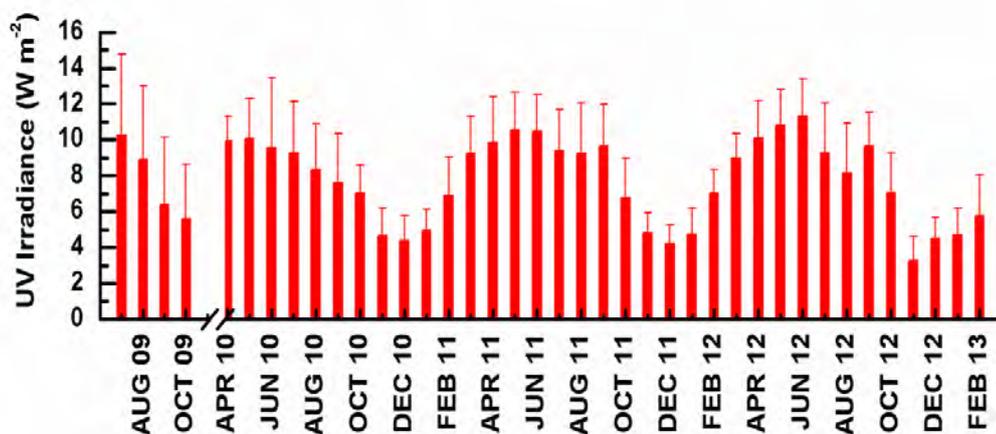
Fig 12: Monthly averaged total UV (280 - 400 nm) flux at Delhi during Aug 2009 to Feb 2013.

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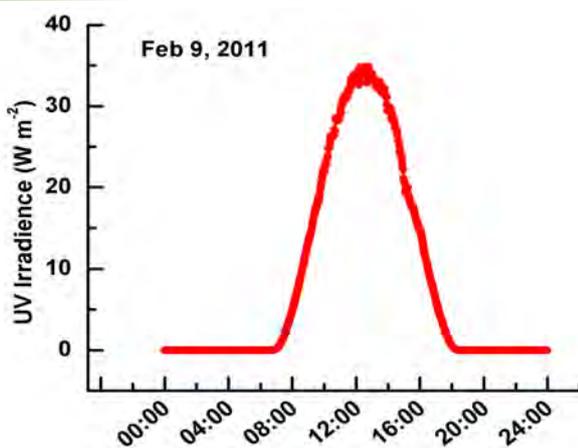
Fig 13: A typical diurnal variation of total UV flux on 9th Feb 2011 at Delhi
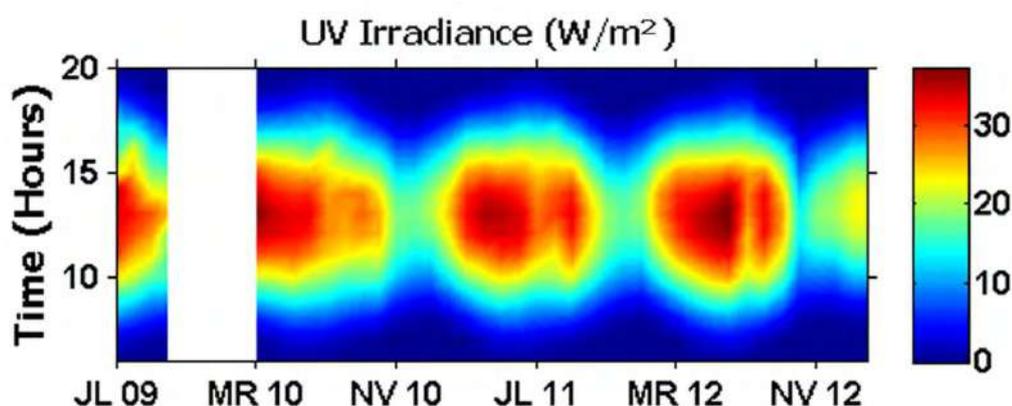
Fig 14:   Contour showing total UV flux during the entire period of observation (Aug 2009-Feb2013) at Delhi

As the sensitivity to eyes are different for UVA and UVB radiation, the actual measurements of UVB(280-315nm) and UVA(413-400nm) was also started since September 2012 onwards. A typical UVB and UVA spectrum during the entire day is shown in Figure14. It is interesting to note that on an average UVA constitutes about 98.0% of the total UV radiation measured at surface at Delhi. Altough, the percentage contribution of UVB increases gradually as day progresses and peaks around noon time (Figure14).

The UVA and UVB measurements at Delhi showed considerable variation in total UVA and UVB flux during different seasons in addition to its day to day variability which depends largely upon solar zenith angle, clouds, aerosols and trace gases (Please see figure 15 below). During the period (Sept 2012 to July 2014), the daily average values of UVA ranges from ~1.54 Wm^{-2}(Dec 21, 2013) to ~19.4Wm^{-2}(May 24, 2014), whereas the

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UVB varies from ~0.03Wm^{-2}(Nov 05, 2013) to ~0.53 Wm^{-2}(July 13, 2013). It clearly shows a strong monthly variation but no long term trend can be inferred from this data.
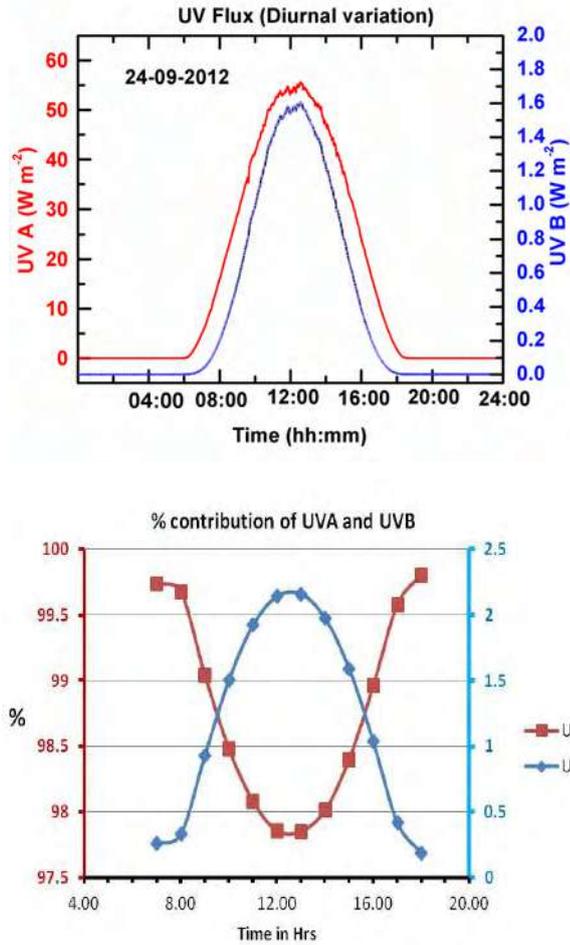
Fig 15: At Delhi (a) A typical UVB and UVA spectrum during the entire day and (b) the percentage contribution of UVA and UVB in total UV.
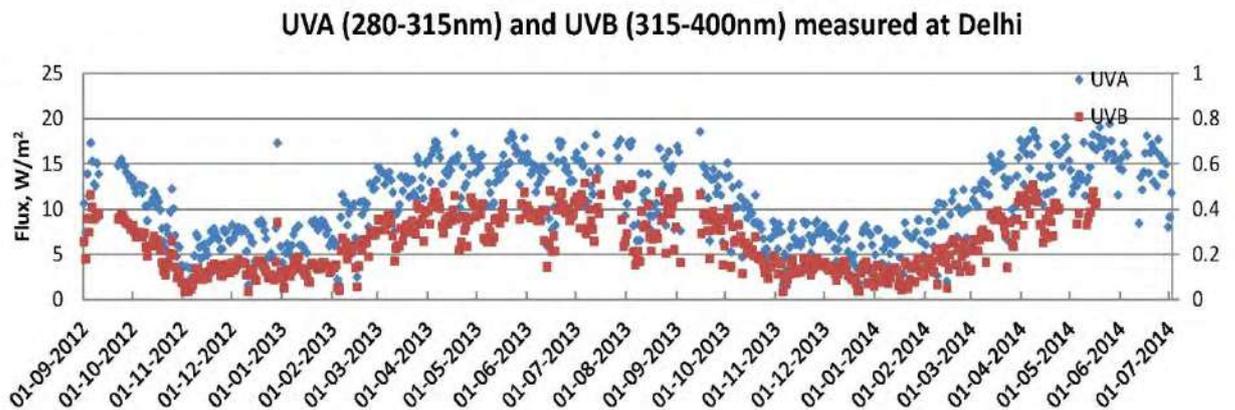
Fig 16: Daily averaged total UVA (280 - 315 nm) and UVB (315-400nm) flux at Delhi.

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The monthly mean short-wave and the UVA and UVB flux are shown in figure 16. It shows a maximum during June-July and a minimum during Nov-Dec. However, no appreciable long-trend in flux is can be noticed during the observation period, particularly in total UV, UVA or UVB.
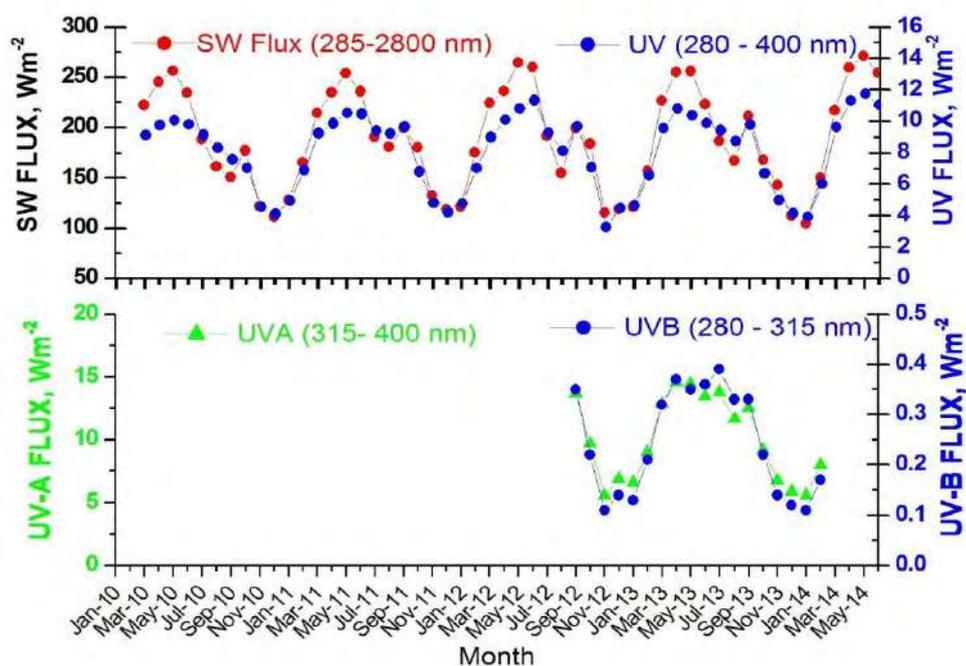
Fig 17: Monthly mean short-wave, total UV and the UVA and UVB flux at Delhi.

9.3.2. Surface measurements of UV at Guwahati:

The UVA and UVB instruments were installed at Regional Meteorological Center, Guwahati to take the continuous regular measurements at Guwahati. The data are downloaded at Delhi directly. The contour plot of all the data till March 04, 2013 is shown in figure 17. A comparison of UVB and UVA flux at Delhi and Guwahati during the same period is also shown in Figure 18. The day to day variation of UVA and UVB fluxes at Guwahati shows more or less same values of that of Delhi. During the period January 5– February 28, the highest values of UVA(UVB) observed at Guwahati is 11.9 (~0.3, on Feb 26) Wm^{-2} and the lowest is 1.8(0.04, Feb 17) Wm^{-2}. The diurnal amplitudes of UVA (UVB) at Guwahati vary from 46(1.4) to 15(0.4)Wm^{-2} depending on the local weather conditions. The percentage contribution of UVA is varying from 97.5 to 98.0 %.

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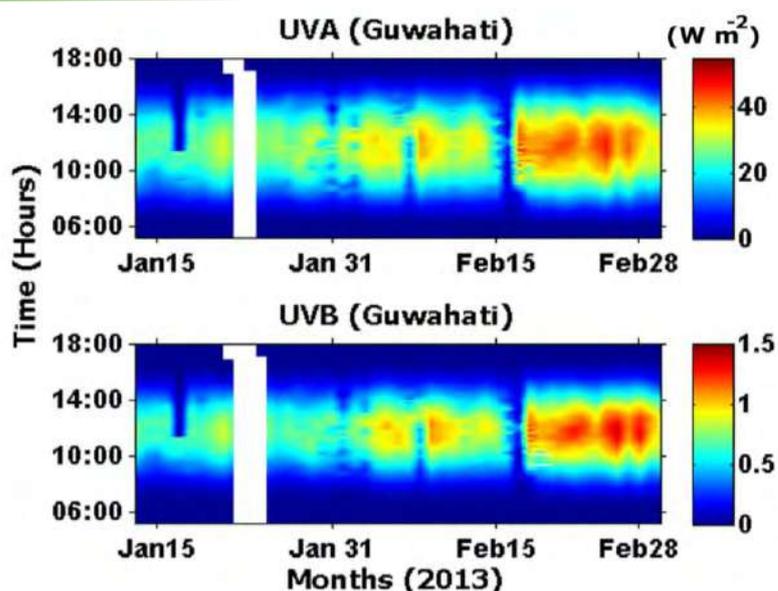
Fig 18: The contour plot of UVB and UVA measured at Guwahati during Jan 5, 2013 to March 04, 2013
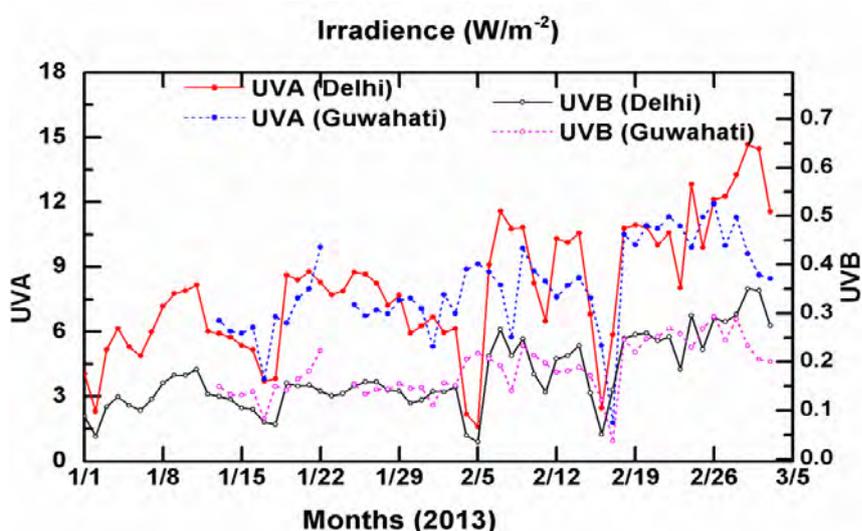
Fig 19: A comparison of UVB and UVA flux at Delhi and Guwahati during Jan-Mar 2013.

Although UVB and UVA fluxes at Delhi and Guwahati broadly show similar variation but a closer look reveal that significant changes in UV flux on day to day basis exists between Delhi and Guwahati, which may be attributed to the changes in local parameters. Depending upon these parameters the percentage contribution of UVB in the total flux (UVA+UVB) also changes at the two stations (Figure 19).

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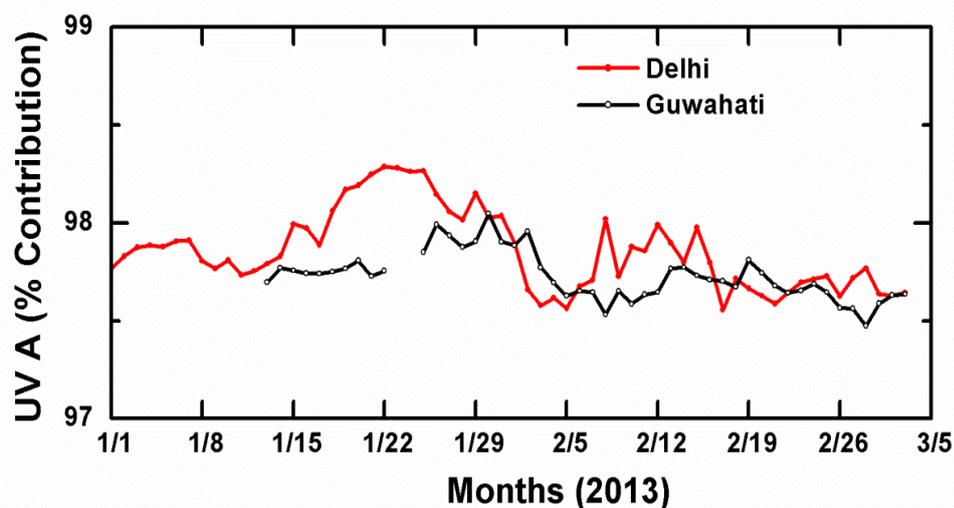
Fig 20: Percentage of UVA (385-400nm) in the total UV (280-400nm) at Delhi and Guwahati.

9.3.3. Surface measurements of UV and Global SW flux from the coastal sites:

An effort was made to put the UVA and UVB instruments at a coastal site Vishakhapatnam which could not be achieved due to the technical problems. However, the shortwave global and UVA and UVB data from the India Meteorological Department (IMD), which have recently started UVA and UVB measurements from several stations was obtained. The data available during January 2011 to December 2014 was recorded from three coastal stations (i) Vishakhapatnam (ii) Chennai and (iii) Goa. The details are described below:

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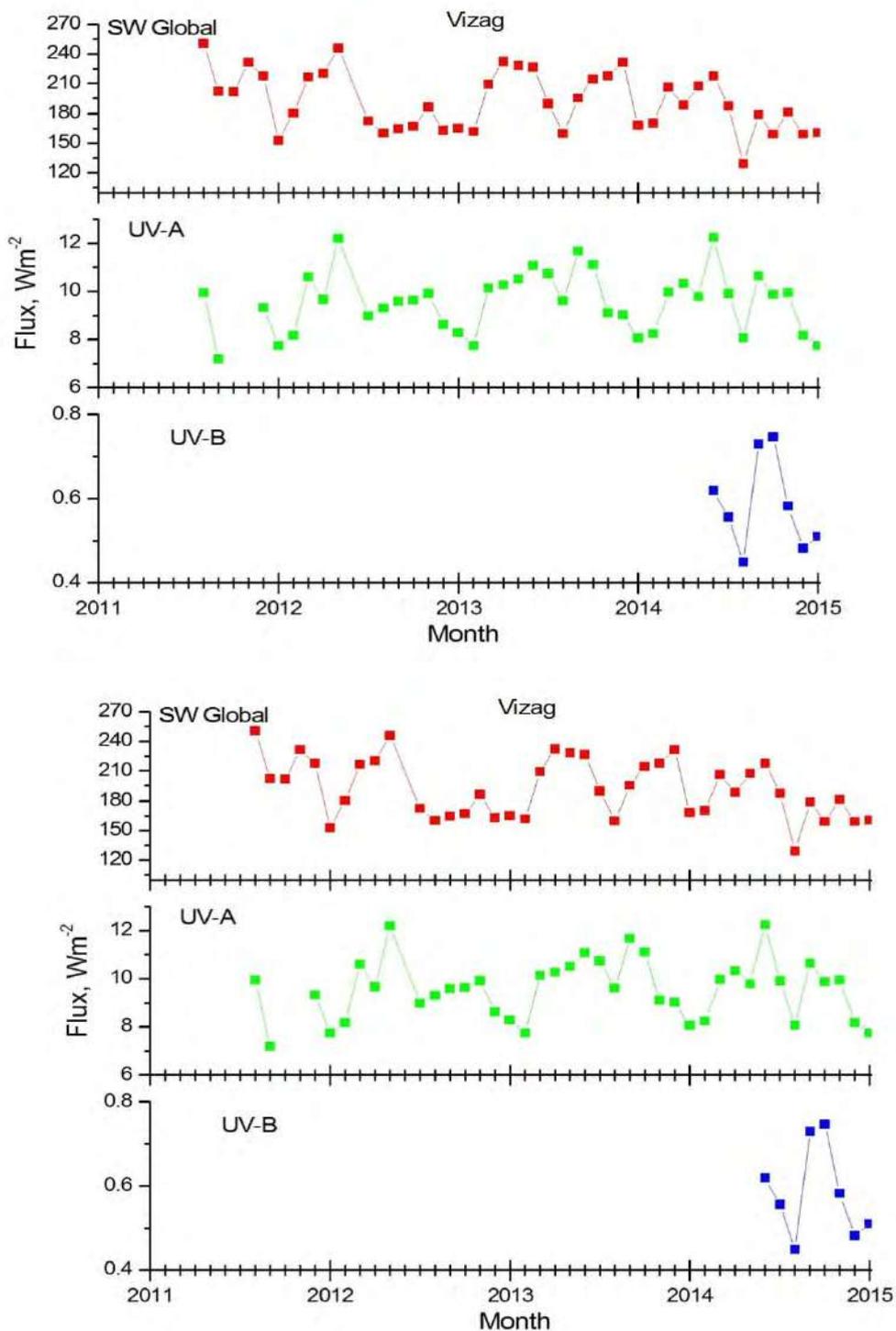
Fig 21: Global shortwave UVA and UVB flux at Vishakhapatnam during 2011-2014.

At Vishakhapatnam, the data of SW global and UVA could be obtained during July 2011 to Dec 2014. The average monthly values are plotted in figure 20. The monthly average SW global flux varied in the range 130-251Wm^{-2} with an average of 192Wm^{-2} during this period. Similarly, the monthly average UVA flux varied in the range 7.2-12.2Wm^{-2} with

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an average monthly value of 9.6 Wm^{-2} during this period. The UVB observations were only during March 2014- Dec 2014 during which the monthly average value varied in the range 0.45-0.75 Wm^{-2} with an average of 0.58Wm^{-2}. Although a small decreasing trend in SW global flux can be inferred from the data no appreciable trend in UV can be seen. The daily average value of AOD was also obtained during this period and has AOD at 500nm been plotted in Figure21. It is interesting to note that the AOD values are also showing slight decreasing trend. Further analysis is required to interpret the SW and UVA flux trend at this station.
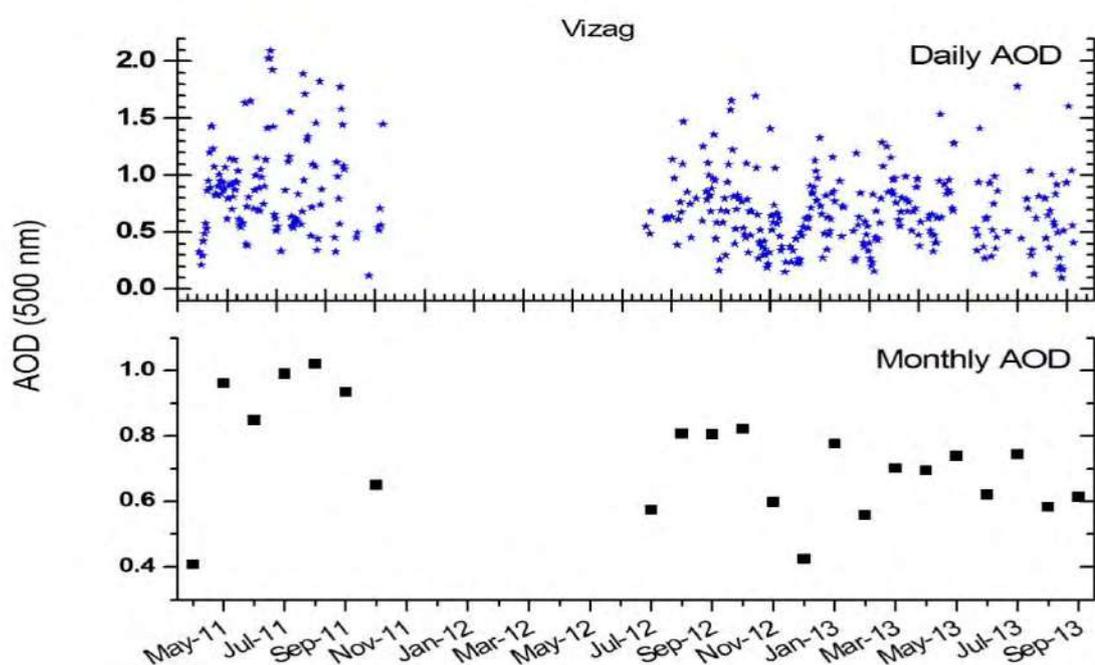
Fig 22:   Aerosol optical depth at 500nm at Vishakhapatnam during 2011-2013.

At another coastal site Goa, the data of SW global and UVA could be obtained during August 2011 to Sept 2014. The average monthly values are plotted in figure22. The monthly average SW global flux varied in the range 139-324Wm^{-2} with an average of 210Wm^{-2} during this period. Similarly, the monthly average UVA flux varied in the range 6.6-17.4Wm^{-2} with an average monthly value of 10.9Wm^{-2} during this period. The UVB observations were only during May 2013-Sept 2014 during which the monthly average value varied in the range 0.16-0.36 Wm^{-2} with an average of 0.29 Wm^{-2}.

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At a third coastal site Chennai, the data of SW global and UVA could be obtained during March 2011 to Dec 2014. The average monthly values are plotted in figure23. The monthly average SW global flux varied in the range 119-270Wm^{-2} with an average of 204Wm^{-2} during this period. Similarly, the monthly average UVA flux varied in the range 6.6-12.8Wm^{-2} with an average monthly value of 10.1Wm^{-2} during this period. The UVB observations were only during Sept 2013- Dec2014 during which the monthly average value varied in the range 0.19-0.42 Wm^{-2} with an average of 0.34 Wm^{-2}.

Fig 23: Global shortwave UVA and UVB flux at Chennai during 2011-2014.

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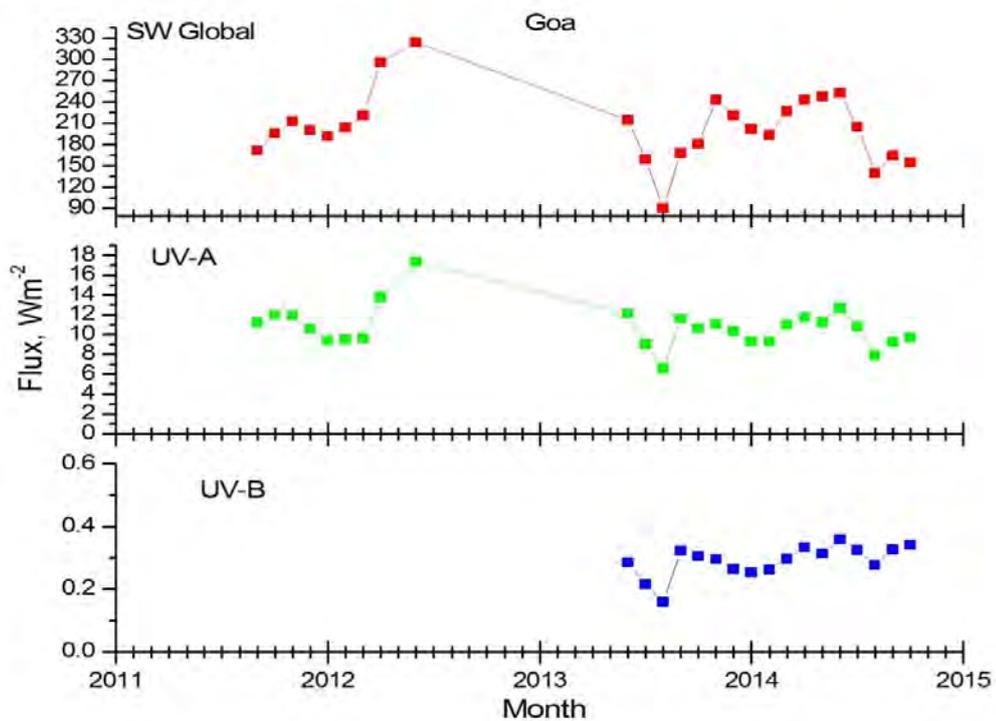
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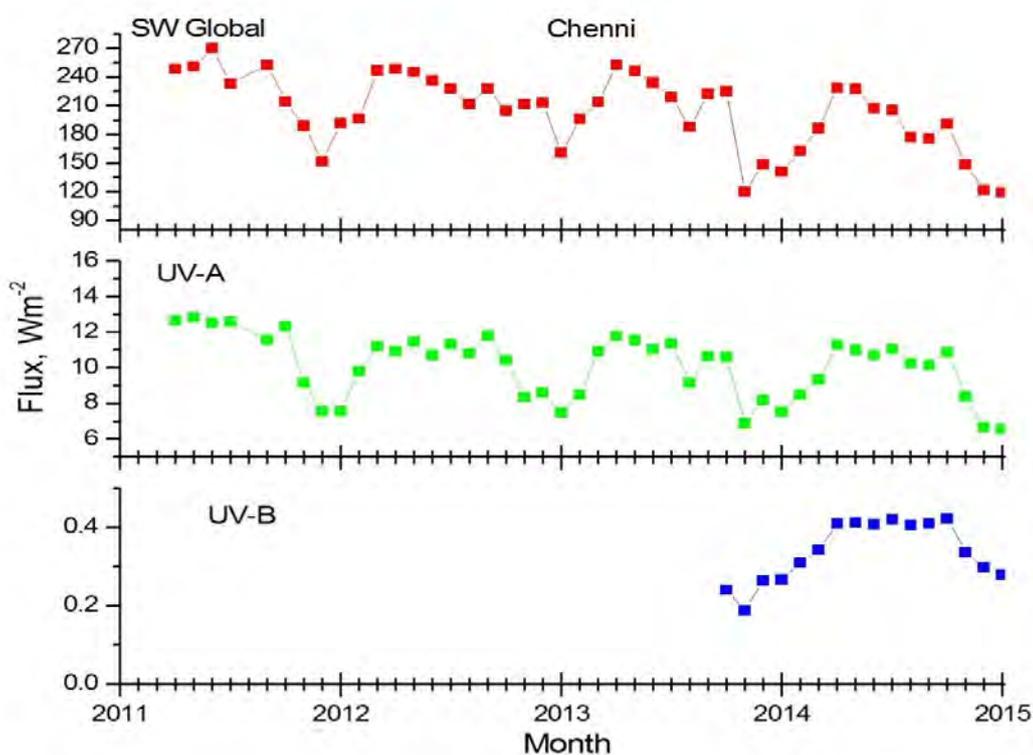
Fig 24: Global shortwave UVA and UVB flux at Chennai during 2011-2014.

9.3.4. Simulation of Effects of aerosol parameters on UV Flux using model (at Delhi)

In order to simulate the effects of aerosol parameters like aerosol optical depth(AOD) on UV flux, tuning of the model as per the observation of total UV flux was done The Tropospheric Ultraviolet Visible model(TUV) was used to obtain the UV flux in the region 280-400nm and compared with the observed flux. One such comparison on the clear-sky day (9th Feb 2011) can be seen in figure 24, where the two irradiances were plotted every hour.

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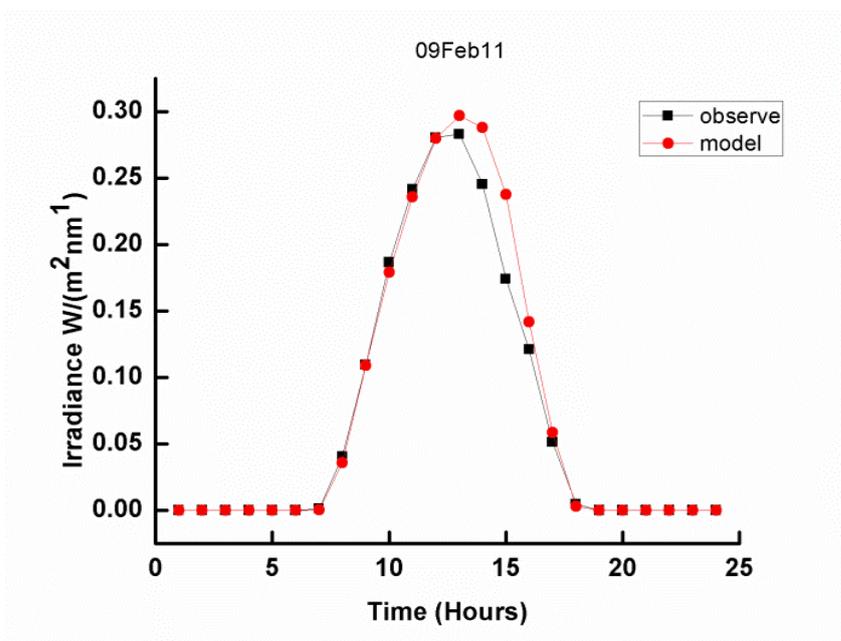
Fig 25: A comparison of total UV flux derived from TUV model and observation

Once the model derived UV flux is synchronized with the observed flux, the model is run with varying the AOD in small increment keeping all other parameters constant. Thus for unit increase in AOD at 500nm the UV flux (280-400nm) decreases by $0.16Wm^{-2}$ (Figure25.1). Similarly the change in single scattering albedo(SSA) which is the ratio of scattering to extinction coefficient of the aerosol and depends upon the chemical composition of aerosols etc, also shows change in UV flux but in opposite direction. For every 0.1 increase in SSA the UV flux increases by $0.02\ Wm^{-2}$ as shown in Figure 25.1. These are however preliminary results and further study is needed in this direction.

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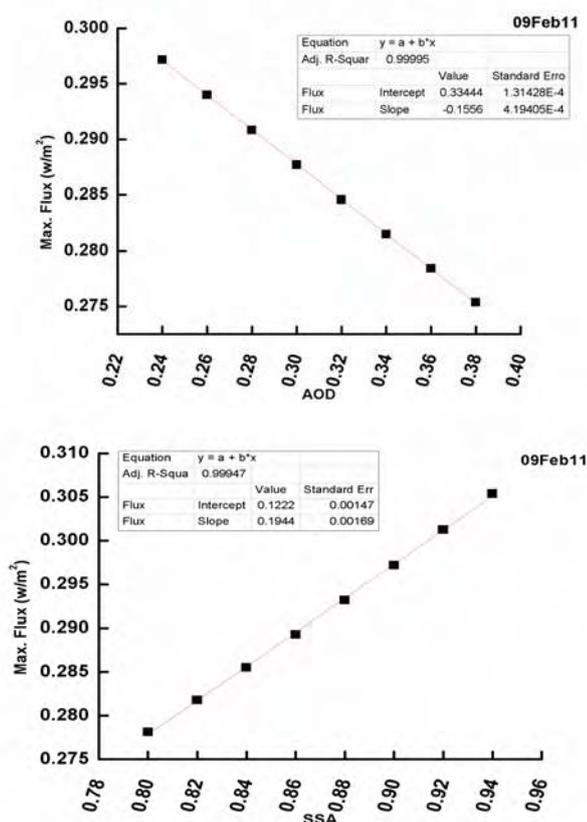
Fig 25.1. A comparison of total UV flux derived from TUV model and observation

9.4. Observed effects of Atmospheric aerosols on UV and SW global radiation flux (at Delhi)

The major atmospheric constituents influencing surface solar radiation variability include cloudiness, aerosols and ozone (Wang et al., 1999; Calb´o et al., 2005, Xia et al., 2008) and it was affirmed that the main UV day to day variability was induced by cloudiness and aerosols but not by ozone (Papayannis et al., 1998). In order to see the effects of aerosols on the shortwave global radiation flux G (in the range 285-2800nm) and on the global UV flux (280-400nm) the data of global UV flux GUV, G and AOD have been used for a year during April 2010 to March 2011 at Delhi. The fluxes are plotted in figure 26 below.

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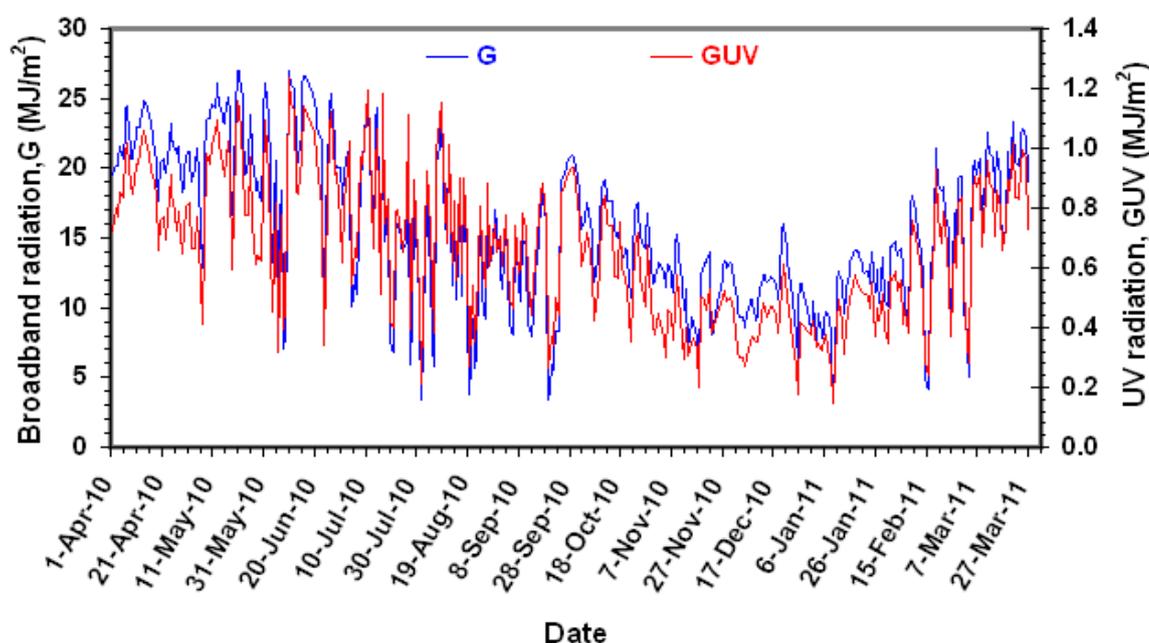
Fig 26: Annual pattern of daily-averaged day time (0700 to 1900hr) G and GUV at Delhi during 1st April 2010 to 31st March 2011.

Hourly values of radiation were derived by integrating the data every hour. The annual pattern of daily G and GUV radiation fluxes generally show similar pattern throughout the observation. The day-time daily-averaged GUV flux varied between 0.15 and 1.23MJm^{-2} with an average annual value of 0.67 ± 0.24MJm^{-2}. Similarly, the daily averaged G varied in the range 3.36 to 27.02 MJm^{-2} with an average annual value 15.81±5.47MJm^{-2}. Daily G and GUV radiation shows that the maximum values were observed during summer months for both, and are generally low during winters. However, the GUV flux shows an increase during monsoon but the broadband flux shows a relative decrease in its value. The increase in GUV flux and the corresponding decrease in global G flux during monsoon season may be due to the increased atmospheric water vapour level during this period of high RH. RH can abate the long wavelengths radiation remarkably well through absorption process, leaving the spectral UV portion unaltered. As a result, UV fraction, the percentage ratio of solar global UV to total solar global radiation (UV fraction), increased as RH increases. Annual average of UV fraction for the entire observation period is 4.23%. In monsoon period, the range of UV fraction is ~4.45 to 7.27% suggesting very high value of UV reaching the earth surface during that period.

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In order to see complete feature of hourly fraction of UV radiation during the whole year the radiometric ratio of GUV to broadband global radiation, denoted as FUV, has been plotted as contour plot in figure27. Where FUV = GUV/G, expressed as a percentage. The day 1 in the x-axis corresponds to 1 April 2010. It can be noticed clearly that during the monsoon period, the FUV values are quite high compared to all other months because as discussed earlier, the water vapour(represented by RH) can abate the long-wave radiation extremely well through absorption processes, thereby leaving the UV spectral portion and the short-wave spectral radiation unchanged. An increase in water vapour therefore, leads to the larger value fraction of UV radiation(FUV). The range of FUV at Delhi may be compared with several previously reported FUV values worldwide, for example, Al-Aruri et al. (1998) reported FUV in the range from 4.2%(December) to 5.2% (August) in Kuwait, Elhadidy et al.(1990) reported range of 2.1–4.5% in Dhahran, Hu et al.(2007) showed FUV varied between 3.0 and 5.0% in different parts of China.
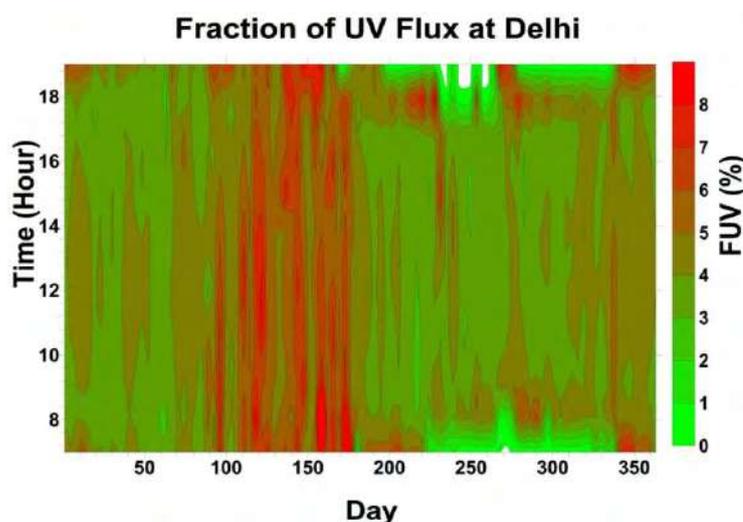
Fig 27: Contour plot of FUV during 1st April 2010 to March 2011 at Delhi

The monthly average hourly broadband global and solar global UV radiation data for the entire year and are shown in figure 28. The diurnal variations for the G and GUV to some extent are similar except for the few months, especially monsoon season months. The diurnal G and GUV variations are characterized by the one afternoon peak occurring at approximately 1300hrs. and have a typical typical bell shape. The timings of sunrise and sunset times varied from day to day on annual basis showing some shift in the peak values.

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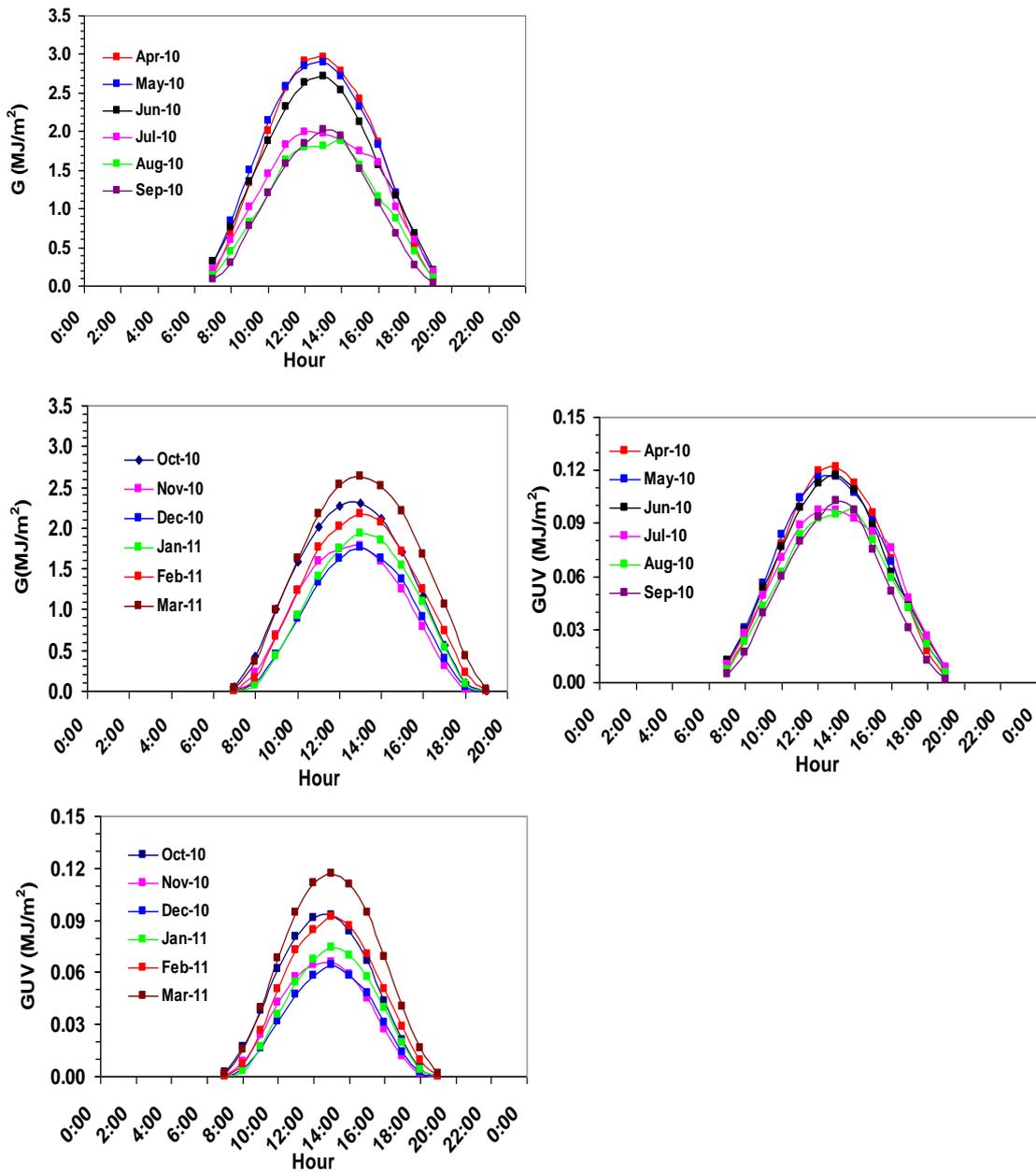
Fig 28: Diurnal variation of monthly means of broadband global radiation flux (G) and global UV radiation flux (GUV), during April 2010 to March 2011 at Delhi.

In Figure29a, FUV has been plotted for the four representative months of the season (May-summer, August-monsoon, December-winter and March-spring seasons). It is interesting to notice that the FUV for all the months shown are nearly similar(in the range 3.2–4.3%) except for the monsoon month of August when it is significantly high (5.5%). This enhancement may be due to increased humidity-induced absorption at longer wavelengths, leading finally to higher GUV to G ratios. Hourly integrated daily-averaged

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GUV and G has also been plotted for the typical months representing the four seasons in Figure 29.
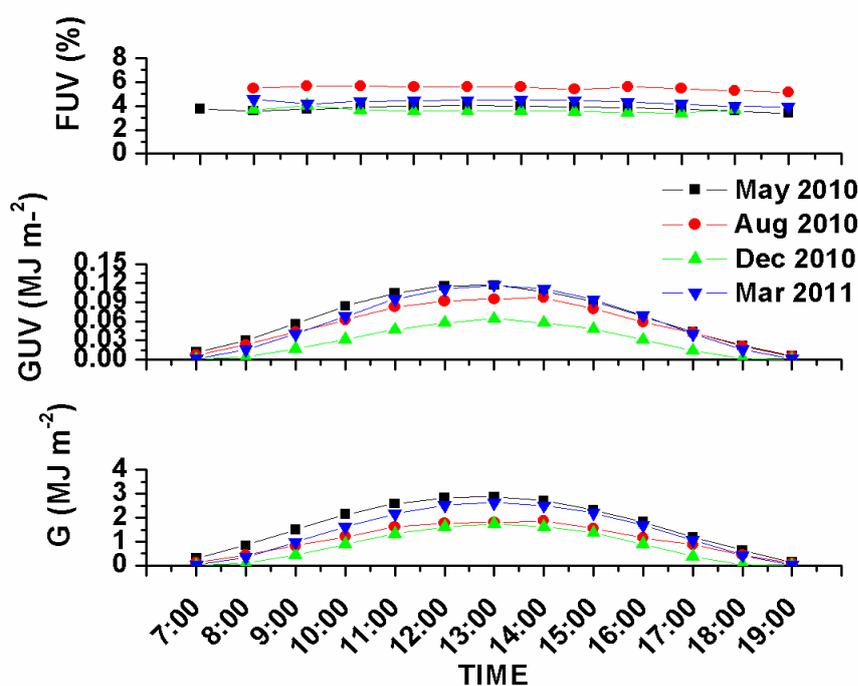
Fig 29: Monthly averaged SW global, G (bottom), global UV, GUV (middle) and UV fraction, FUV for four representative seasons at Delhi during 2010-2011.

The monthly averaged, hourly GUV is found to be maximum in the dry summer month of May with a peak value of 0.12MJm^{-2} (average 0.07MJm^{-2}) and minimum in the winter month of December with a peak value 0.064MJm^{-2} (average 0.029MJm^{-2}). Similarly, the value for the global broadband radiation, G, is also maximum during May at a peak value of 2.89MJm^{-2} (average 1.67MJm^{-2}) and minimum during December with maximum value 1.76MJm^{-2} (average 0.80MJm^{-2}). It can be noticed that the reduction in the peak value of GUV radiation from summer (May) to monsoon (August) is about 55.0% whereas the reduction in the corresponding peak value of G is more than 60.0%. This additional decrease in G is likely due to the increased absorption due to water vapour and clouds, particularly in the near infrared region, which is comparatively less absorbing in the UV range(Martinez-Lozano et al., 1994; Jacovides et al., 2006). This is the reason why FUV has a high value during the monsoon month of August. It can be more clearly visible when we plot FUV with relative humidity as shown in figure 30 below.

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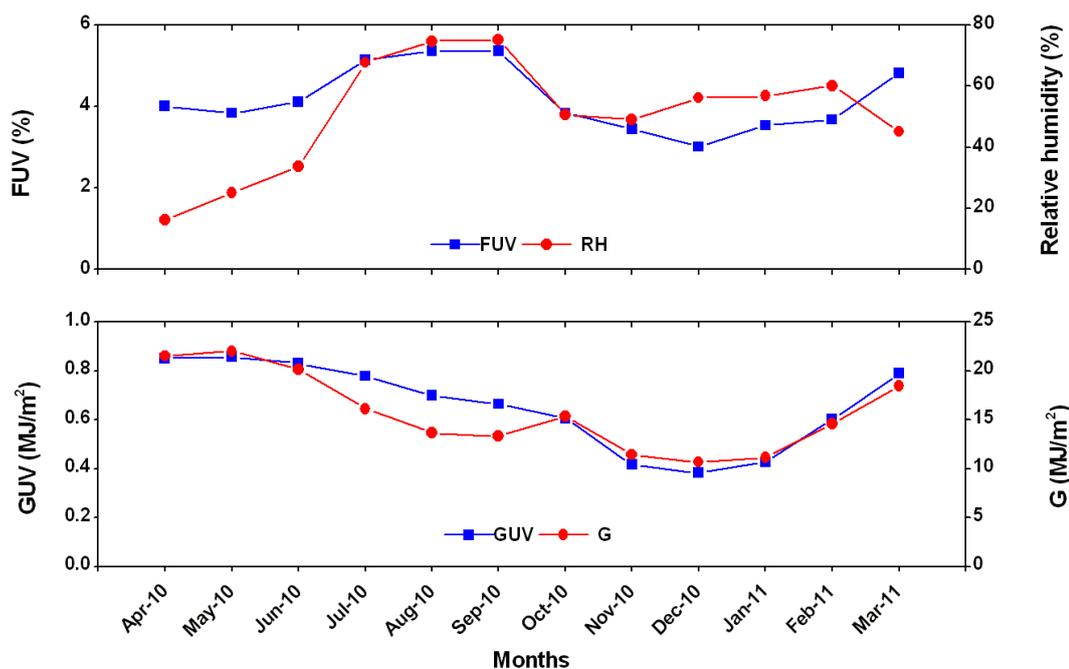
Fig 30: **Comparative monthly average of daily FUV and RH (top) and global ultraviolet radiation (GUV) and broadband global radiation (G) (bottom) over Delhi**

Finally, the effects of aerosols have also been observed on the UV and shortwave flux and also on the FUV. The aerosols are known to attenuate the solar radiation through scattering and absorption. The scattering efficiency of aerosols depends upon the size distribution or the real part of the refractive index whereas the absorption efficiency depends upon the imaginary part of the refractive index. The finer particles have greater extinction effect on shorter wavelength as compared to the longer ones. In order to study the effects of aerosols we need to measure the column AOD in the atmosphere. AOD is a measure of the total extinction (scattering + absorption) of solar radiation in the atmosphere. By measuring AOD at different wavelengths we can parameterize the effective size of the aerosols in the atmosphere. The relation between the AOD and the wavelength can be best described by Angstrom formula $\tau(\lambda) = \beta\lambda^{-\alpha}$ where τ is the AOD, λ is the wavelength in μm (Angstrom, 1964), α, called the Angstrom exponent, and β, is the Angstrom turbidity coefficient. α is a rough indicator of the size distribution of the aerosols particles in the column while β represents the aerosol loading in the atmosphere, which is also the AOD at $\lambda = 1\mu$m. In this case, AOD measurements were done at 340, 500, 675, 870 and 1020nm using MICROTOPS-II sunphotometer during clear sky conditions. In order to see the effect of AOD on UV fraction(FUV) we have plotted the daily FUV variation with respect to the corresponding daily average AOD at 340nm as

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well as at AOD 500nm in Figure 31(a) and (b) respectively. The regression analysis between FUV and the AOD at 340nm and 500nm has been performed. This shows the direct effect of aerosol on the FUV measurements at Delhi. For every unit increase in AOD at 340nm, the FUV decreases by 0.53%. A negative linear correlation between FUV and the AOD at 500nm of the order of −0.51 can be noticed. For every unit increase in AOD at 500nm the average FUV is found to decrease by ~0.7%.
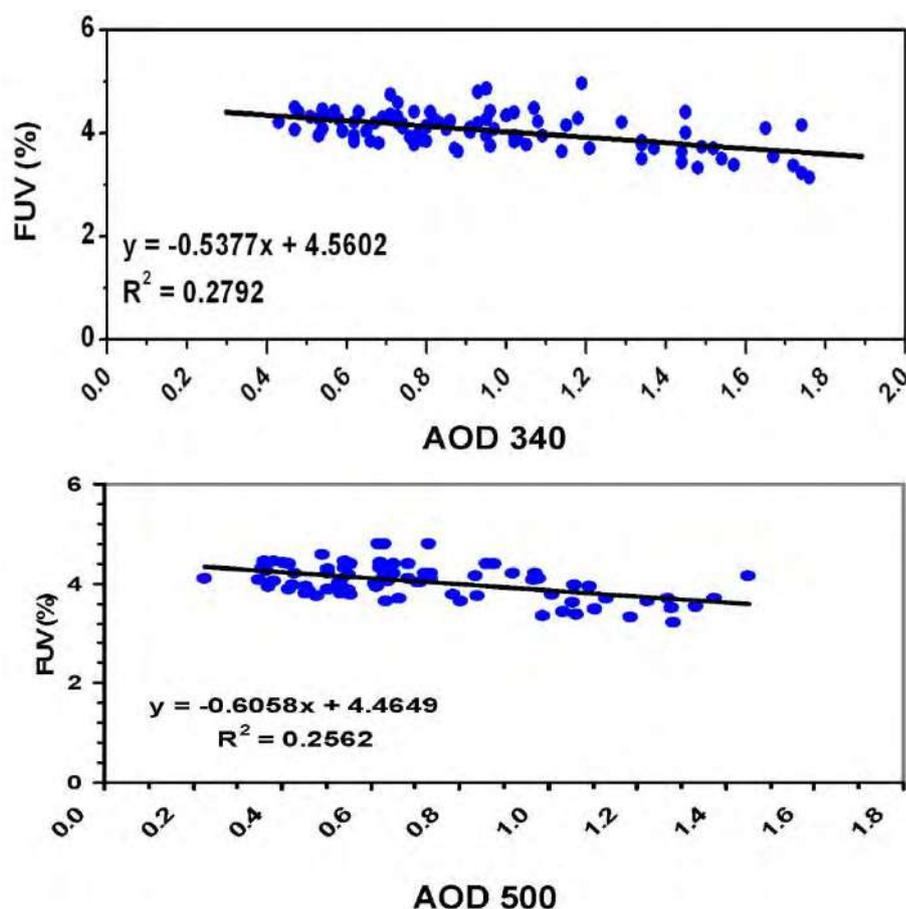
Fig 31: Impact of AOD on FUV at Delhi during 2010-11.

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9.5. Methodology for Objective-II followed at all 3 centres (RP centre AIIMS, RIO Guwahati, IIPH, Hyderabad)

Experimental setup

It was an extensive community based epidemiological survey done in 35 clusters of Delhi, conducted by Dr Rajendra Prasad Centre for ophthalmic sciences, AIIMS. Participants from heterogeneous communities were interviewed for their demographic details, risk factors (sun exposure, cooking fuel type, Use of protective head gear) for ocular diseases and underwent detailed ocular examination.

In Guwahati, it was conducted in 32 clusters by Regional Eye Institute Guwahati. Participants from heterogeneous communities were interviewed in detail for their demographic details, risk factors for eye diseases and underwent ocular examination.

In Prakasam, it was conducted in 34 clusters by Indian Institute of Public Health, Hyderabad (Prakasam) Participants from both rural and urban selected clusters were interviewed in detail for their demographic details, risk factors for eye diseases and underwent ocular examination.

The study was conducted by Dr Rajendra Prasad Centre for Ophthalmic Sciences at National Capital Region, Gurgaon from 2011-2013. In 2011, Gurgaon had population of 1,514,432 of which male and female were 816,690 and 697,742 respectively. In Gurgaon participants from heterogeneous communities were found, including tribal people of Haryana and minorities. The main language spoken in Gurgaon is Hindi. Following study methodology was used to estimate prevalence of cataract, dry eye, pterygium in people aged 40 years and above and prevalence of vernal keratoconjunctivitis in children aged 5-15 years in the study population and also to measure the association of risk factors with various ocular diseases

Guwahati is one of the fastest growing cities in India. It is rapidly increasing in population as well. People from all over the country have settled here due to its booming economic prospects. The population since 1971 has grown manifold and it is estimated that more than 1.6 million people currently live in Guwahati.. education section, total literates in Guwahati city are 793,360 of which 423,122 are males while 370,238 are females. Men constitute 55.0% of the total population, while 45.0% of the numbers are

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females. Children aged below 6 years make up 10.0% of the population. The literacy rate of Guwahati is impressive. The total literacy rate of 78.0% is comprised of 81.0% educated males and 74.0% educated females.The community based epidemiological survey was conducted by Regional Eye Institute(RIO) Guwahati in 32 clusters of Guwahati, participants from heterogeneous communities were found, including tribal people of Assam, minorities and ethnic Assamese people, with different food habits, body built and genetic lineage and different propensity for diseases.

According to 2011[11] census Prakasam district had a population of nearly 33.97 lakhs of which males constituted 50.5% and females constituted 49.5% and 19.5% of the population was living in the urban regions of the district. Literacy rate of the district as per the census was 63.08% (male literacy rate: 72.92%; female literacy rate: 53.11%). The sex ratio of the district was 981 females per 1000 males. Children aged 0-6 years constituted 11.13% of the total district population. Prakasam district is divided into three administrative revenue divisions: Markapur, Kandukur and Ongole divisions. In 2011, a total of 664,582(19.5% of total population) people resided in the urban areas of which males were 332,123(49.97%) and females were 332,459(50.02%). Sex Ratio in urban region of Prakasam district was 1001 as per 2011 census data. Child population (0-6) in the urban region was 67,187 of which males and females were 34,547(51.4%) and 32,640(48.5%) respectively. 80.44 % population of Prakasam districts lived in rural areas. The population living in rural areas was 2,732,866 of which males and females were 1,382,641(50.5%) and 1,350,225(49.5%) respectively. In rural areas of Prakasam district, sex ratio was 977 females per 1000 males. Child population in the age 0-6 was 311,074 in rural areas of which males were 161,206(52%) and females were 149,868(48.0%).

Following study methodology was used to estimate prevalence of cataract, dry eye, pterygium in people aged 40 years and above and prevalence of vernal kerato-conjunctivitis in children aged 5-15 years in the study population.

I. Study design:

Cross-sectional, population based study using Cluster Random Sampling.

II. Sample size:

The community based survey was done to determine the prevalence of various eye diseases involved cluster random sampling to include 18,000 respondents. The field

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survey at each site covered approximately 14,000 rural populations (3500 population of 40 years and above). The sample size was calculated as based on the prevalence of major ocular diseases cataract (58.0%),[12] dry eye (18.3%)[7] and pterygium (11.7%)[8], Sample size was estimated based on the lowest prevalent disease i.e. pterygium (11.7%)[8] among the three diseases studied (design effect as 2 and confidence limit of 95%). A sample size of 3562 was calculated. Based on this a total of approximately 3600 individuals aged more than 40 years were planned to be studied for the prevalence of various ocular diseases. Our study was adequately powered to calculate association between cataract and sun exposure. The sample was selected from 35 clusters. In the above houses where adults aged more than 40 years were registered for the study, all the children aged 5-15 years were also enrolled for VKC examination. The inclusion criteria for these individuals was that only those participants more than age 40 years were interviewed for risk factors and ophthalmic examination that were living in that cluster for more than 6 months. The above participants were labeled as eligible population.

III. Study tools

It consisted of 6 forms, the details of these forms is as follows:

Form I   : Enumeration form

Form II   : Risk assessment in the study population aged more than 40 years

Form III   : To determine the ocular surface disease index

Form IV   : Risk assessment Questionnaire in population between 5-15 years of age,

Form V   : Clinical examination (including clinical and ocular examination) in the study population more than 40 years of age

Form VI   : Clinical examination (including systemic and ocular examination) of study population 5-15 years of age.

IV. Sampling:

The sampling cluster in the village were identified during the first field visit by the field supervisor using **compact segment sampling method**. The Field supervisor and enumeration team took a complete round of the village with the help of village volunteers e.g. chaukidar, ASHA, anganwadi worker or any other person deputed by village pradhan. They prepared a broad outlined map of the village. If the population of village was between 400-600 as per the sample cluster list, the entire village was taken as one

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cluster and covered for the study. But if the population of village was higher, then the village was divided into equal segments of population between 400-600. Help was taken from the key informants in the village to ensure that the clusters were of equal population. Each identified segment was numbered starting from the Northwest of the village. The segment that was listed under the "list of the sampling clusters" in that village was selected and labeled as the study cluster.

V. Cluster mapping & enumeration:

In each selected cluster, the village map was first sketched showing various clusters and a detailed map of selected clusters was sketched showing all households and landmarks. At the onset, every house and landmark in each cluster was mapped. All houses were allocated a study household number, irrespective of whether there were any 40+ residing in the house or not. Demographic profile of all individuals matching eligibility criteria was noted in the enumeration form. For allocating house numbers, the North West corner of the village was chosen as the starting point. Household number were allocated to all houses where people were residing. In allocating house nos., the enumerator continued to move towards the left hand side till the cluster was completed. Household numbers were allocated based on cooking units. In situations where a joint family was staying under the same roof but some family members had independent cooking arrangements, different household numbers were allocated accordingly. In cases where a house did not have a kitchen and the family members routinely go out to eat, such household was enumerated as one household.

VI. Training and Monitoring:

Training and orientation of all staff for consistency in methodology and accuracy of data collection was done at Central Coordinating Centre(CCC) (Dr. R.P. Centre) in 2010. Piloting of survey was done in one cluster of Guwahati along with staff of CCC to ensure uniformity in examination and data collection. Similar type of piloting was done in Prakasam, Hyderabad in one cluster of Hyderabad along with staff of CCC to ensure uniformityin examination and data collection.Resolution of queries and monitoring of site management was done through site visits by team from coordinating centre (Dr. R.P. Centre). The approved method as per protocol was followed, timely calibration of equipments was done.

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Clinical Examination done by Ophthalmologist

Filling of risk assessment questionnaire by various participants

Clinical Examination

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UV fluorescence photography done by optometrist

VII. Consent:

After enumeration of the household members in 40+ individuals, an informed consent was taken from all the participants before starting the Risk Assessment questionnaire. Medico social worker took the consent after providing information as per the participant information sheet. The consent was signed by two witnesses. Participants relative or nearby neighbours were requested to sign the witness from. The consent was repeated at the time of the clinical examination.

VIII. Assessment Of risk factors and clinical Examination:

Torch light examination was done by the optometrists and the risk assessment form was filled by medical social worker, all the participants were invited for the clinical assessment for a detailed ophthalmic examination which was conducted at a clinical site in the village. Risk assessment questionnaire were then administered to the study population to ascertain exposure to UVR. This risk assessment included information regarding duration of exposure to sunlight, indoor cooking fuel usage and duration of smoking. This was followed by the clinical examination of persons to identify eye diseases like cataract, dry eye, pterygium in study sample aged more than 40 years. Besides this,children less than 15 years were screened for VKC. Prior dates were communicated to the participants and a master list of all the participants above 40 years with their contact details was maintained by the medical social worker.

IX. Role of the individual team members:

- Field workers: Enumeration of the selected cluster, Measurement of blood pressure, height, weight and mid arm circumference.
- Lab technician: Testing of blood sugar testing
- Optometrists: Detailed ETDRS visual acuity, Auto refraction, refraction, UV fluorescent photography, Intra ocular pressure measurement, Schirmer's test,.

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- Ophthalmologist: Detailed clinical history and comprehensive ocular examination including Tear film break up time test (TBUT), Torch light examination, Slit lamp examination, Grading of cataract according to the clinical examination using portable slit lamp and fundus examination was done using direct and indirect ophthalmoscopic examination was done in all the patients.

9.6. Methodology for filling Forms

9.6.1. DEMOGRAPHIC INFORMATION (Form I)

- **Age** was recorded in completed years.(Some clues to help to know actual age of the person)
  - Born Before Independence for people around 65 years and above
  - Age at marriage / Consummation of Marriage
  - 1st child and his/her current age and how many years after marriage the child was born (ask specifically if there was any elder child who died subsequently).
  - No. of years since attaining Menopause (only for females)
  - If a person is 63 and a half or 42 years and 10months their age would be recorded as 63 and 42 years respectively.
- **Marital status:** The respective category (Married, unmarried, separated, widow) was filled.
- **Education:** The respondent were asked regarding schooling. If he/she said "no", asked "can you read and write". If answer was "No" recorded as "illiterate", code 00; if answer was"yes" recorded as "can read and write" code 50. For all those who attended school, they were enquired about number of years of schooling and also whether extra education was received after leaving school. Code number of years of schooling if no extra education after school. If extra education after school code the final level attained e.g. diploma=14, graduation=15, post-graduation=17, professional e.g. doctor, engineer, lawyer=20. Example: person reported 8th grade only, record 8; person reported 8th grade plus two years' diploma, record 14. Person reports 12 years schooling and doctor training, record 20. 33 NA, 66- others 99 not known

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- **Occupation:**

  o Housewife- (In a household, if the housewife was also engaged in some other income generation or income contributory activity, that activity was recorded rather than house wife as an occupation.)

  o Cultivator - Those having their own land. They cultivate the land themselves or with help of laborers

  o Agricultural laborer - Those farmers who work for others

  o Non Agricultural laborer e.g. factory worker, road workers, assistant to skilled workers

  o Skilled worker e.g. mason, carpenter, electrician, driver

    ▪ Office job: ask their post and categorize as follows:

      o Class 4 - if peons, attendants, sweeper;

      o Class 2& 3 – if clerk, nurses, dietician, teacher;

      o Class 1- managers, senior executives, gazetted officers.

    ▪ Business e.g. shop keeper, vending

    ▪ Professional e.g. doctor, engineer, lawyer

    ▪ Unemployed category – This included those who are not currently working or they are sitting idle or expelled from their earlier job. Retired people or those who are too old to work were not categorized as Unemployed.

    ▪ Retired – legal requirement to stop working/Not working because of old age.

    ▪ Not working because of ill health

    ▪ students

- **Type of residents (Identification of eligible participants):** only for those residents who stayed for more than 6 months in the study area.

9.6.2. RISK FACTOR ASSSSMENT (Form II)

The various risk factors studied were sun exposure, smoke and indoor fuel usage. The team of interviewers asked some questions about individual's exposure to sunlight during their lifetime, how much time they spend outdoors in different periods of life, use of sun protection, the time spent in kitchen and type of cooking fuels used in various households, smoking habits, some general questions about the eye problems. The interview lasted approximately 30 minutes.

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Outdoor sun exposure:

- **Methodology for calculating Total Sun Exposure (Thousand hours):** Total exposure time (hours) in doing outdoor activity per day * total years of doing outdoor activity (9a.m.-5p.m.) in present *365.25+Total exposure time (hours) in doing outdoor activity per day * total years of doing outdoor activity (9a.m.-5p.m.) in past*365.25+ Total exposure time (hours) in doing outdoor activity per day * total years of doing outdoor activity (9 am-5 pm) in remote past *365.25/1000.

- **Effective Sun exposure: OEeff12= Effective Sun exposure: OEeff =** Σ Total hours of sun exposure without head gear usage + Total hours of sun exposure using head gear *protection factor for various head gears] *365.25* number of years of that activity in present, past, remote past (for age >18 years).

  - While calculating this formula, it was ensured that duration of exposure of outdoor activity +18 years was not more than the age of the participants.

- **Protection factors for various head gears adopted:**
  - 0.53- dupatta/Saree/pagree/umbrella

  - 0.21- sungalsses

  - 0-Nil used

- **Smoking Habits:** A detail of smoking including number of smoking substance along with type of substance and its duration would be recorded. Based on these, pack years will be calculated

- **Calculation of Pack Years of smoking[13]:** Pack year is calculated by multiplying the number of packs of cigarettes smoked per day by the number of years the person has smoked. It assumes 1 cigarette pack contains 20 cigarettes. For example, 1 pack year is equal to smoking 1 pack per day for 1 year, or 2 packs per day for half a year, and so on.
  - Cigarette Smoking Pack years= years of smoking x cigarettes smoked per day / 20
  - Bidi Smoking Pack years= years of smoking x bidis smoked per day/4 x/20, (1 bidi was considered as equivalent to 1/4 of a cigarette)

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   o Hukkah Smoking Pack years= Years of smoking x sessions smoked per day *10/20, (Assuming 1 chilem of hukkah if smoked for 30minutes is equivalent to 10 cigarettes)

Total pack years of smoking was calculated as a sum of cigarette and bidi pack years.

- **Indoor Smoke Exposure through Kitchen fuels[10]:** A detail of cooking in the kitchen with type of fuel used was also noted. A detailed overview of type of fuels usage in the form of good (LPG, biogas or solar cooking) and bad fuels (Kerosene, coal, wood, dung cakes or charcoal) was recorded along with the duration of usage in the form of hours per day and years was also recorded.

- **Ocular Surface Disease Index (OSDI) (Form III)[14]:** An OSDI is a validated reliable disease specific questionnaire that assesses Quality of life measures in patients with Dry eye disease. The OSDI is a 12 item questionnaire that assesses both dry eye symptoms and their effects on vision related function. The questionnaire requires 5 minutes to complete and the scores range from 0 to 100. On the basis of the score, the patient's symptoms can be categorized as normal(0-12), mild dry eye(13-22), moderate dry eye(23-32), or severe dry eye(33-100). The 12-item OSDI questionnaire scores range from 0 to 100 and it contains 3 ocular symptom questions, 6 vision-related function questions, and 3 environmental trigger questions. Each question score ranges from 0 ("none of the time") to 4("all of the time"). The total score is calculated on the basis of the following formula: OSDI ¼ ([sum of scores for all questions answered 100]/ [total number of questions answered 4]).[14]

The OSDI was calculated by the following formula:

Total score/ Number of questions answered by the participants *25

A mean of 35 was taken as cutoff for dry eye after applying the results on a study subgroup, Participants having OSDI more than 35 were considered as having dry eye.

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9.6.3. SYSTEMIC AND OCULAR EXAMINATION (Form V)

History: A detailed history for presence, duration and treatment of various systemic diseases (Diabetes mellitus, hypertension and coronary artery disease) was recorded in a questionnaire. Besides this, presence of other systemic disease was also recorded.

- **Blood sugar estimation:** Blood sugar was measured using One Touch Sure Step system, Life Scan Johnson & Johnson device with test strips. After ensuring that the participant is sitting comfortably, they were explained regarding measuring of blood sugar and that they may feel some pain in the finger of left hand. The ring finger of the left hand (preferably) was cleaned with spirit swab and 26gz needle was used to prick the tip of the finger. The reading type taken was specified as fasting(F), post prandial(PP) (two hours after a meal) or random (R). The needle was destroyed after use with the aid of a needle destroyer. If blood sugar was not measured, then reason was stated in the form of refusal from participant or machine giving an error message/not working or any other reason was specified.

  According to American Diabetes Association[15], random blood sugar levels ≥140 mg/dl is considered as positive criteria for diabetes.

- **Blood Pressure:** Blood pressure was measured using the automated Omron SEM-1(HEM 7051-C12) device.The participant's arm blood pressure was taken first when they have rested for at least 3-5minutes in sitting position, preferably the right arm reading was recorded. Ideally the participants arm should be made to rest either on the table or on examiners arm with level of the cuff at the level of heart in the body (the arm of the participant should not hang down). Two readings were recorded, time interval between two recordings was 5minutes, confirmed and print out was stapled on to the form.This measurement was taken in case of home visit as well. However, the print out was not be taken during the home examination. If blood pressure was not taken, then reason in the form of refusal from participant or machine giving an error message/not working or any other reason was specified.

  According to American society of Hypertension[16], presence of hypertension was taken as blood pressure ≥140/90mmHg.

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- **Weight measurement:** The scales were well maintained and regularly calibrated and placed on a firm flat surface. The scale was calibrated in kilograms and 100grams (0.1kg) units. The scales were handled with care at all times to ensure accuracy of weighing and to keep it in working order. The study participants were ineligible for measurement of weight if chair-bound. If the participant was found to be too unsteady on his/her feet to carry out the weight measurement without causing undue distress or putting him/her under unnecessary risk, the measurement was not done. If a study participant either refuses or is ineligible for measurement of weight. It was recorded at appropriate place in the form. Possible reasons could include: study participant refuses, study participant chair-bound, study participant too unsteady on feet etc.

  The scales were placed on a firm flat surface, ideally shoes should be removed, any heavy outer garments (jacket, jumper etc.) and loose money and keys from pockets should also be taken out before standing on scale. The posture of the respondent is important. Reading might be affected if the subject bends or moves on the scale. Weight is measured in kilograms and recorded as the nearest 0.1kilogram on the form.

- **Standing Height measurement:** The study participant were ineligible for measurement of height if chair-bound. If the participant was too unsteady on his/her feet to carry out the height measurement or cannot stand straight, without causing undue distress or putting him/her under unnecessary risk, the measurement were be carried out further. If participant refuses or is ineligible for height measurement the box for height measurement was left empty and the reason was mentioned.

  The respondent was instructed to keep their eyes focused on a point straight ahead and to stand as straight as possible without changing the position of the head after removing their slippers and head should rest under the head plate. The back should be straight with arms loosely hanging by the side and both the feet together. The cap or turban were removed before taking the measurement. The measurement was recorded in the questionnaire in centimeters and to the nearest 0.1cm. In case heels or head positioning were lost during the measurement, the procedure will be repeated.

- **Body Mass Index:** BMI (Body Mass Index) is calculated by dividing weight in kilograms by square of height in centimeters. [Wt(kg)/Ht(cm)^2].

  The grading for BMI is as follows:

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Under weight 18.5 kg/m^2

Normal 18.5-24.9 kg/m^2

Overweight 25-25.9 kg/m^2

Obese $\geq$ 30 kg/m^2

- **Visual acuity:** The ETDRS (Early Treatment for Diabetic Retinopathy Study) tumbling E chart was used to measure the distant visual acuity. This chart is made of non-reflective white polystyrene material and is installed in a retro illuminated box(2 feet x 2feet). Three fluorescent tube lights of 20W each placed behind the chart illuminate the chart. The luminescence is 150cd/m^2 or greater. Ideally the standard room illumination for the vision chart was at least 100 lux. (I LUX =1 cd/m^2).

  Initially, the vision in each eye should be measured from 4 meters. If the top line cannot be read from 4 meters, the person should be made to read the chart from one meter. Marking should be made on the floor with chalk indicating the distance of 4 meters and one meter. A chair should be positioned from the chart so that it is in perfect line with the center of the chart. The chart is placed at a distance of 4 meters from the eyes of the person. There are five letters in each row of the chart. There are 14 rows in the 4-meter chart, but only the TOP 11(eleven) rows are used for testing. Being able to read the 11th row from the top is considered as normal visual acuity of 6/6.This line represents the minimum angle of resolution that a normal eye should have. From one meter only the top 6(six) lines should be read. The person must correctly identify at least 4 letters of a line with each eye to get the score for that line. Vision was measured (i) unaided (ii) with usual distance glasses if worn (i.e. presenting vision). The number of Es were counted and Right eye was tested first, followed by the left eye. Vision was recorded immediately on the form. Both presenting and unaided distance and near vision were measured.

- **Refraction :** Refraction was done for all subjects irrespective of the visual acuity. Refraction was manually done by trained personnel at the central clinic in the village.

  The refraction protocol should consist of :

  - Vision Testing without and with current glasses.

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- Refraction by streak retinoscopy.

- Recording the acceptance of spectacle prescription.

- Recording of the best corrected visual acuity for distance and near vision.

- Retinoscopy with dilation was done at the discretion of the ophthalmologist for eyes with hazy media.

The Nidek Hand held autorefractometer model AR-20 was used in the study. It contains the functions for measuring the spherical power, cylindrical power and cylinder axis. After Stabilizing the participant's head during the measurement readings of both eyes was measured sequentially. It was done in all study participants. The appropriate response was circled if auto refraction was not done. This examination was not done during the home visit.

- **Streak Retinoscopy:** An electric streak retinoscope was used. The specifications for the instrument used were: Heinz Beta 200 electric retinoscope with Heinz XHL 3.5-volt halogen lamp. The "para-stop" in the Heinz retinoscope was taped/ fixed in the "down" position to avoid confusion in the direction of shadow movement. The working distance should normally be 67cm. The correction for working distance can be made numerically from the total lens combination in the trial frame at the end, for example: subtract 1.5 diopters for a working distance of 67cm. In any case, one standard method was followed in a particular centre. Retinoscopy should be completed first for the right eye, then the left eye should be done.The subject were asked to fix at the smallest easily visible line in the ETDRS chart or for those who cannot see any line, at a suitable distant target. If astigmatism was present, the axis and power was determined by using appropriate spherical lens which neutralizes movement in that meridian. The objective refractive error as determined by the above steps was used as the basis for testing subjective acceptance.If retinoscopy was not possible due to a dull reflex or abnormal reflexes such as a scissors reflex, one should proceed directly to subjective refraction. However, dilated retinoscopy should be done for confirmation of the axis of astigmatism etc. at the discretion of the ophthalmologist.

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- **Grading of myopia and hypermetropia was as follows[17]:**

  Myopia:

  Mild myopia- -0.5 to -3.5DS

  Moderate myopia- -3.5 to -5.5DS

  Severe myopia- -5.5 to -8DS

  Very Severe myopia ≥-8DS

  Hypermetropia[18]:

  Mild +1 to +3.5DS

  Moderate +3.5 to +5.5DS

  Severe +5.5 to +8DS

  Very severe ≥+8DS

- **Acceptance:** The right eye was tested first followed by the left eye. The manifest refraction for distance was be tested first, followed by near vision testing. The major components of the manifest refraction process consisted of

  o adjustment of spherical power,

  o refinement of cylinder axis and power and

  o refinement of spherical power.

  The full spherical refractive correction from the objectively determined refraction was placed in the trial frame first. The spherical correction was then adjusted.The spherical power was rechecked and refined. The subjectively accepted correction as well as the best corrected visual acuity were recorded in the form for each eye separately.

- **Low vision and blindness[19]:** According to WHO criteria[19], blindness was defined as visual acuity less than 3/60 in better eye with available correction, severe visual impairment was defined as visual acuity less than 6/60 to 3/60, Moderate visual impairment was defined as visual acuity less than 6/60 to 6/18, Mild visual impairment was defined as visual acuity less than 6/12 to 6/18 whereas those with visual acuity ranging between 6/9 to 6/6 were considered as normal.

  According to NPCB criteria, blindness was defined as visual acuity less than 6/60 in better eye with available correction, Moderate visual impairment was defined as

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visual acuity less than 6/60 to 6/18, Mild visual impairment was defined as visual acuity less than 6/12 to 6/18 whereas those with visual acuity ranging between 6/9to 6/6 were considered as normal.

- **Protocol for ophthalmic examination**

  The order of examination was as follows:
  1. The right eye examination was done first followed by the left eye.
  2. Using diffuse illumination, with a pen torch, gross examination of the eye lids, lacrimal apparatus and the status of the globe was assessed.
  3. Ocular alignment was checked with the cover test.
  4. The corneal transparency and pupillary reactions were checked using a flash light.
  5. This was followed by slit lamp biomicroscopy to be recorded in Section F2.

9.6.4. Cataract

The state of the lens, Intra Ocular Lens(IOL) and posterior capsule was determined using the slit lamp biomicroscope. Depending on this a person was classified as having posterior subcapsular, cortical, nuclear, developmental, traumatic, advanced and associated with pseudoexfoliation syndrome.

- **Definition of cataract**

  A person can have either normal, unoperated or operated cataract in each eye. In this study the cataract status of a *person* was classified as per below:

Unoperated cataract: A person having lenticular opacities included a person having cortical/ nuclear/ Posterior subcapsular /developmental/ traumatic/advanced and those lenticular opacities that were associated with pseudoexfoliation syndrome in both eyes or in one eye with other eye being normal.

Operated cataract: Presence of operated cataract in both eyes or presence of operated cataract in one eye with other eye having normal lens

Mixed cataract: Presence of operated cataract in one eye and un-operated cataract in the other eye.

Total prevalence of cataract is the sum of persons having unoperated, operated and mixed cataract.

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9.6.5. Dry eye

Standard test of Schirmers and Tear film breakup time (TBUT) would be conducted using the methodology described below:[7]

- **Schirmers test**

Basic secretion of tears was estimated in all patients without anaesthetizing the conjunctival sac. A strip of commercially available pre-sterilized Whatman 41 filter paper measuring 5mm x 35mm, was folded at 5mm from one end. This end was inserted into the lower fornix at the junction of medial two third and lateral one third of the eyelid margin. The subject was made to sit in a dimly lit room, with eyes closed. The amount of wetting from the fold, in millimeters, was noted after 5 minutes. Both eyes were tested at same time. No topical anesthetic was used to allow normal blinking. Reflex tearing should be avoided; wipe any extra tears first; Eyes were closed, if the participant was comfortable. Fans should be switched off.

- **Tear Break Up Time**

The tear film break up time is the time in seconds, taken between a complete blink and first appearance of random dark spot. Both eyes were assessed sequentially. For measuring break up time, pre-sterilized fluorescein strips were applied on the inferior temporal bulbar conjunctiva of the participant's eye. Then the patient was asked to blink once in order to distribute the fluorescein equally over the cornea. The participant was instructed to keep the lid open and for examination under cobalt blue light. The examiner should not touch the lids to avoid stimulated secretion from the lacrimal and Meibomian glands. The normal value is greater than 10 to 18seconds. A tear film break up time of less than 10seconds is taken as abnormal tear film break up pattern. If dry eye tests was not performed, the reason there of was mentioned.

For prevalence of dry eye,[7] Tear film breakup time and Schirmers < 10[20] in either of eye was considered as presence of dry eye.

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9.6.6. Pterygium

Fluorescein Staining- Details about pterygium staining with fluorescein if present was noted. Grading of pterygium was done on the basis of standard classification into five grades[21]

I: head of pterygium at the corneal limbus,

II: head of pterygium between the limbus and the undilated pupil margin,

III: head of pterygium at the pupil margin,

IV: head of pterygium within the pupil margin,

V: head of pterygium crossing the pupil.

Besides this location (nasal/temporal) with size in millimeter was noted.

9.6.7. Vernal Kerato Conjunctivitis (VKC)[22] (Form IV & VI)

With the help of torch light, an optometrist examined all enrolled children in 5-15 year age group for signs of VKC on the basis of presence of mucus discharge, presence of papillae in superior tarsus and changes in limbal area during house-to-house visit. All the diagnosed cases of VKC were referred to central clinic there an ophthalmologist examined them on slit-lamp to determine the presence of active disease based on presence of papillary hypertrophy of the bulbar and/or the limbal conjunctiva, limbal thickening, Horner Tarantas dots and mucous discharge or quiescent form on the basis of inactive upper tarsal conjunctival papillae and/or scarring of upper palpebral conjunctiva along with the presence of history of itching.[12] On the basis of presence of active or quiescent disease treatment was decided.

9.6.8. Other ocular diseases:

The diagnosis of other ocular disease of conjunctiva was done on the basis of standard classification[23], diabetic retinopathy was based on classification done by Early treatment diabetic retinopathy study[24] and age related macular degeneration was done using Wisconsin age related maculopathy grading system.[25]

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9.6.9. Conjunctival Ultra Auto-fluorescence[26]:

Conjunctival Ultra-Violet Auto-fluorescence(UVAF) images were captured using the camera system in 13 villages of Gurgaon, NCR by the trained optometrist and in 2 villages in Prakasam.This system consisted of a height adjustable table equipped with subject head-rest, camera positioning assembly, digital single-lens reflex camera, macro lens and filtered electronic flash. Each eye was photographed at 0.94 magnification, with separate views of the nasal and temporal regions of both eyes. Coloured low-voltage light emitting diodes were positioned on stands in the visual field of the subject at 35. to the camera–subject axis to aid fixation. The UV-induced fluorescence photography was based on standard principles, using a specially adapted electronic flash system fitted with UV-transmission filters (transmittance range 300–400 nm, peak 365nm) as the excitation source. Subject fluorescence was recorded with a Nikon D100 (Nikon, Melville, NY, USA) digital camera and 105mm f/2.8 Micro Nikon(Nikon) lens fitted with infrared and UV barrier filters. Thus, only fluorescence was recorded by the camera. Images were saved in RGB format at the D100 settings of JPEG fine(1:4 compression) and large resolution. Some unwanted red light allowed by the UV transmission filter was eliminated by removal of the red channel in Adobe Photoshop (Adobe Systems Inc., San Jose, CA, USA), equivalent to the use of a cyan filter on the camera lens.

Each photograph could be verified immediately after it was taken and recaptured, if necessary, to obtain an enhanced image. Imaging software was then used to calculate the area of UVAF. Four photos were analysed per person (right nasal/left nasal/right temporal/left temporal). The Figure 1 Photograph of UVAF system used in the Study demonstrating the seating of a model participant. The settings required for the UVAF analysis were pixel length=3216 and logical length=2.4. The resultant area is expressed in mm^2. The camera system detects a fairly uniform area of AF, and the area analysed corresponds to the summation of all of the areas. However, the area analysed is of varying intensity of AF, and it may be difficult to determine the specific area of the conjunctiva that needs to be determined. In most cases, only one discreet area of AF is found. However, in cases in which multiple areas of AF exist, each area was calculated separately and the total area is calculated for that eye.

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The detailed method for clinical examination is described in this flowchart

```
           ┌─────────────────────────────────┐
           │     Respondent registration     │
           └─────────────────────────────────┘
                           │
           ┌─────────────────────────────────┐
           │  BP/ B. sugar/Height/ weight /2nd BP │
           └─────────────────────────────────┘
                           │
           ┌─────────────────────────────────┐
           │     History of systemic disease  │
           └─────────────────────────────────┘
                           │
           ┌─────────────────────────────────┐
           │ Visual Acuity Measurement &Undilated │
           └─────────────────────────────────┘
                           │
           ┌─────────────────────────────────┐
           │         Auto refraction          │
           └─────────────────────────────────┘
                           │
           ┌─────────────────────────────────┐
           │     N.C.T., Schirmer's test      │
           └─────────────────────────────────┘
                           │
  ┌─────────────────────────────────────────────────────┐
  │ Basic Eye Examination (Undilated Pupil) by Ophthalmologist │
  └─────────────────────────────────────────────────────┘
                           │
           ┌─────────────────────────────────┐
           │      Slit lamp exam and BUT      │
           └─────────────────────────────────┘
                           │
           ┌─────────────────────────────────┐
           │    Examination under dilatation  │
           └─────────────────────────────────┘
                           │
           ┌─────────────────────────────────┐
           │   Examination by ophthalmologist │
           └─────────────────────────────────┘
                           │
  ┌─────────────────────────────────────────────────────┐
  │ Lens (Clinical examination for cataract) and fundus exam, Evaluation │
  │              of Reason if VA<6/18                    │
  └─────────────────────────────────────────────────────┘
                           │
  ┌─────────────────────────────────────────────────────┐
  │ Referral for cataract surgery, spectacles, other treatment or investigation │
  └─────────────────────────────────────────────────────┘
                           │
           ┌─────────────────────────────────┐
           │  Filling of referral card and advice. │
           └─────────────────────────────────┘
```

Fig 32: Flow chart describing steps of clinical examination

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10. Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject (Results)

10.1. Results (Objective-II)

Study Area
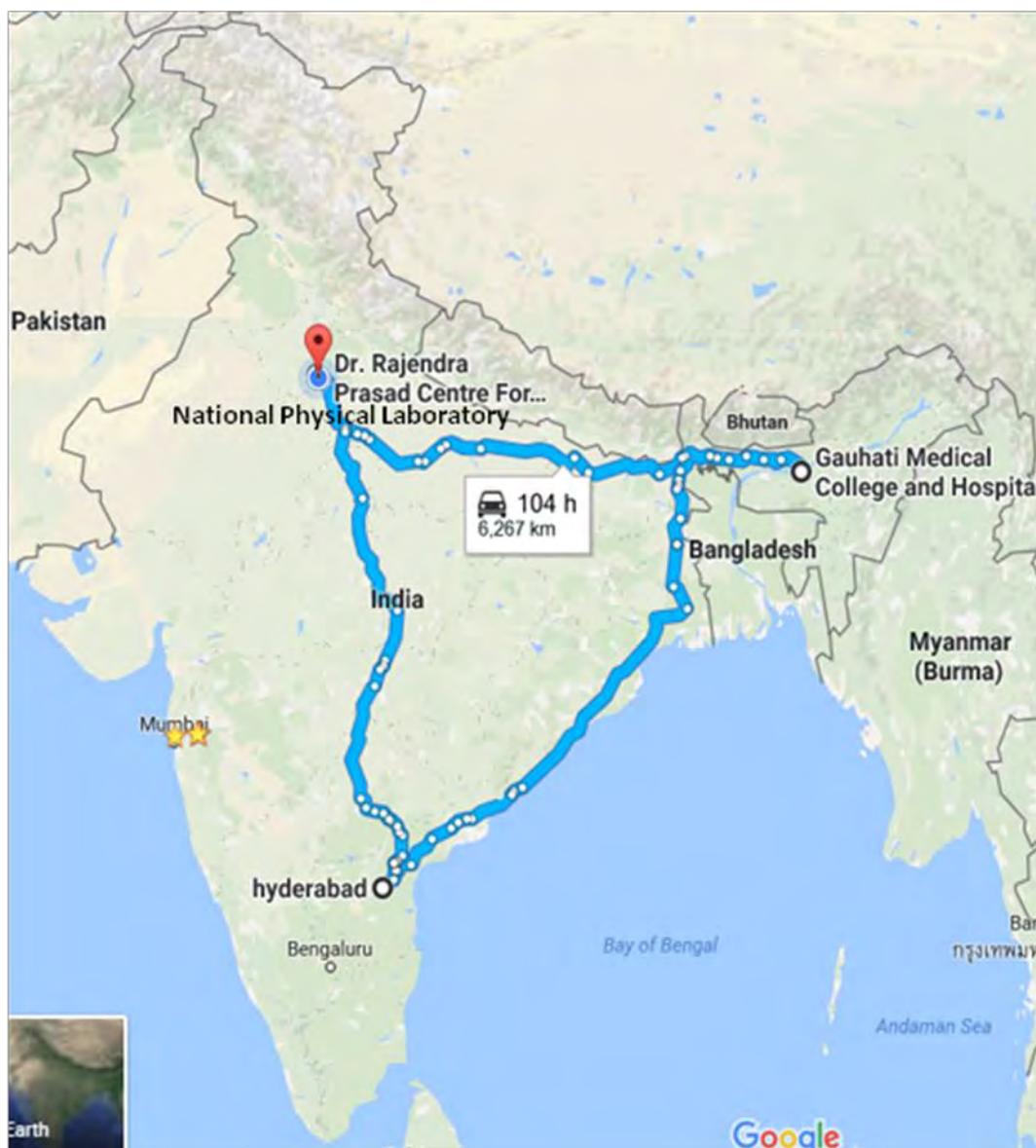
Fig 33: Map showing study area in Gurgaon

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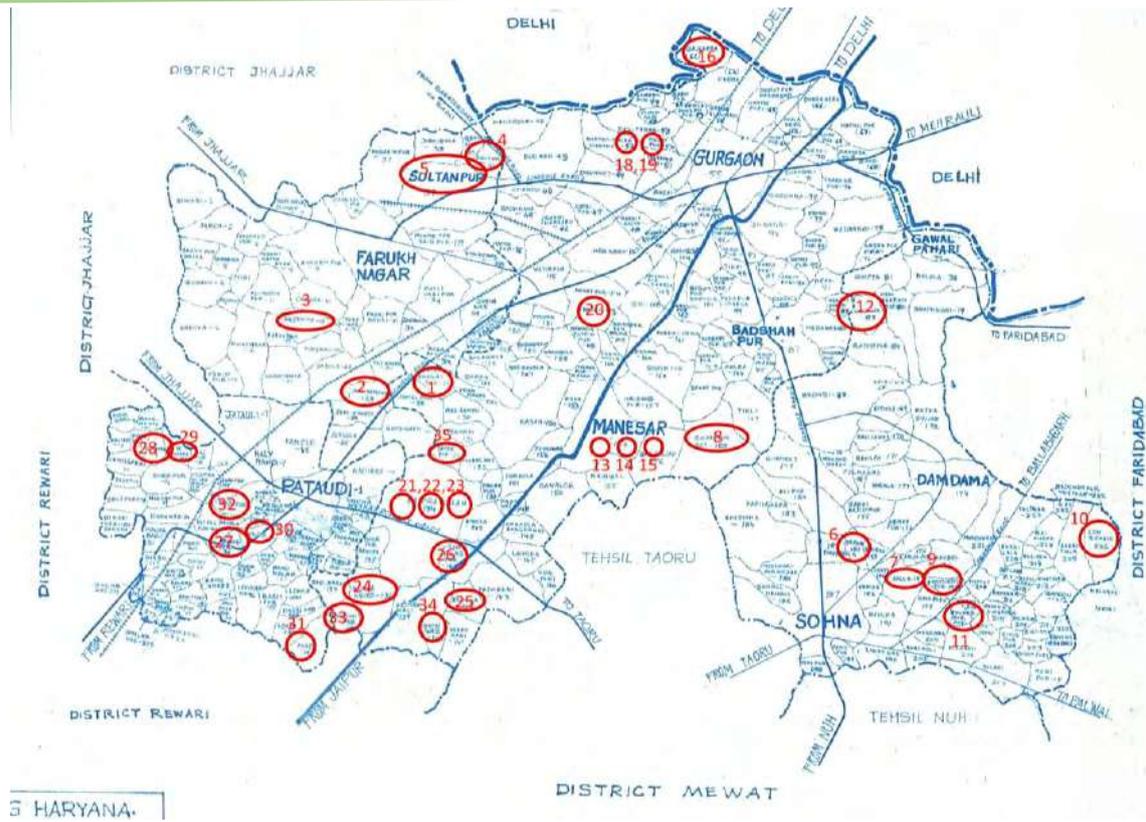
Fig 34: Map showing study area in Guwahiti
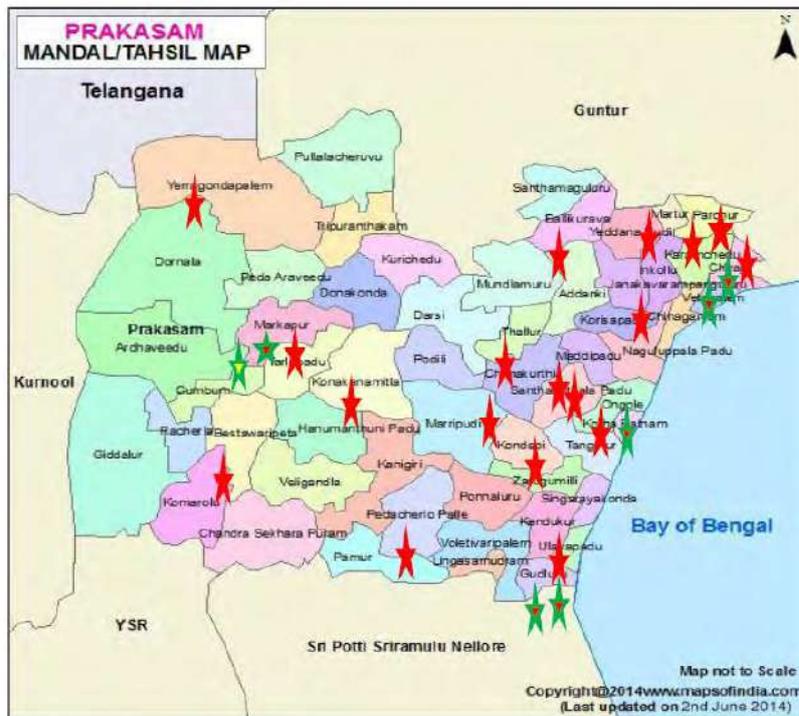
Fig 35: Map showing study area in Prakasam

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Work and role of the individual team members:

- Field workers: Enumeration of the selected cluster, Blood pressure, height, weight and mid arm circumference measurements.

- Lab technician: Blood sugar testing

- Optometrists: Auto refraction, UV fluorescent photography, Intra ocular pressure measurement, Schirmer's test, detailed ETDRS visual acuity, refraction.

- Medical social worker: Filling of risk assessment questionnaire and questionnaire related to vernal kerato conjunctivitis (VKC) and counselling for cataract surgery.

- Ophthalmologist: Detailed clinical history and comprehensive ocular examination including Tear film break up time test(TBUT), Torch light examination, Slit lamp examination, Lens opacity classification system and fundus examination was done in all patients.

Table 1.1: Details of Village clusters (Delhi, Gurgaon) included

S.No.	Village	Total Population	40+ population	Risk Assessment (%)	Clinical Examination (%)
1	KHAWASPUR	406	135	123 (91.1)	115 (85.2)
2	SAMPKA	460	116	107 (92.2)	96 (82.8)
3	BASUNDA	508	124	114 (91.9)	103 (83.1)
4	KALIAWAS	580	125	112 (89.6)	100 (80.0)
5	SULTANPUR	444	115	106 (92.2)	99 (86.1)
6	BERKA	613	123	111 (90.2)	103 (83.7)
7	DAULA	523	123	109 (88.6)	101 (82.1)
8	GAIRATPUR BAS	545	121	112 (92.6)	98 (81.0)
9	HARCHANDPUR	621	118	107 (90.7)	97 (82.2)
10	LOH SINGHANI	547	115	102 (88.7)	97 (84.3)
11	CHUHADPUR	524	114	108 (94.7)	95 (83.3)
12	ULLAWAS	629	113	100 (88.5)	91 (80.5)
13	MANESAR1	522	111	101 (91.0)	90 (81.1)
14	MANESAR2	418	101	85 (84.2)	82 (81.2)
15	MANESAR3	549	112	111 (99.1)	97 (86.6)
16	BAJGHERA	513	123	112 (91.1)	104 (84.6)
17	WAZIRPUR	537	139	119 (85.6)	110 (79.1)
18	DAULTABAD1	519	127	114 (89.8)	105 (82.7)
19	DAULTABAD2	493	123	112 (91.1)	99 (80.5)
20	BADHA	583	122	112 (91.8)	102 (83.6)
21	BHORAKALAN1	527	129	118 (91.5)	104 (80.6)
22	BHORAKALAN2	487	128	112 (87.5)	107 (83.6)
23	BHORAKALAN3	517	131	118 (90.1)	108 (82.4)
24	BHORAKHURAD	486	124	111 (89.5)	101 (81.5)
25	BHUDAKA	491	129	120 (93.0)	108 (83.7)
26	BILASPUR	495	122	108 (88.5)	98 (80.3)

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27	GADAIPUR	434	130	118 (90.8)	108 (83.1)
28	GUDHANA	528	141	128 (90.8)	117 (83.0)
29	HUSAINKA	457	115	103 (89.6)	95 (82.6)
30	KHOR	441	137	124 (90.5)	111 (81.0)
31	MAU	587	132	118 (89.4)	112 (84.8)
32	MIRJAPUR	496	127	112 (88.2)	102 (80.3)
33	PALASOLI	462	118	109 (92.4)	104 (88.1)
34	RATHIWAS	553	136	128 (94.1)	110 (80.9)
35	TATARPUR	520	154	138 (89.6)	126 (81.8)
	Total	**18015**	**4353**	**3942 (90.6)**	**3595 (82.6)**

A total population of 18015 people residing in that area for more than 6 months were enumerated, 4353 people were more than 40 years of age, of which 3942(90.6%) people were interviewed for risk assessment questionnaire and 3595(82.6%) underwent clinical examination.

Table 1.2:   Details of Village clusters (Guwahati) included

S.No.	Village	Total Population	40+ population	Risk Assessment (%)	Clinical Examination (%)
1	AKADI	753	171	130 (76)	116 (67.8)
2	MAGARBERA	421	168	144 (85.7)	125 (74.4)
3	PACHIM NAOKOTA	413	127	109 (85.8)	102 (80.3)
4	PIALIKHATA	450	131	111 (84.7)	101 (77.1)
5	JATIA BHANGRA	471	135	111 (82.2)	95 (70.4)
6	KARIKUCHI	408	142	120 (84.5)	101 (71.1)
7	RAJPAT	432	132	119 (90.2)	114 (86.4)
8	DARI	541	139	124 (89.2)	115 (82.7)
9	BARI SARVARIKATI	485	110	95 (86.4)	91 (82.7)
10	KULHATI	566	162	129 (79.6)	123 (75.9)
11	MAJORKURI	478	141	123 (87.2)	112 (79.4)
12	DAKACHANH	606	122	104 (85.2)	98 (80.3)
13	NIZ KAORBAHA	486	127	110 (86.6)	100 (78.7)
14	BANGALTOLA	490	118	105 (89)	98 (83.1)
15	DAKHSHIN RANGAPANI	622	119	108 (90.8)	97 (81.5)
16	SATHISALA PAM	558	118	103 (87.3)	95 (80.5)
17	BARBAKARA F.V	411	115	101 (87.8)	74 (64.3)
18	CHIRA KHUNDI	427	116	102 (87.9)	99 (85.3)
19	DEOCHUNGA	443	122	94 (77)	71 (58.2)
20	GOG	446	130	115 (88.5)	107 (82.3)
21	RAIPARA	382	114	99 (86.8)	75 (65.8)
22	JARI GAON	517	130	113 (86.9)	95 (73.1)
23	DHAMI GAON	382	117	104 (88.9)	100 (85.5)
24	SARABORI	501	136	117 (86)	113 (83.1)
25	BAR KURIHA	451	115	106 (92.2)	100 (87)
26	RANCHA	431	123	106 (86.2)	102 (82.9)

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27	BADLA PATHAR	376	129	115 (89.1)	101 (78.3)
28	PARLI PART	397	146	128 (87.7)	122 (83.6)
29	JATI BHANGRA	413	115	100 (87)	83 (72.2)
30	BARUA GAON	508	115	103 (89.6)	94 (81.7)
31	AMRANGA	401	132	117 (88.6)	113 (85.6)
32	BARUA PATHAR	406	123	107 (87)	99 (80.5)
	Total	**15,072**	**4,140**	**3572 (86.3)**	**3231 (78)**

A total population of 15072 people residing in that area for more than 6 months were enumerated, 4140 people were more than 40 years of age, of which 3572(86.3%) people were interviewed for risk assessment questionnaire and 3231(78%) underwent clinical examination.

Table 1.3: Details of Village clusters of Prakasam included

S.No.	Village/Wards	Total Population	40+ population	Risk Assessment	Clinical Examination (%)
RURAL					
1	KASYA PURAM	224	113	100	96 (85.0)
2	NANDIPADU	281	107	100	92 (86.0)
3	KONANKI	280	100	89	82 (82.0)
4	GOLLAVIDIPI	362	104	96	87 (83.7)
5	CHILAKAPADU	304	102	88	80 (78.4)
6	VEERANNA PALEM	232	101	91	81 (80.2)
7	INAMANAMELLUR	315	106	89	86 (81.1)
8	KARAVADI	337	110	102	97 (88.2)
9	GOGULA DINNE	349	104	94	90 (86.5)
10	AMMAVARI PALEM	335	106	96	91 (85.8)
11	KOTCHERALA	260	100	92	79 (79.0)
12	KONIDENA	344	100	96	85 (85.0)
13	SALAKALAVEEDU	260	99	91	84 (84.8)
14	KOTHAPETA	307	102	93	89 (87.3)
15	PEDAVARIMADUGU	311	111	98	94 (84.7)
16	B.K. PADU	312	108	91	82 (75.9)
17	KUNDURRU	282	104	100	89 (85.6)
18	NUTHALA PADU	305	107	98	94 (87.9)
19	CHEVURU	294	102	95	91 (89.2)
20	TROVAGUNTA	296	100	98	91 (91.0)
21	BHIMAVARAM	247	102	91	82 (80.4)
22	RAMANAYA PALEM	166	102	91	85 (83.3)
23	ILLAPAVULURU	270	100	94	87 (87.0)
24	ONGOLE	365	101	93	88 (87.1)
25	SIDDAVARAM	348	102	93	90 (88.2
26	MAGANBOTLAPALEM	341	100	83	78 (78.0)
27	VAGUMADUGU	391	104	78	73 (70.2)
28	SINGARAYAKONDA	334	105	90	82 (78.1)

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URBAN					
29	MARKAPUR WARD-10	334	106	83	80 (75.5)
30	CHIRALA W-12	322	101	89	78 (77.2)
31	KANDUKURU WARD-20	316	106	87	78 (73.6)
32	KANDUKURU W NO-21	321	103	87	82 (79.6)
32	CHIRALA WARD NO-15	318	105	87	84 (80.0)
34	MARKAPUR W-4	250	105	89	82 (78.1)
	Total	10313	3528	3132	2909(82.5)

A total population of 10313 people residing in that (rural and urban) area for more than 6 months were enumerated, 3528 people were more than 40 years of age, of which 3132 (88.7%) people were interviewed for risk assessment questionnaire and 2909 (82.5%) underwent clinical examination.

10.2. Data Management and Statistical Analysis:

The data of all the 32 clusters was collected after a visit by Central Coordinating Centre (Dr. RP Centre) at RIO Guwahati in November 2014 and also from Prakasam in October 2015. All the hard copies of the data were received, re-entry and cleaning of the data was done in anAccess™ based software with an inbuilt consistency checks, Final analysis was done using Stata 13 statistical package to determine associations, various statistical tests were applied.

Table 2: Demographic profile of population enumerated and eligible for the the study (all ages and population aged more than 40 years) at the study sites

	Gurgaon		Guwahati		Prakasam	
	Total Enumerated (all ages) n=18,015	Eligible Population (40+ years) n=4,353	Total Enumerated (all ages) n=15,072	Eligible Population (40+ years) n=4140	Total Enumerated (all ages) n=10313	Eligible Population (40+ years) n=3528
Age(years)	**18,015**	**4,353**	**15072**	**4140**	**10,313**	**3,528 (34.2)**
0-4	1,721 (9.6)	-	1,330 (8.8)	-	675 (6.5)	-
5-15	4,081 (22.7)	-	3,244 (21.5)	-	1980 (19.2)	-
16-39	7,860 (43.7)	-	6,358 (42.2)	-	4130 (40.1)	-
40-49	1,822 (10.0)	1,822 (100)	1,947 (12.9)	1,947 (100.0)	1398 (13.6)	1398 (100.0)
50-59	1,084 (6.0)	1,084 (100)	1,051 (7.0)	1,051 100.0)	912 (8.8)	912 (100.0)
60-69	845 (4.7)	845 (100)	710 (4.7)	710 (100.0)	746 (7.2)	746 (100.0)
≥70	602 (3.3)	602 (100)	432 (2.9)	432 (100.0)	472 (4.6)	472 (100.0)
Gender	**18,015**	**4,353**	**15072**	**4140**	**10,313**	**3,528 (34.2)**
Male	9,489 (52.7)	2,159 (22.7)	7646 (50.7)	2176 (28.5)	5041 (48.9)	1705 (33.8)
Female	8,526 (47.3)	2,194 (25.7)	7426 (49.3)	1964 (26.4)	5272 (51.1)	1823 (34.5)
Education	**18,015**	**4,353**	**13524**	**4117**	**10,313**	**3,528 (34.2)**
Illiterate	2,671 (14.8)	2,023 (75.7)	2246 (16.6)	1596 (71.1)	3631 (35.2)	2274 (62.6)

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Can read & write upto primary	3,189 (17.7)	639 (20.0)	3836 (25.5)	986 (25.7)	2355 (22.8)	594 (25.2)
Primary to intermediate	8,762 (48.6)	1,556 (17.8)	6822 (45.3)	1377 (20.2)	3063 (29.7)	560(18.3)
Graduation and above	952 (5.3)	135 (14.2)	620 (4.1)	158 (25.5)	586 (5.7)	98 (16.7)
Others*	2,441 (13.6)	-	1508 (10.0)	3 (0.2)	678 (6.6)	2 (0.3)
99			40 (0.3)	20 (50.0)		
Marital Status	**18,015**	**4,353**	**11526**	**4136**	**10,313**	**3,528 (34.2)**
Married	8,786 (48.8)	3,536 (40.3)	7000 (60.7)	3296 (47.1)	5531 (53.6)	2668 (48.2)
Unmarried	8,347 (46.3)	26 (0.3)	3721 (32.3)	82 (2.2)	909 (8.8)	24 (2.6)
Others (Divorced, separated, widow/ widower, Not applicable)	882 (4.9)	791 (89.7)	4351 (28.9)	762 (17.5)	3,802 (37.5)	836 (22.0)
Occupation	**18,015**	**4,353**		**4130**	**10,313**	**3,528 (34.2)**
House work	4,828 (26.8)	1,885 (39.0)	4262 (28.3)	1722 (40.4)	1307 (12.7)	558 (42.7)
Unskilled	2,773 (15.4)	1,100 (39.7)	2847 (18.9)	1283 (45.1)	4159 (40.3)	2024 (48.7)
Skilled and professionals	1,865 (10.4)	605 (32.4)	1779 (11.8)	671 (37.7)	1166 (11.3)	440 (37.7)
Unemployed	970 (5.4)	763 (78.7)	750 (5.0)	454 (60.5)	655 (6.4)	501 (76.5)
Others**	7,579 (42.0)	-	5434 (36.1)	10 (0.2)	3026 (29.3)	5 (0.2)
Religion	**18,015**	**4,353**	**15053**	**4137**	**10,313**	**3,528 (34.2)**
Hindu	17,666 (98.1)	4,294 (24.3)	9168 (60.9)	2731 (29.8)	5897 (57.2)	2073 (35.1))
Muslim	349 (1.9)	59 (16.9)	5794 (38.5)	1385 (23.9)	1246 (12.1)	397 (31.9)
Sikh	0 (0.0)	0 (0.0)	18 (0.1)	5 (27.8)	0 (0.0)	0 (0.0)
Christian	0 (0.0)	0 (0.0)	73 (0.5)	16 (21.9)	3170 (30.7)	1058 (33.4)
Cultivable land	**18,015**	**4,353**	**15041**	**4130**	**10,313**	**3,528 (34.2)**
No Land	11368 (63.1)	2550 (22.4)	4138 (27.5)	1005 (24.3)	6790 (65.8)	2194 (32.3)
1 to 5 acres	5428 (30.1)	1471 (27.1)	10875 (72.3)	3116 (28.7)	3217 (31.2)	1209 (37.6)
>5 acres	1219 (6.8)	332 (27.2)	28 (0.2)	9 (32.1)	306 (3.0)	125 (40.8)
Family Income/month	**18,015**	**4,353**	**15020**	**4127**	**10,313**	**3,528 (34.2)**
< 4999	795 (4.4)	210 (4.8)	3321 (22.1)	830 (25.0)	2740 (26.6)	1158 (42.3)
5000 to 9999	4,903 (27.2)	1,050(21.4)	6608 (44.0)	1749 (26.5)	4782 (46.4)	1464 (30.6)
10000 to 14999	3,958 (22.0)	945 (23.9)	1615 (10.8)	470 (29.1)	1438 (13.9)	461 (32.1)
15000 to 19999	3,164 (17.6)	832 (26.3)	1373 (9.1)	427 (31.1)	701 (6.8)	220 (31.4)
20000 to 24999	2,188 (12.2)	583 (26.7)	764 (50.1)	224 (29.3)	295 (2.9)	107 (36.3)
25000 to 29999	1,291 (7.2)	321 (24.9)	450 (3.0)	146 (32.4)	189 (1.8)	58 (30.7)
30000 and above	1,716 (9.5)	412 (24.0)	889 (5.9)	281 (31.6)	168 (1.6)	60 (35.7)

Others for educational information as they are children less than 7 years.
*** Others-Students and children less than 7 years therefore not applicable for occupational status.*
99 Not Knowm

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In Delhi a total of 18015 participants were enumerated of these 4353 participants were aged more than 40 years, In Guwahati a total of 15072 were enumerated in Guwahati of these 4140 participants were aged more than 40 years. In Prakasam a total of 10313 were enumerated of these 3528 participants were aged more than 40 years.

The details are as follows :-

Age and Gender- In Gurgaon, amongst total 18015 study population enumerated, 5802(32.3%) of the study participants were children less than 15 years. 7,860(43.7%) belonged to the age group of 16-39 years. 1,822(10.0%) were between 40-49 years age group. 1,084(6.0%) were in 50-59 years, 845(4.7%) were between 60-69 years and 602(3.3%) were ≥70 years. A total of 9,489(52.7%) were males and 8,526(47.3%) were females.

Amongst 4353 participants aged more than 40 years, 1822(41.9%) were between 40-49 years age group. 1084(24.9%) were in age group 50-59 years, 845(19.4%) were in age group 60-69 years and 602(13.8%) were ≥70 years. A total of 2159(49.6%) were males and 2194 (50.4%) were females.

In Guwahati, amongst 15072 enumerated, 4574(30.3%) of the study population were children less than 15 years. 6358(42.2%) belonged to the age group of 16-39 years. 1947(12.9%) were between 40-49 years age group. 1051(7.0%) were in 50-59 years, 710(4.7%) were between 60-69 years and 432(2.9%) were ≥70 years. A total of 7646(50.7%) were males and 7426(49.3%) were females.

Amongst 4140 people more than 40 years, 1947(47%) were between 40-49 years age group. 1051(25.4%) were in age group 50-59 years, 710(17.2%) were in age group 60-69 years and 432(10.4%) were ≥70 years. A total of 2176(52.6%) were males and 1964(47.4%) were females.

In Prakasam, amongst 10313 enumerated, 2655(25.7%) of the study population were children less than 15 years. 4130(40.1%) belonged to the age group of 16-39 years. 1398(13.6%) were between 40-49 years age group. 912(8.8%) were in 50-59 years, 746(7.2%) were between 60-69 years and 472(4.6%) were ≥70 years. A total of 5041(48.9%) were males and 5272(51.1%) were females.

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Amongst 3528 people more than 40 years, 1398(39.6%) were between 40-49 years age group. 912(25.9%) were in age group 50-59 years, 746(21.2%) were in age group 60-69 years and 472(13.4%) were ≥70 years. A total of 1705(48.3%) were males and 1823(51.7%) were females.

Education- In Gurgaon, Amongst the total 18015 study participants enumerated, 2671(14.8%) were illiterate, 3189(17.7%) were those who can read and write to educated upto primary class, 8762(48.6%) were educated from primary till 12th (intermediate), 952(5.3%) were graduates, post graduates, diploma holders and professionally qualified. A total of 2414(9.9%) belonged to age group less than 7 years so they were not included for educational information. Amongst 4353 people aged more than 40 years, a total of 2023(75.7%) were illiterate, 639(20%) were those who Can read and write to educated upto primary class, 1556(14.2%) were educated between primary to intermediate grade, 135(14.2%) were graduates, post graduates, diploma holders and professionally qualified.

In Guwahati, amongst all enumerated, 2246(16.6%) were illiterate, 3836(25.5%) were those who can read and write to educated till primary standard,6822(45.3%) were those who were educated between primary 12th standard,620(4.1%) were graduates, post graduates, diploma holders and professionally qualified. A total of 1508(10.0%) belonged to age group less than 7 years so they were not included for educational information. Amongst 4117 people aged more than 40 years, a total of 1596(71.1%) were illiterate, 986(25.7%) were those who Can read and write to educated upto primary class, 1337(20.2%) were educated between primary to intermediate grade, 158(25.5%) were graduates, post graduates, diploma holders and professionally qualified.

In Prakasam, amongst all enumerated, 3631(35.2%) were illiterate, 2355(22.8%) were those who can read and write to educated till primary standard, maximum 3063(29.7%) were those who were educated between primary 12th standard, 586(5.7%) were graduates, post graduates, diploma holders and professionally qualified. A total of 678(6.6%) belonged to age group less than 7 years so they were not included for educational information. Amongst 3528 people aged more than 40 years, a total of 2274(62.6%) were illiterate, 594(25.2%) were those who Can read and write to educated upto primary class, 560(18.3%) were educated between primary to intermediate grade, 98(16.7%) were graduates, post graduates, diploma holders and professionally qualified.

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Marital Status-In Gurgaon, amongst all enumerated, 8786(48.8%) were married, 8347(46.3%) were unmarried, 882(4.9%) were divorced or separated or widowed, 3513(23.3%) were less than 18 years therefore information related to marriage was not recorded from them. Amongst 4353 aged 40 years and above, 3536(40.3%) were married, 26 (0.3%) were unmarried, 971(89.7%) were divorced or separated or widowed.

In Guwahati, amongst all enumerated, 7000(46.4%) were married, 3721(32.3%) were unmarried, 4351(28.9%) were divorced or separated or widowed. Amongst 4136 participants aged 40 years and above, 3296(47.1%) were married, 82(2.2%) were unmarried, 762 (17.5%) were divorced or separated or widowed.

In Prakasam, amongst all enumerated, 5531(53.6%) were married, 909(8.8%) were unmarried, 3803(37.5%) were divorced or separated or widowed. Amongst 3528 aged 40 years and above, 2668(43.2%) were married, 24(2.6%) were unmarried, 836(22%) were divorced or separated or widowed.

Occupation-In Gurgaon, the study population was divided according to occupation, out of 18015, 4828(26.8%) were involved in household work, 2773(15.4%) were doing unskilled work (agricultural activities, non-agricultural laborer, cultivator, office job class IV workers), 1865(10.4%) were involved in skilled activities (business, skilled worker, Office Job I/II/III). 970(5.4%) were unemployed and 7579(42%) were not involved in any activities,as 4030 of them were students,1394 were children less than 7 years. Amongst 4353 aged 40 years and above 1885 (39%) were involved in house work, 1100(39.7%) were unskilled workers, 605(32.4%) were involved in skilled activities (business, skilled worker, Office Job I/II/III) and 763(78.7%) were unemployed.

In Guwahati, the study population was divided according to occupation, out of 15072, 4262(28.3%) were involved in household work, 2847(18.9%) were doing unskilled work (agricultural activities, non-agricultural laborer, cultivator, office job class IV workers), 1779(11.8%) were involved in skilled activities (business, skilled worker, Office Job II/III). 750(5%) were unemployed and 5434(36.1%) were not involved in any activities, as 4030 of them were students, 1394 were children less than 7 years. Amongst 4140 aged 40 years and above 1722(41.6%) were involved in house work, 1283(31%) were unskilled workers, 671(16.2%), 454(11%) were unemployed.

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In prakasam, the study population was divided according to occupation, out of 10313, 1307(12.7%) were involved in household work, 4159(40.3%) were doing unskilled work (agricultural activities, non-agricultural laborer, cultivator, office job class IV workers), 1166(11.3%) were involved in skilled activities (business, skilled worker, Office Job II/III). 655(6.4%) were unemployed and 3026(29.3%) were not involved in any activities, as were students or children less than 7 years. Amongst 3528 aged 40 years and above 558(42.7%) were involved in house work, 2024(48.7%) were unskilled workers, 440(37.7%), 501(76.5%) were unemployed.

Religion- In Gurgaon, amongst the 18015 population interviewed for religion, Majority of the study population were Hindus 17666 (98.1%), 349(1.9%) were Muslims. Amongst 4353 study participants aged more than 40 years, 4294(98.6%) were Hindus, 59(1.4%) were Muslims.

In Guwahati, amongst the 15,053 population interviewed for religion, Majority of the study population were Hindus 9168(60.9%), 5794(38.5%) were Muslims, 73(0.5%) were Christians, 18(0.12%) were Sikhs. Amongst 4137 people aged more than 40 years, 2731(29.8%) were Hindus, 1385(23.9%) were Muslims, 5(27.8%) were Christians, 16(21.9%) were Sikhs.

In Prakasam, amongst the 10313 population interviewed for religion, Majority of the study population were Hindus 5897(57.2%), 1246(12.1%) were Muslims and 3170(30.7%) were Christians. Amongst 3528 people aged more than 40 years, 2073(35.1%) were Hindus, 397(31.9%) were Muslims and 1058(33.4%) were Christians.

Land Holdings- In the Household Enumeration Form (Form I), data was also recorded to assess an estimate about the socio-economic status and living conditions of the study population in the 35 clusters of Delhi. In this rural population, landholdings were accounted as an indicator of socio-economic status and were categorized on the basis of the number of acres of land possessed by that household. . In the rural population, land holdings were accounted as an indicator of socio-economic status and were categorized on the basis of the number of acres of land possessed by that household. The number of land holdings (number of acres of land) possessed ranged from none to a maximum of 24. Majority of people had no land holdings(11368, 63.1%) followed by 5428(30.1%) people with 1 to 5acres. Only 1219(6.8%) people had land holding more than 5 acres. Amongst

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4353 study participants more than 40 years, 2550(22.4%) had no land holdings followed by 1471(27.1%) participants with land holdings between 1 to 5 acres. Only 332(27.2%) participants had land holding more than 5 acres.

In the 32 clusters of Guwahati, 4138(27.5%) participants had no land holdings, 10875(72.3%) had land holdings between 1-5acres 28(0.2%) people had landholding more than 5 acres. Amongst 4130 people more than 40 years, 1005(24.3%) had no land holdings followed by (3116,28.6%) people with up to 5acres. Only (9, 32.1%) people had landholding more than 5 acres.

Amongst the 34 clusters of Prakasam, Amongst 10313 participants, 6790(65.8%) had no land holdings followed by (3217, 31.2%) participants with up to 5 acres. Only (3306, 3.0%) people had landholding more than 5 acres. Amongst 3528 people more than 40 years, 2194(32.3%) had no land holdings followed by (1209,37.6%) people with up to 5 acres. Only (125, 40.8%) people had landholding more than 5 acres.

Family income-**In Gurgaon**,The total family income from all sources per month was also recorded based on the response of the interviewee. The average family income was Indian Rs 10,457 per month. Amongst 18015 study participants 795(4.4%) had monthly income ranging between 1000-4999 rupees, 4903(27.2%) had income ranging between 5000-9999 rupees, 3958(22.0%) study participants had income between 10,000-14,999 rupees, 3164(17.6%)people had income between 15,000-19,999rupees, 2188(12.2%) study participants had income between 20,000-24,999 rupees, 1291(7.2%) people had income between 25,000-29,999 rupees, and 1716(9.3%) participants had income more than 30,000 rupees. Amongst 3190 houses in which 18015 study participants were enumerated, the total mean monthly family income was Rs 13,754.94 rupees with the mean income in the range of 600-90,000 rupees.

Amongst 4353 study participants aged more than 40 years, 210(4.8%) had monthly family income ranging between 1000-4999 rupees, 1050(21.4%) had income ranging between 5000-9999rupees, 945(23.9%) people had income between 10,000-14,999 rupees, 832(26.3%) participants had income between 15,000-19,999 rupees, 583(26.7%) participants had income between 20,000-24,999 rupees, 321(24.9%) participants had income between 25,000-29,999 rupees, 412(24%) participants had income more than 30,000 rupees. Amongst 2405 houses in which 4353 study participants aged more than 40

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years were enumerated, the total mean monthly family income of Rs 14,917.57 with the mean income in the range of 600-90,000 rupees.

In Guwahati, The total family income from all sources per month was also recorded based on the response of the interviewee. The average family income was Indian Rs 9327 per month. Amongst 15020 study participants 3321(22.1%) had monthly income ranging less than 4999 rupees, 6608(44%) had income ranging between 5000-9999 rupees, 1615 (10.8%) study participants had income between 10,000-14,999 rupees, 373(9.1%) people had income between 15,000-19,999 rupees, 764(50.1%) study participants had income between 20,000-24,999 rupees, 450(3%) people had income between 25,000-29,999 rupees, and 889(5.9%) participants had income more than 30,000 rupees.

In Prakasam,The total family income from all sources per month was also recorded based on the response of the interviewee. The average family income was Indian Rs 7109 per month. Amongst 10313 study participants 2740(26.61%) had monthly income ranging less than 4999 rupees, 4782(46.4%) had income ranging between 5000-9999 rupees, 1438(13.9%) study participants had income between 10,000-14,999 rupees, 701 (6.8%)people had income between 15,000-19,999 rupees, 295(2.9%) study participants had income between 20,000-24,999 rupees, 189(1.8%) people had income between 25,000-29,999 rupees, and 168(1.6%) participants had income more than 30,000 rupees.

10.2.1. RISK FACTOR EVALUATION (IN POPULATION >40 YEARS)

A risk assessment questionnaire (Form II) was completed for 3942(90.5%) participants aged more than 40 years staying in this area for more than 6 months, in 3572(86.3%0 participants in Guwahati, in 3132(88.8%) study participants in Prakasam. The questionnaire assessed the following:

- Type of occupation (indoor or outdoor agricultural or non-agricultural work) in present, past, remote past (more than 30 years) with number of hours spent outside their houses by the participants in the sunlight between 9a.m.to 5p.m. and during peak hours of sunlight between 11a.m. to 3p.m. when they were travelling to reach their workplace or were doing their occupational activities.
- Present- The activity done in the present duration.
- Past- Any activity done in the previous time before this present activity.

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- Remote past- Any activity done more than 30 years before the past activity

- Use of protective head gear during the sunlight along with the duration for which they wore this head gear was recorded.

- Number of hours spent in the kitchen and nature of fuel used for cooking. Bad fuels included wood, kerosene, coal, dung cake, and charcoal. Good fuels included electricity, Liquefied petroleum gas (LPG), biogas and solar cooker. This duration of exposure in kitchen was calculated in relation to female participants.

- Smoking habits in the present, past, remote past with nature of substance used for smoking (cigarette, bidi, hukka or others) was also recorded.

Though a total of 3942, 3572 and 3132 study participants were interviewed for risk assessment questionnaire in Delhi, Guwahati and Prakasam not all subjects gave a response to all questions asked. For a few questions (occupation type, sun exposure, fuel information, smoking habits, ocular diseases), data is missing and so, the total number of participants for each variable is different.

Demographic profile

Table 3: Demographic characteristics of the enumerated and population assessed for risk factors in participants aged more than 40 years

	Gurgaon		Guwahati		Prakasam	
	Study Population (40+ years)	**Population assessed for risk factors**	**Study Population (40+ years)**	**Population assessed for risk factors**	**Study Population (40+ years)**	**Population assessed for risk factors**
Age(years)	**4,353**	**3942**	**4140**	**3572 (86.3%)**	**3,528**	**3132 (88.8)**
40-49	1,822 (41.9)	1589 (87.2)	1,947 (47.0)	1619 (83.2)	1398 (39.6)	1229 (87.9)
50-59	1,084 (24.9)	979 (90.3)	1,051 (25.4)	901 (85.7)	912 (25.9)	808 (88.6)
60-69	845 (19.4)	802 (94.9)	710 (17.2)	649 (91.4)	746 (21.2)	668 (89.5)
≥70	602 (13.8)	572 (95.0)	432 (10.4)	403 (93.3)	472 (13.4)	427 (90.5)
Gender	**4,353**	**3942**	**4140**	**3572 (86.3)**	**3,528**	**3132 (88.8)**
Male	2,159 (49.6)	1828 (84.7)	2176 (52.6)	1728 (79.4)	1705 (48.3)	1440 (84.5)
Female	2,194 (50.4)	2114 (96.4)	1964 (47.4)	1844 (93.9)	1823 (51.7)	1692 (92.8)
Education	**4,353**	**3942**	**4140**	**3572 (86.3)**	**3,528**	**3132 (88.8)**
Illiterate	2,023 (46.5)	1910 (94.4)	1596 (28.6)	1430 (89.6)	2274 (64.5)	2064 (90.8)
Can read & write upto primary	639 (14.7)	578 (90.5)	986 (23.8)	874 (88.6)	594 (16.8)	523 (88.0)
Primary to intermediate	1,556 (35.8)	1340 (86.1)	1377 (33.3)	1142 (82.9)	560(15.9)	466 (83.2)
Graduation and above	135 (3.0)	114 (84.4)	158 (3.8)	111 (70.3)	98 (2.8)	78 (79.6)
Others*	0 (0.00)	0 (0.00)	3 (0.1)	0 (0.0)	2 (0.1)	1 (50.0)
99	0 (0.00)	0 (0.00)	20 (0.5)	15 (75.0)	0 (0.00)	0 (0.00)
Marital Status	**4,353**	**3942**	**4140**	**3572 (86.3)**	**3,528**	**3132 (88.8)**
Married	3,536 (81.2)	3163 (89.5)	3296 (79.7)	2813 (85.3)	2668 (75.6)	2335 (87.5)
Unmarried	26 (0.6)	24 (92.3)	82 (2.0)	65 (79.3)	24 (0.7)	19 (79.2)
Others (Divorced Separated Widow/widower)	791 (18.2)	755 (95.4)	762 (18.4)	694 (91.1)	836 (23.7)	758 (90.7)

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Occupation	4,353	3942	4140	3572 (86.3)	3,528	3132 (88.8)
House work	1,885 (43.3)	1825 (96.8)	1722 (41.7)	1622 (94.2)	558 (15.8)	501 (89.8)
Unskilled	1,100 (25.3)	920 (83.6)	1283 (31.0)	1053 (82.1)	2024 (57.4)	1808 (89.3)
Skilled	605 (13.9)	468 (77.4)	671 (16.2)	467 (69.6)	440(12.5)	357 (81.1)
Unemployed	763 (17.5)	729 (95.5)	454 (11.0)	423 (93.2)	501(14.2)	463 (92.4)
Others**	0 (0.00)	0 (0.00)	10 (0.2)	7 (70.0)	5 (0.1)	3 (60.0)
Religion	**4,353**	**3942**	**4140**	**3572 (86.3)**	**3,528**	**3132 (88.8)**
Hindu	4,294 (98.6)	3889 (90.6)	2731 (66.0)	2355 (86.2)	2073(58.8)	1828 (88.2)
Muslim	59 (1.4)	53 (89.8)	1385 (33.5)	1200 (86.6)	397(11.3)	339 (85.4)
Sikh	0 (0.00)	0 (0.00)	5 (0.1)	4 (80.0)	0 (0.00)	0 (0.00)
Christian	0 (0.00)	0 (0.00)	16 (0.4)	10 (62.5)	1058(30.0)	965 (91.2)
Cultivable land	**4,353**	**3942**	**4130**	**3562 (86.3)**	**3,528**	**3132 (88.8)**
No Land	2550 (58.6)	2293 (89.9)	1005 (24.3)	870 (86.6)	2194 (62.2)	1911 (87.1)
1 to 5 acres	1471 (33.8)	1342 (91.2)	3116 (75.5)	2684 (86.1)	1209 (34.3)	1110 (91.8)
>5 acres	332 (7.6)	307 (92.5)	9 (0.2)	8 (88.9)	125 (3.5)	111 (88.8)
Family Income	**4, 353**	**3942**	**4127**	**3560 (86.3)**	**3,528**	**3132 (88.8)**
< 4999	210 (4.8)	198 (94.3)	830 (20.1)	729 (87.8)	1158 (32.8)	1031 (89.0)
5000 to 9999	1,050 (24.1)	951 (90.6)	1749 (42.4)	1520 (86.9)	1464 (41.5)	1307 (89.3)
10000 to 14999	945 (21.7)	847 (89.6)	470 (11.4)	418 (88.9)	461 (13.1)	412 (89.4)
15000 to 19999	832 (19.1)	750 (90.1)	427 (10.4)	364 (85.2)	220 (6.2)	195 (88.6)
20000 to 24999	583 (13.4)	523 (89.7)	224 (5.4)	178 (79.5)	107 (3.0)	88 (82.2)
25000 to 29999	321 (7.4)	300 (93.5)	146 (3.5)	125 (85.6)	58 (1.6)	49 (84.5)
30000 and above	412 (9.5)	373 (90.5)	281 (6.8)	226 (80.4)	60(1.7)	50 (83.3)

Others data not available*
99 Not known

In Gurgaon, a total of 18015 participants were enumerated of these 4353 participants were aged more than 40 years,from these 3942 participants underwent interview for risk assessment. In Guwahati a total of 15072 were enumerated in Guwahati of these 4140 participants were aged more than 40 years amongst these 3572 participants underwent interview for risk assessment . In Prakasam a total of 10313 were enumerated of these 3528 participants were aged more than 40 years., amongst these 3132 participants underwent interview for risk assessment

The details are as follows :-

Age and Gender- In Gurgaon, Among the 3942 subjects, 1589(41.9 %) were in the age group of 40-49 years of these 1589(87.2%) underwent risk assessment interview in this age group, 1084(24.9 %) were in age group 50-59 years of these 979(90.3%) were interviewed for risk assessment, 845(19.4%) were in age group of 60-69 years, of these 802(94.9%) underwent risk assessment interview. 602(13.8%) belonged to age group more than or equal to 70 years of these 572(95%) were interviewed for risk assessment. Out of 2159(49.6%) males enumerated, 1828(84.7%) underwent risk assessment interview and amongst 2194(50.4%) females, 2114(96.4 %) females were interviewed.

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In Guwahati, amongst 4140 people more than 40 years, Among the 3942 subjects, 1947 (47 %) were in the age group of 40-49 years of these 1619(83.2%) underwent risk assessment interview in this age group, 1051(25.4 %) were in age group 50-59 years of these 901(85.7%) were interviewed for risk assessment, 710(17.2%) were in age group of 60-69 years, of these 649(91.4%) underwent risk assessment interview. 432(10.4%) belonged to age group more than or equal to 70 years of these 403(93.3%) were interviewed for risk assessment. Out of 2176(52.6%) males enumerated, 1728(79.4%) underwent risk assessment interview and amongst 1964(47.4%) females, 1844(93.9%) females were interviewed.

In Prakasam, Among the 3528 subjects, 1398(39.6%) were in the age group of 40-49 years of these 1229(87.9%) underwent risk assessment interview in this age group, 912 (25.9%) were in age group 50-59 years of these 808(88.6%) were interviewed for risk assessment, 746(21.2%) were in age group of 60-69 years, of these 668(89.5%) underwent risk assessment interview. 472(13.4 %) belonged to age group more than or equal to 70 years of these 427(90.5%) were interviewed for risk assessment. Out of 1705 (48.3%) males enumerated, 1440(84.5%) underwent risk assessment interview and amongst 1823(51.7%) females, 1692(92.8%) females were interviewed.

Education- In Gurgaon, amongst 3942 participants maximum of 1910(94.4%) were illiterates followed by 1340 (86.1%) were educated till intermediate grades.
In Guwahati, amongst 3572 participants a maximum of 1430(89.6%) were illiterates followed by 1142(82.9%) study participants that were educated till intermediate grades.

In Prakasam, amongst 3132 participants, 2064(90.8%) were illiterates followed by 523 (88%) that were educated till primary grade.

Marital Status- In Gurgaon, Out of 3942 participants undergoing risk assessment interview, 3163(89.5%) were married, 24(92.3%) were unmarried, 755(95.4%) were divorced or separated or widowed.

In Guwahati, Out of 3572 participants undergoing risk assessment interview, 2813 (85.3%) were married, 65(79.3%) were unmarried, 694(91.1%) were divorced or separated or widowed.

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In Prakasam, Out of 3132 participants undergoing risk assessment interview, 2335(87.5%) were married, 19(79.2%) were unmarried, 758(90.7%) were divorced or separated or widowed.

Occupation-In Gurgaon, Out of 3942 participants undergoing risk assessment interview, 1825(96.8 %) were household workers, 920(83.6%) did unskilled activities, 468(77.4%) were doing skilled jobs, 729(95.5%) were unemployed.

In Guwahati, amongst 3572 Out of 3942 participants undergoing risk assessment interview, 1825(96.8%) were household workers, 920(83.6%) did unskilled activities, 468(77.4%) were doing skilled jobs, 729(95.5%) were unemployed.

In prakasam, amongst 3528 aged 40 years and above 558(15.8%) were involved in house work, 2024(57.4%) were unskilled workers, 440(14.2%), 501(14.2%) were unemployed.

Religion-In Gurgaon, Out of 3942 participants undergoing risk assessment interview, 3889(90.6%) were Hindus, 53(89.8%) were Muslims.

In Guwahati, amongst 3572 participants undergoing risk assessment interview, 2355(86.2%) were Hindus, 1200(86.6%) were Muslims, 4(80%) were Sikhs and 10(62.5%) were Christians.

In Prakasam, Out of 3132 participants undergoing risk assessment interview, 1828 (88.2%) were Hindus, 339(85.4%) were Muslims and 965(91.2%) were Christians.

Land Holdings-In Gurgaon,Out of 3942 participants undergoing risk assessment interview, 2293(89.9%) did not own any land. 1342(91.2%) had up to 5 acres of land and 307(92.5%) had more than 5 acres of land.

In the 32 clusters of **Guwahati**, amongst 3562 people more than 40 years, 870(86.6%) did not own any land. 2684(86.1%) had up to 5 acres of land and 8(88.9%) had more than 5 acres of land.

Amongst the 34 clusters of **Prakasam,** amongst 3132 participants, 1911(87.1%) did not own any land. 1110(91.8%) had up to 5 acres of land and 111(88.8%) had more than 5 acres of land.

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Family income- In Gurgaon, Out of 3942 people undergoing risk assessment interview, 198(94.3%) had income between 1000-4999 rupees, 951(90.6%) had income between 50000–9999 rupees, 847(89.6%) had income between 10000–14999 rupees, 750 (90.1%) had income between 15000-19999 rupees, 523(89.7%) had income between 20000-24999 rupees, 300(93.5%) had income between 25000-29999 rupees, 373(90.5%) had income more than 30,0000 rupees.

In Guwahati, Out of 3560 people undergoing risk assessment interview, 729(87.8%) had income between 1000-4999 rupees, 1520(86.9%) had income between 50000–9999 rupees, 418(88.9%) had income between 10000-14999 rupees, 364(85.2%) had income between 15000-19999 rupees, 178(79.5%) had income between 20000-24999 rupees, 125(85.6%) had income between 25000-29999 rupees, 226(80.4%) had income more than 30,0000 rupees.

In Prakasam, Out of 3942 people undergoing risk assessment interview, 198(94.3%) had income between 1000-4999 rupees, 951(90.6%) had income between 50000–9999 rupees, 847(89.6%) had income between 10000–14999 rupees, 750(90.1%) had income between 15000-19999 rupees, 523(89.7%) had income between 20000 -24999 rupees, 300(93.5%) had income between 25000-29999 rupees, 373(90.5%) had income more than 30,0000 rupees.

Table 4: Categorisation of study participants according to the history of the activities done in past, present and remote past at all study sites

Study Area	Present	Past	Remote past
Gurgaon	3942	2661	656
Guwahati	3572	3314	1460
Prakasam	3132	3137	128

In Gurgaon, the history of activities in the form of agriculture / outdoor non agricultural /and indoor activities was available in 3942 participants in the present, 2661 participants in the past and 656 participants in the remote past.

In Guwahati, the history of above activities was available in 3572 participants in the present, 3314 participants in the past and 1460 participants in the remote past.

In Prakasam, the history of similar activities was available in 313 participants in the present, 3137 participants in the past and 128participants in the remote past.

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Table 5: Mean cumulative duration of sun exposure in present, past and remote past reported by the study participants

Number of People	Gurgaon		Guwahati		Prakasam	
	Mean duration of sun exposure (Thousand Hours)	95% CI	Mean duration of sun exposure (Thousand Hours)	95% CI	Mean duration of sun exposure (Thousand Hours)	95% CI
Present	28.06	27.1-29.0	27.11	26.4-27.8	48.25	46.60-49.89
Past	61.39	60.0-62.8	30.69	29.8-31.6	76.83	74.05-79.61
Remote Past	19.66	18.4-21.0	8.61	8.1-9.1	39.79	31.98-47.59
Total	72.77	71.8-73.8	59.16	58.5-59.9	77.75	76.13-79.34

Methodology for calculating Total Sun Exposure (Thousand hours) - Total exposure time (hours) in doing outdoor activity per day* total years of doing outdoor activity (9 am-5 pm) in in present *365.25, past or remote past* 365.25/1000

In Gurgaon, 3942 study participants interviewed for risk assessment questionnaire, the mean duration of exposure to sun in present was 28.06 thousand hours (CI 27.1-29.0), Of 2661 giving information of past exposure, the mean duration of exposure to sun in past was 61.39 thousand hours (CI 60.0-62.8). Of 656 participants who gave history of remote past exposure, the mean duration of exposure to sun in remote past was 19.66 thousand hours (CI 18.4-21.0). The total average duration of exposure to sun in 3942 participants was 72.77 thousand hours (71.8-73.8).

Amongst 3567 people **in Guwahati,** the mean duration of exposure to sun in present was 27.11 thousand hours (CI 26.4-27.8), of 3310 people who have information of past exposure, the mean duration of exposure to sun in past was 30.69 thousand hours (CI 29.8-31.6), of 1454 participants who gave history of remote past exposure, the mean duration of exposure to sun in remote past was 8.61 thousand hours (CI 8.1-9.1). The total average duration of exposure to sun in 3567 participants was 59.16 thousand hours (58.5-59.9).

Amongst 3129 people **in Prakasam**, the mean duration of exposure to sun in present was 48.25 thousand hours (CI 46.60-49.89), of 1136 people who have information of past exposure, the mean duration of exposure to sun in past was 76.83 thousand hours (CI 74.05-79.61). Of 127 participants who gave history of remote past exposure, the mean

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duration of exposure to sun in remote past was 39.79 thousand hours (CI 31.98-47.59). The total average duration of exposure to sun in 3129 participants was 77.75 thousand hours (76.13-79.34).

Participants were categorized in two groups based on higher than or less than mean lifetime total sun exposure. The prevalence of various eye disorders were then compared across participants in the two groups using uni-variable and multi-variable logistic regression (Table)

Table 6: Prevalence of smoking in present or past in study participants

History of Smoking	Gurgaon n (%)	Guwahati (%)	Prakasam (%)
Smokers	2208 (56.0)	841 (23.6)	936 (29.9)
Non smokers	1734 (44.0)	2723 (76.4)	2196 (70.1)
Total	3942	3564*	3,132*

* Information related to smoking was not available in

In Gurgaon, of 3942 participants interviewed for risk assessment questionnaire, 2208 gave positive history of smoking. Prevalence of smoking in this population was 56.0%.

In Guwahati, of 3563 participants interviewed for risk assessment questionnaire, 841 gave positive history of smoking. Prevalence of smoking in this population was 23.6%.

In Prakasam, of 3132 participants interviewed for risk assessment questionnaire, 936 gave positive history of smoking. Prevalence of smoking in this population was 29.9%.

Table 7: Type of tobacco products used at present in the study participants

	Gurgaon	Guwahati	Prakasam
Type of smoked tobacco product	**Present (n,%)**	**Present (n,%)**	**Present (n,%)**
Cigarette	31 (1.3)	205 (29.6)	278 (29.7)
Bidi	1582 (65.4)	443 (64)	303 (32.4)
Hukka	804 (33.2)	6 (0.9)	1 (0.1)
Others (Specify)	1 (0.1)	38 (5.5)	335 (35.8)

- **In Gurgaon**, though there were 2208 smokers, the detailed history of type of substance used for smoking in present was available in 2418 participants as one participant could be using more than one substance for smoking.

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- The percentage calculated for the study participants is calculated with 2418(i.e participants giving history of smoking in present) as denominator.

- Out of 2208 smokers, 31(1.3%) gave history of smoking cigarettes, 1582(65.4%) gave positive history of bidi smoking, 804(33.2%) smoked hukkas and 1(0.05%) smoked other substances (*bhang/ chillum/ ganja /khasang /shang*)

In Guwahati, the detailed history of type of substance used for smoking in present was available in 692 participants out of 841 smokers, Amongst these 692 smokers, 205 (29.6%) gave positive history of smoking cigarettes, 443(64%) gave positive history of bidi smoking, 6(0.9%) smoked Hukkas and 38(5.5%) smoked other substances like Bhang, Chilim, Ganja, Khasang and Shang.

In Prakasam, the detailed history of type of substance used for smoking in present was available in 919 participants out of 936 smokers, amongst these 936 smokers, 278(29.7%) gave positive history of smoking cigarettes, 303(32.4%) gave positive history of bidi smoking, 1(0.1%) smoked Hukkas and 335(35.8%) smoked other substances like Bhang, Chilim, Ganja, Khasang and Shang.

Table 8: Categorisation of study participants according to pack years of smoking

Pack Years of Smoking	Gurgaon Study population, n (%)	Guwahati Study population, n (%)	Prakasam Study population, n (%)
Non Smoker	1734 (44.0)	2731(76.4)	2195(70.1)
>0 to ≤1 pack years	288 (7.3)	189(5.3)	64(2)
>1 to <5 pack years	651 (16.5)	375(10.5)	211(6.7)
≥5 pack years	1268 (32.2)	239(6.7)	334(10.7)
Other Smoker	1 (0.03)	38(1.1)	328(10.5)

Calculation of Pack Years of smoking[13]: Pack year is calculated by multiplying the number of packs of cigarettes smoked per day by the number of years the person has smoked. It assumes 1 cigarette pack contains 20 cigarettes. For example, 1 pack year is equal to smoking 1 pack per day for 1 year, or 2 packs per day for half a year, and so on.

- Cigarette Smoking Pack years= years of smoking x cigarettes smoked per day/20
- Bidi Smoking Pack years= years of smoking x bidis smoked per day/4 x/20, (1 bidi was considered as equivalent to 1/4 of a cigarette)

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- Hukkah Smoking Pack years= Years of smoking x sessions smoked per day * 10/20, (Assuming 1 chilem of hukkah if smoked for 30 minutes is equivalent to 10 cigarettes)

In **Gurgaon**, From the total of 2208 participants giving positive history of smoking, smoke pack years were calculated using above mentioned formula. Among these participants, 1734 were nonsmokers, 288(7.3%) smoked upto 1 smoke pack years, 651(16.5%) smoked upto 5 pack years, 1268(32.2%) smoked more than 5 pack years. Only 1 participant gave history of smoking other substances so above formula could not be applied for those substances.

In Guwahati, From the total of 841 participants giving positive history of smoking, smoke pack years were calculated using above mentioned formula. Among these participants, 2731 were nonsmokers, 189(5.3%) smoked upto 1 smoke pack years, 375(10.5%) smoked upto 5 pack years, 239(6.7%) smoked more than 5 pack years. 38 participants gave history of smoking other substances so above formula could not be applied for those substances.

In Prakasam, From the total of 936 participants giving positive history of smoking, smoke pack years were calculated using above mentioned formula. Among these participants, 2195(70.1%) were nonsmokers, 64(2%) smoked upto 1 smoke pack years, 211(6.7%) smoked upto 5 pack years, 334(10.7%) smoked more than 5 pack years. 328 participant gave history of smoking other substances so above formula could not be applied for those substances.

Table 9: Categorisation of study participants according to duration of years of cooking food/spending time in the kitchen

Number of years	Gurgaon n (%)	Guwahati n (%)	Prakasam n (%)
0.5-9	225 (9.0)	20 (0.6)	40 (2.3)
10-19	98 (3.9)	32 (1.0)	37 (2.1)
20-30	712 (28.4)	527 (16.1)	294 (16.7)
> 30	1471 (58.7)	2687 (82.3)	1389 (78.9)
Total	2506 (100)	3266 (100)	1760 (100)

A detailed information regarding nature of fuel[10] used was also noted from the study population.

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Bad fuels included use of wood, kerosene, coal, dung-cakes or charcoal. Good fuels included use of electricity, LPG, biogas or solar cooker for cooking.

In Gurgaon, amongst 3942 participants, a total of 2506(63.6%) participants were involved in cooking and were therefore interviewed for the duration of cooking in years and type of fuel used for cooking. Nearly 1471(58.7%) have been cooking for more than 30 years followed by 712(28.4%) cooking for 20-30 years, 98(3.9%) spent 10-19 years in the kitchen and 225(9.0%) spent less than 9 years in the kitchen. The mean duration spent in the kitchen was 2.09 hours (range 0.25-11 hours) per day.

In Guwahati, all these 3267 participants were also interviewed for the duration of cooking in years and type of fuel used for cooking. Nearly 2688(82.3%) have been cooking for more than 30 years followed by 527(16.1%) cooking for 20-30 years, 32 (1.0%) spent 10-19 years in the kitchen and 20(0.6%) spent less than 9 years in the kitchen. The mean duration spent in the kitchen were 2.2 hours (range 0.5-10 hours) per day.

In Prakasam, all these 1760 participants were also interviewed for the duration of cooking in years and type of fuel used for cooking. Nearly 1389(78.9%) have been cooking for more than 30 years followed by 294(16.7%) cooking for 20-30 years, 37(2.1%) spent 10-19 years in the kitchen and 40(2.3%) spent less than 9 years in the kitchen. The mean duration spent in the kitchen was 1.7 hours (range 0.25-12 hours) per day.

A detailed information regarding nature of fuel used was also noted from the study population.

Bad fuels included use of wood, kerosene, coal, dung-cakes or charcoal. Good fuels included use of electricity, LPG, biogas or solar cooker for cooking.

10.2.2. OSDI (Ocular Surface Disease Index)[14]

OSDI score is an important determinant for dry eye. It consists of various symptoms related to sensitivity of eyes to light with few symptoms like watering, pain, redness, blurring of vision difficulty in opening of eyes while reading, watching television, in air conditioned atmosphere, in areas of low humidity along with the duration of these symptoms throughout the day, most and some of the times of day. The OSDI includes the following 3 domains: ocular symptoms, vision-related function and environmental triggers. The goals of OSDI are to make the diagnosis of ocular surface disease easier,

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quicker more reliable to provide evidence of differences in ocular disability due to dry eye disease. The OSDI allows clinicians to collect comprehensive subjective data in addition to a clinical history, and it can be used as a tool for measuring the effectiveness of a specific dry eye disease treatment.The OSDI is a 12-item self-administered questionnaire to assess ocular surface symptoms. The questionnaire takes approximately 5 minutes to complete and has been used successfully by researchers and by clinicians. The OSDI has an overall score and 3 subscale scores (ocular symptoms [5 items], vision-related function [4 items], and environmental triggers [3 items]). The OSDI has satisfactory internal consistency, test-retest reliability, validity, sensitivity, and specificity for use among patients with ocular surface disease. The information related to OSDI score was recorded in Form III.

The OSDI was calculated by the following formula:

Total score/ Number of questions answered by the participants *25

A mean of 35 was taken as cutoff for dry eye after applying the results on a study subgroup, Participants having OSDI more than 35 were considered as having dry eye.

Table 10: Distribution of study participants for total OSDI score according to gender

OSDI	Gurgaon		Guwahati		Prakasam	
	Score<35 (Normal)	Score>35 (Dry Eye)	Score<35 (Normal)	Score>35 (Dry Eye)	Score<35 (Normal)	Score>35 (Dry Eye)
Age(Years)						
40-49	1136 (71.49)	453 (28.5)	1,457 (90.5)	153 (9.5)	1135 (92.4)	94 (7.7)
50-59	681 (69.6)	298 (30.4)	764 (85.4)	131 (14.6)	698 (86.5)	109 (13.5)
60-69	540 (67.3)	262 (32.7)	511 (79.0)	136 (21.0)	528 (79.0)	140 (21.0)
≥70	303 (53.0)	269 (47.0)	250 (62.5)	150 (37.5)	310 (72.6)	117 (27.4)
Gender						
Male	1329 (72.7)	499 (27.3)	1,538 (89.5)	180 (10.5)	1273 (88.4)	167 (11.6)
Female	1331 (63.0)	783 (37.0)	1,444 (78.8)	390 (21.3)	1398 (82.7)	293 (17.3)
Total	2660 (67.5)	1282 (32.5)	2,982 (83.9)	570 (16.1)	2671 (85.3)	460 (14.7)

OSDI (Ocular Surface Disease Index) score. The mean OSDI was 35 the participants having a score of <35 were considered as normal and having a score of >35 were considered as having dry eye.

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In Gurgaon, according to this OSDI score was less than 35 in 1329(72.7%) males and 1331(63.0%) females and OSDI score was more than 35 in 499(27.3%) males and 783 (37.0%) females out of 1828 males and 2114 females respectively.

In Guwahati, according to this OSDI score was less than 35 in 1,538(89.5%) males and 1,444(78.7%) females and OSDI score was more than 35 in 180(10.5%) males and 390 (21.3%) females out of 1718 males and 1834 females respectively.

In Prakasam, according to this OSDI score was less than 35 in 1329(72.7%) males and 1331(63%) females and OSDI score was more than 35 in 499(27.3%) males and 783(37%) females out of 1440 males and 1691 females respectively.

Table 11: Prevalence of dry eye using OSDI score in study participants

OSDI	Gurgaon n (%)	Guwahati n (%)	Prakasam n (%)
Score<35 (Normal)	2,660(67.5)	2,982(83.9)	2671(85.3)
Score>35 (Dry Eye)	1,282(32.5)	570(16.1)	460(14.7)
Total	3,942(100.0)	3,552(100.0)	3,131(100.0)

The prevalence of dry eye in **Gurgaon** according to OSDI score was 32.5%.

The prevalence of dry eye in **Guwahati** according to OSDI score was 16.1%.

The prevalence of dry eye in **Prakasam** according to OSDI score was 14.7%.

CLINICAL EXAMINATION (STUDY PARTICIPANTS>40 YEARS)

Form V consisted of detailed clinical examination in study sample more than 40 years. In Gurgaon, Out of total 4353 participants enumerated in age group more than 40 years, 3595 gave history of systemic disorders and underwent clinical examination by ophthalmologist. In Guwahati, Out of total 4140 participants enumerated in age group more than 40 years, 3231 gave history of systemic disorders and underwent clinical examination by ophthalmologist. In Prakasam, Out of total 3528 participants enumerated in age group more than 40 years, 2909 gave history of systemic disorders and underwent clinical examination by ophthalmologist. However, for a few questions like presence and duration of systemic diseases, refraction, ocular diseases like cataract, dry eye and pterygium, the data was missing.

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Table 12: **Demographic Characteristics of the enumerated sample population (population aged more than 40 years) undergoing clinical examination in Gurgaon:**

	Study Population (40+ years)	Examined Population
Age(years)	**4,353**	**3595**
40-49	1,822 (41.9)	1427 (78.3)
50-59	1,084 (24.9)	881 (81.3)
60-69	845 (19.4)	746 (88.3)
≥70	602 (13.8)	541 (89.9)
Gender	**4,353**	**3595**
Male	2,159 (49.6)	1614 (74.8)
Female	2,194 (50.4)	1981 (90.3)
Education	**4,353**	**3595**
Illiterate	2,023 (46.5)	1769 (87.4)
Can read & write	639 (14.7)	532 (83.3)
Intermediate	1,556 (35.8)	1192 (76.6)
Graduation	135 (3.0)	102 (75.6)
Marital Status	**4,353**	**3595**
Married	3,536 (81.2)	2887 (81.6)
Unmarried	26 (0.6)	18 (69.2)
Others(Divorced/ Separated/widow/widower)	791 (`8.2)	690 (87.2)
Occupation	**4,353**	**3595**
House work	1,885 (43.3)	1712 (90.8)
Unskilled	1,100 (25.3)	801 (72.8)
Skilled	605 (13.9)	399 (66.0)
Unemployed	763 (17.5)	683 (89.5)
Religion	**4,353**	**3595**
Hindu	4,294 (98.6)	3548 (82.6)
Muslim	59 (1.4)	47 (79.7)
Cultivable land	**4,353**	**3595**
No Land	2550 (58.6)	2076 (57.7)
1 to 5 acres	1471 (33.8)	1228 (34.2)
>5 acres	332 (7.6)	291 (8.1)
Family Income	**4, 353**	**3595**
<5000	210 (4.8)	173 (82.4)
5000 to 9999	1,050(24.1)	865 (82.4)
10000 to 14999	945 (21.7)	771 (81.6)
15000 to 19999	832 (19.1)	689 (82.8)
20000 to 24999	583 (13.4)	480 (82.3)
25000 to 29999	321 (7.4)	272 (84.7)
30000 and above	412 (9.5)	345 (83.7)

In Gurgaon, amongst 4353 participants aged 40 years and above, a total of 3595 underwent clinical examination.

Age and Gender- Amongst 4353(24.2%) participants aged more than 40 years, 1822 were between 40-49 years age group. 1084 were in age group 50-59 years, 845 were in

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age group 60-69 years and 602 were ≥70 years. A total of 2159(22.7%) were males and 2194(25.7%) were females. Amongst these total 3595 participants undergoing clinical examination, 1,427(78.3%) were between 40-49 years age group. 881 (81.3%) were in 50-59 years, 746(88.3%) were between 60-69 years and 541(89.9%) were ≥70 years. A total of 1614(74.8%) were males and 1981(90.3%) were females.

Education-Amongst 4353 people aged more than 40 years, a total of 2023(75.7%) were illiterate, 639(20%) were those who can read and write to educated upto primary class, 1556(14.2%) were educated between primary to intermediate grade, 135(14.2%) were graduates, post graduates, diploma holders and professionally qualified. Of the 3595 participants undergoing clinical examination, 1769(87.4%) were illiterates, 532(83.3%) were those who Can read and write to educated upto primary class, 1192(76.6%) were educated between primary to intermediate grade, 102(75.6%) were graduates, post graduates, diploma holders and professionally qualified.

Marital Status- Amongst 3595 participants undergoing clinical examination out of 4353 participants aged 40 years and above the marital status was as follows, 2887(81.6%) were married, 18(69.2%) were unmarried, 2(50.0%) were divorced, 688(87.6%) were widowed.

Occupation- Amongst 4353 aged 40 years and above 1885(39%) were involved in house work of these 1712(90.8%) were clinically examined, 1100(39.7%) were unskilled workers of these 801(72.8%) were clinically examined, 605(32.4%) were involved in skilled activities (business, skilled worker, Office Job I/II/III) of which 399(66.0%) were clinically examined and 763(78.7%) were unemployed of these 683(89.5%) were clinically examined.

Religion- Amongst 4353 study participants aged more than 40 years, 4294(24.3%) were Hindus of these 3548(82.6%) were clinically examined, 59(16.9%) were Muslims of these 47(79.7%) underwent clinical examination.

Land Holdings- Amongst 4353 study participants more than 40 years, 2550(58.6%) had no land holdings followed by 1471(33.8%) participants with landholdings between 1 to 5 acres. Only 332(7.6%) participants had landholding more than 5 acres.

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Family income-The total family income from all sources per month was also recorded, based on the response of the interviewee. Amongst 4353 participants aged 40 years and above 210(4.8%) had income less than 5000 rupees of these 173(82.4%) underwent clinical examination, 1050(24.1%) had income ranging between 5000-9999 rupees of these 865(82.4%) underwent clinical examination, 945(21.7%) study participants had income between 10,000-14,999 rupees of these 771(81.6%) were clinically examined, 832(19.1%) people had income between 15,000-19,999 rupees of which 689(82.8%) underwent clinical examination, 583(13.4%) study participants had income between 20,000-24,999 rupees of these 480(82.3%) underwent clinical examination,321(7.4%) people had income between 25,000-29,999 rupees of these 272(84.7%) underwent clinical examination,412(9.5%) participants had income more than 30,000 rupees out of 345(83.7%) underwent clinical examination.

Table 12.1: Demographic Characteristics of the enumerated sample population (population aged more than 40 years) undergoing clinical examination in Guwahati:

	Study Population (40+ years)	Examined Population
Age(years)	**4140**	**3231 (78.0%)**
40-49	1,947 (47.0)	1454 (74.7)
50-59	1,051 (25.4)	802 (76.3)
60-69	710 (17.2)	603 (84.9)
≥70	432 (10.4)	372 (86.1)
Gender	**4140**	
Male	2176 (52.6)	1491 (68.5)
Female	1964 (47.4)	1740 (88.6)
Education		
Illiterate	1596 (28.6)	1306 (81.8)
Can read & write	986 (23.8)	779 (79.0)
Intermediate	1377 (33.3)	1036 (75.2)
Graduation	158 (3.8)	101 (63.9)
99	23 (0.6)	9 (45.0)
Marital Status		
Married	3296 (79.7)	2516 (76.3)
Unmarried	82 (2.0)	54 (65.9)
Others (Divorced/ Separated/widow/widower)	762 (18.4)	661 (86.7)
Occupation		
House work	1722 (41.7)	1528 (88.7)
Unskilled	1283 (31.0)	915 (31.1)
Skilled	671 (16.2)	396 (16.2)
Unemployed	454 (11.0)	386 (11.0)
99	10 (0.2)	6 (60.0)
Religion		

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Hindu	2731 (66.0)	2115 (77.4)
Muslim	1385 (33.5)	1101 (79.5)
Sikh	5 (0.1)	4 (80.0)
Christian	16 (0.4)	8 (50.0)
Cultivable land		
No Land	1005 (24.3)	782 (77.8)
1 to 5 acres	3116 (75.5)	2432 (78.0)
>5 acres	9 (0.2)	7 (77.8)
Family Income		
< 4999	830 (20.1)	657 (79.2)
5000 to 9999	1749 (42.4)	1383 (79.1)
10000 to 14999	470 (11.4)	372 (79.1)
15000 to 19999	427 (10.4)	332 (77.8)
20000 to 24999	224 (5.4)	164 (73.2)
25000 to 29999	146 (3.5)	114 (78.1)
30000 and above	281 (6.8)	197 (70.1)

99 Education and occupation information not available

In Guwahati, Amongst 4140participants aged 40 years and above, a total of 3231 underwent clinical examination.

Age and Gender: Of total 4140 people enumerated in age group more than 40 years, 3231(78.04%) underwent detailed ocular examination, In the age group of 40-49 years out of 1947 enumerated, 1454(74.7%) underwent ocular examination, In the age group of 50-59 years out of 1051 enumerated 802(76.3%) underwent ocular examination, In the age group of 60-69 years out of 710 enumerated 603(84.9%) underwent ocular examination, In the age group of more than 70 years out of 432 enumerated 372(86.1%) underwent ocular examination. . In total 3231 people examined, there were 1491(46.2%) males and 1740(53.8%) females.

Education-Amongst 4140 people aged more than 40 years, a total of 1596(28.6%) were illiterate, 986 (23.8%) were those who can read and write to educated upto primary class, 1377(33.3%) were educated between primary to intermediate grade, 158(3.8%) were graduates, post graduates, diploma holders and professionally qualified. Of the 3595 participants undergoing clinical examination, 1306(81.8%) were illiterates, 779(79.0%) were those who Can read and write to educated upto primary class, 1036(75.2%) were educated between primary to intermediate grade, 101(63.9%) were graduates, post graduates, diploma holders and professionally qualified.

Marital Status- Amongst 3231 participants undergoing clinical examination out of 4140 participants aged 40 years and above the marital status was as follows, 2516(76.3%) were married, 54 (65.9%) were unmarried, 661(86.7%) were divorced or widowed.

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Occupation- Amongst 3231 examined study participants aged 40 years and above 1528(89%) were involved in house work, 915(31.1%) were unskilled workers, 396(16.2%) were involved in skilled activities (business, skilled worker, Office Job I/II/III), 386(11%) were unemployed of these 683(89.5%) were clinically examined.

Religion- Amongst 3231 examined study participants aged more than 40 years, 2115(77.4%) were Hindus, 1101(79.5%) were Muslims, 4(80%) were Sikhs and 8(50%) were Christians.

Land Holdings - Amongst 3231 examined study participants more than 40 years, 782(77.8%) had no land holdings followed by 2432(78%) participants with landholdings between 1 to 5 acres. Only 7(77.8%) participants had landholdings more than 5 acres.

Family income-The total family income from all sources per month was also recorded, based on the response of the interviewee. Amongst 3231 participants aged 40 years and above 657(79.2%) with income less than 5000 rupees underwent clinical examination, 1383(79.1%) with income ranging between 5000-9999 rupees underwent clinical examination , 372(79.1%) with income between 10,000-14,999 rupees underwent clinical examination, 332(77.8%) people with income between 15,000-19,999 rupees underwent clinical examination, 164(73.2%) study participants with income between 20,000-24,999 rupees underwent clinical examination, 114(78.1%) people with income between 25,000 - 29,999 rupees underwent clinical examination, 197(70.1%) participants with income more than 30,000 rupees underwent clinical examination.

Table 12.2: **Demographic Characteristics of the enumerated sample population (population aged more than 40 years) undergoing clinical examination in Prakasam**

	Study Population (40+ years)	Examined Population
Age(years)	**3528**	**2909 (82.5)**
40-49	1398 (39.6)	1117 (79.9)
50-59	912 (25.9)	755 (82.8)
60-69	746 (21.2)	632 (84.7)
≥70	472 (13.4)	405 (85.8)
Gender	**3528**	**2909 (82.5)**
Male	1705 (48.3)	1321 (77.5)
Female	1823 (51.7)	1588 (87.1)
Education	**3528**	**2909 (82.5)**
Illiterate	2274 (64.5)	1925 (84.7)
Can read & write	594 (16.8)	487 (82.0)
Intermediate	560 (15.9)	431 (77.0)

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Graduation	98 (2.8)	65 (66.3)
99	2 (0.1)	1 (50.0)
Marital Status	**3528**	**2909 (82.5)**
Married	2668 (75.6)	2184 (81.9)
Unmarried	24 (0.7)	14 (58.3)
Others (Divorced/ Separated/widow/widower)	836 (23.7)	711 (85.1)
Occupation	**3528**	**2909 (82.5)**
House work	558 (15.8)	471 (84.4)
Unskilled	2024 (57.4)	1676 (82.8)
Skilled	440 (12.5)	320 (72.7)
Unemployed	501 (14.2)	439 (87.6)
99	5 (0.1)	3 (60.0)
Religion	**3528**	**2909 (82.5)**
Hindu	2073 (58.8)	1697 (81.9)
Muslim	397 (11.3)	311 (78.3)
Christian	1058 (30.0)	901 (85.2)
Cultivable land	**3528**	**2909 (82.5)**
No Land	2194 (62.2)	1761 (80.3)
1 to 5 acres	1209 (34.3)	1046 (86.5)
>5 acres	125 (3.5)	102 (81.6)
Family Income	**3528**	**2909 (82.5)**
1000 to 4999	1158 (32.8)	969 (83.7)
5000 to 9999	1464 (41.5)	1214 (82.9)
10000 to 14999	461 (13.1)	371 (80.5)
15000 to 19999	220 (6.2)	182 (82.7)
20000 to 24999	107 (3.0)	83 (77.6)
25000 to 29999	58 (1.6)	41 (70.7)
30000 and above	60 (1.7)	49 (81.7)

99 Education and occupation information not available

In Prakasam, amongst 3528 participants aged 40 years and above, a total of 2909 underwent clinical examination.

Age and Gender: Of total 3528 people enumerated in age group more than 40 years, 2909(82.4%) underwent detailed ocular examination, In the age group of 40-49 years out of 1398 enumerated, 1117(79.8%) underwent ocular examination, In the age group of 50-59 years out of 912 enumerated 755(82.8%) underwent ocular examination, In the age group of 60-69 years out of 746 enumerated 632(84.7%) underwent ocular examination, In the age group of more than 70 years out of 472 enumerated 405(85.8%) underwent ocular examination.In total 2909 people examined, there were 1321(77.5%) males and 1588 (87.1%) females.

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Education-Amongst 3528 people aged more than 40 years, a total of 2274(64.5%) were illiterate, 594(16.8%) were those who can read and write to educated upto primary class, 560(15.9%) were educated between primary to intermediate grade, 98(2.8%) were graduates, post graduates, diploma holders and professionally qualified. Of the 2909 study participants undergoing clinical examination, 1925(84.7%) were illiterates, 487(82.0%) were those who can read and write to educated upto primary class, 431(77.0%) were educated between primary to intermediate grade, 65(66.3%) were graduates, post graduates, diploma holders and professionally qualified.

Marital Status- Amongst 2909 participants undergoing clinical examination out of 3528 participants aged 40 years and above the marital status was as follows, 2184(81.9%) were married, 14(58.3%) were unmarried, 711(85.1%) were divorced or widowed.

Occupation- Amongst 2909 examined study participants aged 40 years and above 471 (84.4%) were involved in house work, 1676(82.8%) were unskilled workers, 320(72.7%) were involved in skilled activities (business, skilled worker, Office Job I/II/III), 439(87.6%) were unemployed.

Religion- Amongst 2909 examined study participants aged more than 40 years, 1697(81.9%) were Hindus, 311(78.3%) were Muslims, 901(85.2%) were Christians.

Land Holdings- Amongst 2909 examined study participants more than 40 years, 1761(80.3%) had no land holdings followed by 1046(86.5%) participants with landholdings between 1 to 5 acres. Only 102(81.6%) participants had landholdings more than 5 acres.

Family income-The total family income from all sources per month was also recorded, based on the response of the interviewee. Amongst 2909 participants aged 40 years and above 969(83.7%) with income less than 5000 rupees underwent clinical examination, 1214(82.9%) with income ranging between 5000-9999 rupees underwent clinical examination , 371(80.5%) with income between 10,000-14,999 rupees underwent clinical examination, 182(82.7%) people with income between 15,000-19,999 rupees underwent clinical examination, 83(77.6%) study participants with income between 20,000-24,999 rupees underwent clinical examination, 41(70.7%) people with income between 25,000-

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29,999 rupees underwent clinical examination,49(81.7%) participants with income more than 30,000 rupees underwent clinical examination.

Table 13: Distribution of study participants according to history of Systemic diseases and treatment

Systemic Diseases	Gurgaon(n-3595)		Guwahati(n-3231)		Prakasam(n-2905)	
	Present n (%)	On treatment n (%)	Present n (%)	On treatment n (%)	Present n (%)	On treatment n (%)
Diabetes	129 (3.6)	108 (3.0)	125 (3.9)	82 (2.5)	338 (11.6)	325 (11.2)
Hypertension	365 (10.2)	248 (6.8)	511 (15.9)	315 (9.8)	439 (15.1)	414 (14.2)
Heart disease	35 (1.0)	33 (0.9)	20 (0.6)	14 (0.4)	70 (2.4)	60 (2.1)

In Gurgaon,of these 3595 participants, a total of 529 people gave history of various systemic diseases. Amongst these, 129(3.6%) had diabetes of which 108(3.0%) were on treatment followed by 365(10.2%) with hypertension amongst these 248(6.8%) were on antihypertensive medication followed by 35(1.0%) people with heart disease of which 33(0.9%) were on treatment.

In Guwahati,of these 3231 participants, a total of 658 people gave history of various systemic diseases. Amongst these, 125(3.9%) had diabetes of which 82(2.5%) were on treatment followed by 511(15.9%) with hypertension amongst these 315(9.8%) were on antihypertensive medication followed by 20(0.6 %) people with heart disease of which 14(0.4%) were on treatment.

In Prakasam,of these 2905 participants, a total of 847 people gave history of various systemic diseases.Amongst these, 338(11.6%) had diabetes of which 325(11.2%) were on treatment followed by 439(15.1%) with hypertension amongst these 414(14.2%) were on antihypertensive medication followed by 70(2.4 %) people with heart disease of which 60(2.1%) were on treatment.

Table 14: Prevalence of random capillary blood glucose levels in study population at all study sites

Blood glucose levels	Gurgaon n(%)	Guwahati n(%)	Prakasam n(%)
≥ 140 mg / dl	800 (22.4)	506 (16)	749 (26.4)
Total	3572*	3156*	2842*

Data not available for 23 participants in Gurgaon, 73 participants in Guwahati, 63 participants in Prakasam

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According to American Diabetes Association[15], random blood sugar levels ≥140 mg/dl is considered as positive criteria for diabetes. **In Gurgaon,** of 3572 participants undergoing random blood sugar, 2772(77.6%) had blood sugar levels less than 140mg/dl and 800(22.4%) people had blood sugar levels more than or equal to 140mg/dl. For 23participants data related to blood sugar levels was not available. The prevalence of diabetes was 22.4%, only 129(3.6%) diabetics were aware of their diabetic status and 108(3%) were on treatment.

In Guwahati, of 3158 people undergoing random blood sugar, 2652(84%) had blood sugar levels less than 140 mg/dl and 506(16%) people had blood sugar levels more than or equal to 140mg/dl. For 73 participants data related to blood sugar levels was not available. The prevalence of diabetes was 16%, only 125 (3.9%) diabetics were aware of their diabetic status and 82(2.5%) were on treatment.

In Prakasam, of 2842 people undergoing random blood sugar, 2093(72.0%) had blood sugar levels less than 140mg/dl and 749(25.8%) people had blood sugar levels more than or equal to 140 mg/dl. For 67 participants data related to blood sugar levels was not available. The prevalence of diabetes was 26.4%, only 338(11.6%) diabetics were aware of their diabetic status and 325(11.2%) were on treatment.

Table 15: Prevalence of blood pressure in study population at various study sites

	Gurgaon	Guwahati	Prakasam
Blood Pressure	**n (%)**	**n (%)**	**n (%)**
≥140/90 mmHg	1147(32.0)	975 (30.3)	1029 (36.2)
Total	3593*	3214*	2,846*

Data not available for 2 participants in Gurgaon, 15 participants in Guwahati, 67 participants in Prakasam

In Gurgaon, the study population aged more than 40 years underwent blood pressure measurements twice in an interval of 10 minutes. The second reading was considered as final for deciding if participant was hypertensive or not. According to American society of Hypertension[16], presence of hypertension was taken as Blood pressure ≥140/90 mmHg, of 3593 participants 1147(32.0%) study participants had blood pressure ≥140/90 mmHg. The prevalence of hypertension in study participants was 32.0%.

In Guwahati, according to American society of Hypertension, presence of hypertension was taken as Blood pressure ≥140/90mmHg, of 3216 participants 976(30.3%) people in

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study participants had blood pressure ≥140/90 mmHg. The prevalence of hypertension in study participants was 30.3%.

In Prakasam, according to American society of Hypertension, of 2846 participants 1029(36.2%) people in study participants participants had blood pressure ≥140/90 mmHg. The prevalence of hypertension in study participants was 36.2%.

Table 16: **Prevalence of study sample according to Body Mass Index (BMI)**

BMI*	Gurgaon n(%)	Guwahati n(%)	Prakasam n(%)
Under Weight (<18.5 kg/m^2)	697 (19.6)	786 (24.7)	372 (13.2)
Normal (18.5-24.9 kg/m^2)	1857 (52.2)	1896 (59.7)	1368 (48.7)
Over Weight (25-29.9 kg/m^2)	756 (21.2)	398 (12.5)	719 (25.6)
Obese(≥30 kg/m^2)	250 (7.0)	97 (3.1)	349 (12.4)
Total	3560*	3177*	2,808*

 Data not available for 35 participants in Gurgaon, 54 participants in Guwahati, 97 participants in Prakasam

BMI (Body Mass Index) is calculated by dividing weight in kilograms by square of height in centimeters. [Wt (kg)/Ht (cm)^2].

 In Gurgaon, a total of 3560 participants underwent weight and height assessment and among them 697(19.6%) were underweight, 1857(52.2%) were normal,756(21.2%)were overweight and 250(7.0%) were obese.

In Guwahati a total of 3177 participants underwent weight and height assessment and among them 786(24.7%) were underweight, 1896(59.7%) were normal, 398(12.5%)were overweight and 97(3.1%) were obese.

In Prakasam, a total of 2808 people underwent weight and height assessment and among them 372(13.2%) were underweight, 1368(48.7%) were normal, 719(25.6%) were overweight and 349(12.4%) were obese.

10.2.3. Visual acuity and refraction

The ETDRS (Early Treatment for Diabetic Retinopathy Study) tumbling E chart was used to measure the distant visual acuity. Refraction was done for all subjects irrespective of the visual acuity using streak retinoscope and autorefraction both. For the refraction analysis subjective refraction has been used.

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Table 17: Prevalence of visual impairment based on presenting visual acuity (PVA) in better eye among study participants according to WHO[19]

Visual impairment/Blindness	Gurgaon n(%)	Guwahati n(%)	Prakasam n(%)
Blind(<3/60)	77 (2.2)	232 (7.2)	29 (1.0)
Severe Visual Impairment(<6/60-3/60)	32 (0.8)	51 (1.6)	27 (0.9)
Moderate Visual Impairment(<6/18-6/60)	436 (12.2)	427 (13.3)	379 (13.4)
Mild Visual Impairment(≤6/12-6/18)	567 (15.8)	231 (7.2)	406 (14.3)
Normal(6/6-6/9)	2480 (69.0)	2277 (70.8)	1997 (70.4)
Total	3592* (100)	3218* (100.0)	2838 (100.0)

* Vision not taken for 3 study participants at Gurgaon,13 at Guwahati, 67 at prakasam

According to WHO criteria[19], blindness was defined as visual acuity less than 3/60 in better eye with available correction, severe visual impairment was defined as visual acuity less than 6/60 to 3/60, Moderate visual impairment was defined as visual acuity less than 6/60 to 6/18, Mild visual impairment was defined as visual acuity less than 6/12 to 6/18 whereas those with visual acuity ranging between 6/9 to 6/6 were considered as normal.

In Gurgaon, Out of 3595 participants undergoing visual acuity, 3 people did not underwent visual acuity testing. Amongst remaining 3592 participants, 77(2.2%) patients were blind, 32(0.8%) had severe visual impairment, 436(12.2%) had moderate visual impairment, 567(15.8%) had mild visual impairment and remaining 2480(69.0%) were normal for their visual acuities.

In Guwahati, out of 3229 participants undergoing visual acuity, 13 people did not underwent visual acuity testing. Amongst remaining 3218 participants, 232(7.2%) patients were blind with no perception of light, 51(1.6%) had severe visual impairment, 472 (13.3%) had moderate visual impairment, 231(7.2%) had mild visual impairment and remaining 2277(70.8%) were normal for their visual acuities.

In Prakasam, out of 2909 participants undergoing visual acuity, 67 people did not underwent visual acuity testing. Amongst remaining 2864 participants, 29(1.0%) patients were blind with no perception of light, 27(0.9%) had severe visual impairment, 379(13.4%) had moderate visual impairment, 406(14.3%) had mild visual impairment and remaining 1997(70.4%) were normal for their visual acuities.

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Table 18: **Distribution of blindness according to WHO and NPCB criteria by age and gender in the study population (based on presenting visual acuity (PVA) in better eye)[19]**

	Gurgaon		Guwahati		Prakasam	
	WHO Better eye(n=77)	NPCB better eye (n=109)	WHO better eye(n=232)	NPCB better eye (n=283)	WHO better eye(n=29)	NPCB better eye (n=60)
Age(years)						
40-49	1(1.2)	4(3.7)	18(7.8)	24(8.5)	1(3.5)	3(5.0)
50-59	7(9.1)	11(10.1)	39(16.9)	46(16.3)	3(10.3)	8(13.3)
60-69	12(15.6)	23(21.1)	68(29.4)	81(28.7)	13(44.8)	23(3.8)
≥70	57(74.1)	71(65.1)	106(45.9)	131(46.5)	12(41.4)	26(43.4)
Gender						
Male	34(44.2)	46(42.2)	97(42.0)	114(40.4)	15(51.7)	26(43.3)
Female	43(55.8)	63(57.8)	134(58.0)	168(59.6)	14(48.3)	34(56.7)

In Gurgaon,Considering the WHO criteria, 1(1.2%) were binocularly blind in the age group 40-49 years, 7(9.1%) were binocularly blind in the age group of 50-59 years, 12(15.6%) were binocularly blind in the age group of 60-69 years, 57(74.4%) were binocularly blind in the age group more than 70 years.

According to NPCB blindness is defined as visual acuity less than 6/60 with best corrected visual acuity in the better eye. According to above criteria, **In Gurgaon,** 4(3.7%) was binocularly blind in the age group 40-49years, 11(10.1%) were binocularly blind in the age group of 50-59 ears, 23(21.1%) were binocularly blind in the age group of 60-69 years, 71(65.1%) were binocularly blind in the age group more than 70 years.

According to WHO criteria, binocular blindness was present in 34(44.2%) males and 43(55.8%) females. According to NPCB criteria, binocular blindness was present in 46(42.2%) males and 63(57.8%) females.

Considering the WHO criteria, **In Guwahati,**18(7.8%) were binocularly blind in the age group 40-49 years, 39 (16.9%) were binocularly blind in the age group of 50-59 years, 68(29.4%) were binocularly blind in the age group of 60-69 years, 106(45.9%) were binocularly blind in the age group more than 70 years. According to NPCB blindness is defined as visual acuity less than 6/60 with best corrected visual acuity in the better eye, 24(8.5%) was binocularly blind in the age group 40-49 years, 46(16.3%) were binocularly blind in the age group of 50-59 years, 81(28.7%) were binocularly blind in the age group of 60-69 years, 131(46.5%) were binocularly blind in the age group more than 70 years.

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According to WHO criteria, binocular blindness was present in 97(42%) males and 134(58%) females. According to NPCB criteria, binocular blindness was present in 114 (40.4%) males and 168(59.6%) females.

Considering the WHO criteria, **In Prakasam**,1(3.5%) were binocularly blind in the age group 40-49 years, 3(10.3%) were binocularly blind in the age group of 50-59 years, 13(44.8%) were binocularly blind in the age group of 60-69 years, 12(41.4%) were binocularly blind in the age group more than 70 years. According to NPCB blindness is defined as visual acuity less than 6/60 with best corrected visual acuity in the better eye, 3 (5%) was binocularly blind in the age group 40-49 years, 8(13.3%) were binocularly blind in the age group of 50-59 years, 23(38.3%) were binocularly blind in the age group of 60-69 years, 26(43.5%) were binocularly blind in the age group more than 70 years.

According to WHO criteria, binocular blindness was present in 15(51.7%) males and 14(48.3%) females. According to NPCB criteria, binocular blindness was present in 26 (43.3%) males and 34(56.7%) females.

Table 19: Categorisation of study population according to history of wearing glasses

History of use of glasses	Gurgaon n(%)	Guwahati n(%)	Prakasam n(%)
Wearing glasses	299(8.3)	57(1.6)	424(14.6)
Total	3,595(100.0)	3,229(100.0)	2,909(100.0)

When these participants were interviewed for wearing glasses.

In Gurgaon, out of 3595 people interviewed for wearing glasses, 299(8.3%) gave positive history of wearing glasses.

In Guwahati, out of 3229 people interviewed for wearing glasses, 57(1.6%) gave positive history of wearing glasses.

In Prakasam, out of 2909 people interviewed for wearing glasses, 424(14.6%) gave positive history of wearing glasses.

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Table 20: Prevalence of myopia according to age and gender in study population for distance vision

Age(years)	Gurgaon Myopia n(%)	Guwahati Myopia n(%)	Prakasam Myopia n(%)
40-49	70 (5.1)	91 (6.4)	91 (8.4)
50-59	62 (7.4)	107 (14.4)	132 (18.3)
60-69	108 (15.3)	171 (33.7)	162(28.1)
≥70	113 (23.4)	99 (44.2)	87(28.2)
Gender			
Male	164 (10.8)	232 (17.0)	219 (17.6)
Female	189 (10.0)	236 (15.4)	253 (17.4)

In Gurgaon, a total of 3402 participants underwent refraction, of these 353 participants were myopes, 70(5.1%) participants belonged to age group 40-49 years, 62(7.4%) belonged to age group of 50-59 years, 108(15.3%) belonged to age group 60-69 years, 113(23.4%) belonged to age group more than 70years. Overall prevalence of myopia in study population was 10.4%.

In Guwahati, a total of 2896 participants underwent refraction, of these 468 people were myopes, 91(6.4%) participants belonged to age group 40- 49 years, 107(14.4%) belonged to age group of 50-59 years, 171(33.7%) belonged to age group 60-69 years, 99(44.2%) were more than 70 years. Overall prevalence of myopia in study population was 16.2%.

In Prakasam, a total of 2692 participants underwent refraction, of these 472 people were myopes, 91(8.4%) participants belonged to age group 40-49years, 132(18.3%) belonged to age group of 50-59 years, 162(28.1%) belonged to age group 60-69 years, 87(28.2%) were more than 70 years. Overall prevalence of myopia in study population was 17.5%.

Table 21: Prevalence of hypermetropia according to age in study population for distance vision

Age(years)	Gurgaon Hypermetropia n(%)	Guwahati Hypermetropia n(%)	Prakasam Hypermetropia n(%)
40-49	86 (6.3)	98 (6.9)	55 (5.1)
50-59	165 (19.8)	77 (10.4)	65 (9.0)
60-69	122 (17.3)	41 (8.1)	29 (5.1)
≥70	42 (8.7)	8 (3.6)	11 (3.6)
Gender			
Male	147 (9.7)	75 (5.5)	52 (4.2)
Female	268 (14.2)	149 (9.7)	108 (7.4)
Total	415 (12.2)	224(7.7)	160 (5.9)

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In Gurgaon, Of total of 3402 participants who underwent refraction, 415 participants had hypermetropia, 86(6.3%) participants belonged to age group 40-50 years, 165(19.8%) belonged to age group of 50-60years, 122(17.3%) belonged to age group 60-70 years, 42(8.7%) belonged to age group more than 70 years. Therefore, the prevalence of hypermetropia was 12.2%.

In Guwahati, of total of 2896 participants who underwent refraction, 224 people had hypermetropia, 98(6.9%) participants belonged to age group 40-50 years, 77(10.4%) belonged to age group of 50-60years, 41(8.1%) belonged to age group 60-69 years, 8(3.6%) belonged to age group more than 70 years. Therefore, the prevalence of hypermetropia was 7.7%.

In Prakasam, of total of 2692 participants who underwent refraction, 160 people had hypermetropia, 55(5.1%) participants belonged to age group 40-50 years, 65(9%) belonged to age group of 50-60years, 29(5.1%) belonged to age group 60-70 years, 11(3.6%) belonged to age group more than 70 years. Therefore, the prevalence of hypermetropia was 5.9%.

Table 22: Distribution of severity of myopia in study population

Severity of myopia (Diopter Sphere)	Gurgaon Total number of people n(%)	Guwahati Total number of people n(%)	Prakasam Total number of people n(%)
Mild(-0.5 to -3)	318(90.0)	443(94.7)	425(90.0)
Moderate(-3.5 to -5)	23(6.6)	17(3.6)	35(7.5)
Severe(-5.5 to -8)	7(2.0)	7(1.5)	12(2.5)
Very Severe(-≥8)	5(1.4)	1(0.2)	-
Total	353(100.0)	468 (100.0)	472(100.0)

The study population with myopia were classified into mild (-0.5 to -3DS), moderate (-3.5DS to -5 DS), severe (-3.5DS to -5DS) and very severe (-8 dioptres) myopia.[17]

Using the above criteria, In Gurgaon, a total of 353 people were found to be myopic on refraction, 318(90.0%) had mild myopia, 23(6.5%) had moderate myopia, 7(2.0%) had severe myopia, 5(1.4%) had very severe myopia.

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In Guwahati, a total of 468 people were found to be myopic on refraction, 443(94.7%) had mild myopia, 17(3.6%) had moderate myopia, 7(1.5%) had severe myopia, 1(0.2%) had very severe myopia.

In Prakasam, a total of 472 people were found to be myopic on refraction, 425(90.0%) had mild myopia, 35(7.5%) had moderate myopia, 12(2.5%) had severe myopia.

Table 23: Distribution of severity of hypermetropia in study population

Severity of Hypermetropia (Diopter Sphere)	Gurgaon n(%)	Guwahati n(%)	Prakasam n(%)
Mild(+0.5 to+3)	359 (86.5)	218 (97.2)	148(92.5)
Moderate(+3.5 to +5)	14 (3.4)	1 (0.5)	2(1.3)
Severe(+5.5 to 8)	9 (2.2)	5 (2.3)	1(0.6)
Very severe(≥ +8)	33 (8.0)	0 (0.0)	9 (5.6)
Total	415 (100.0)	224 (100.0)	160(100.0)

The study population with hypermetropia were classified[18] into mild (+0.5 to +3DS), moderate (+3.5DS to +5DS), severe (+5.5DS to +8DS) and very severe (≥+8 dioptres) hypermetropia.

In Gurgaon, out of 3402 participants undergoing refraction, 415 had hypermetropia[18], of these 359(86.5%) had mild hypermetropia between +0.5 to +3DS, 14(3.4%) had moderate hypermetropia between +3.5DS to +5DS, 9(2.2%) had severe hypermetropia between +5.5 DS to +8 DS and 33(8%) had very severe hypermetropia more than +8DS.

In Guwahati, out of 2896 who underwent refraction, 224 participants had hypermetropia, 218(97.2%) had mild hypermetropia between +0.5DS to +3DS, 1(0.5%) had moderate hypermetropia between +3.5DS to +5DS and 5(2.3%) had severe hypermetropia more than +5.0 DS.

In Prakasam, out of 2692 who underwent refraction, 160 participants had hypermetropia, 148(92.5%) had mild hypermetropia between +0.5DS to +3DS, 2(1.3%) had moderate hypermetropia between +3.5DS to +5DS and 1(0.6%) had severe hypermetropia more than +5.0 DS and 9(5.6%) had very severe hypermetropia of ≥ +8 DS.

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10.2.4. *Various ocular diseases*

Table 24: Prevalence of study participants according to abnormalities in anterior adenexa on basic Eye Examination

Anterior adenexa abnormalities	Gurgaon n(%)	Guwahati n(%)	Prakasam n(%)
Squint	67 (1.9)	26 (0.8)	19(0.7)
Nystagmus	4 (0.1)	4 (0.1)	_
Anterior staphyloma	6 (0.2)	1 (0.03)	2(0.07)
Phthisis/Disorganized globe	25 (0.7)	6 (0.2)	11(0.4)
Corneal opacity	499 (13.9)	22 (0.7)	35(1.2)
Adherent Leucoma	24 (0.7)	1 (0.03)	2(0.07)
Corneal Ulcer	1 (0.03)	2 (0.1)	1(0.03)
Others	92 (2.6)	118 (3.7)	5 (0.2)

In Gurgaon,on examining 3595 participants, abnormalities found in anterior adenexa included, 67(1.9%) subjects with squint, 4(0.1%) with nystagmus, 6(0.2%) had anterior staphyloma,25(0.7%) had pthisis or disorganized globe, 499(13.9%) corneal opacity, 24(0.7%) adherent leucoma, 1(0.03%) had corneal ulcer and 92(2.6%) had other abnormalities in the form of bullous keratopathy, chronic dacryosystitis, blephritis, bullous keratopathy, lower lid ectropion,upper lid entropion, poliosis, xanthelesma.

In Guwahati,on examining 3231 participants, abnormalities found in anterior adenexa included, 26(0.8%) subjects with squint, 4(0.1%) with nystagmus, 1(0.03%) anterior staphyloma, 6(0.2%) pthisis or disorganized globe, 22(0.7%) corneal opacity, 1(0.03%) adherent leucoma, 2(0.1%) corneal ulcer and 119(3.7%) other abnormalities in the form of bullous keratopathy, chronic dacryosystitis, blephritis, bullous keratopathy, lower lid ectropion, upper lid entropion, poliosis, xanthelesma.

In Prakasam,on examining 2909 participants, abnormalities found in anterior adenexa included, 19(0.7%) subjects with squint, 2(0.07%) anterior staphyloma, 11(0.4%) pthisis or disorganized globe, 35(1.2%) corneal opacity, 2(0.07%) adherent leucoma, 1(0.03%) corneal ulcer and 5(0.2%) other abnormalities in the form of bullous keratopathy, chronic dacryosystitis, blephritis, bullous keratopathy, lower lid ectropion, upper lid entropion, poliosis, xanthelesma.

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10.2.5. Cataract

Following Lens Grading was used for cataract:

The state of the lens, Intra Ocular Lens (IOL) and posterior capsule was determined using the slit lamp biomicroscope. Depending on this a person was classified as having posterior subcapsular, cortical, nuclear, developmental, traumatic, advanced and associated with pseudoexfoliation syndrome.

Definition of cataract

A person can have either normal, unoperated or operated cataract in each eye. In this study the cataract status of a *person* was classified as per below:

Unoperated cataract: A person having lenticular opacities included a person having cortical/ nuclear/ posterior subcapsular /developmental/ traumatic/advanced and those lenticular opacities that were associated with pseudoexfoliation syndrome in both eyes or in one eye with other eye being normal.

Operated cataract: Presence of operated cataract in both eyes or presence of operated cataract in one eye with other eye having normal lens

Mixed cataract: Presence of operated cataract in one eye and un-operated cataract in the other eye.

Total prevalence of cataract is the sum of persons having unoperated, operated and mixed cataract.

Table 25: Prevalence of different lens grading in study population at Gurgaon

	RE	LE	Both Eye
1. Normal	2482 (69.7)	2490 (69.9)	2457(68.5)
2. Pseudoexfoliation	9 (0.3)	7 (0.2)	10 (0.3)
3. Cortical Cataract	379 (10.7)	366 (10.3)	466 (13.0)
4. Nuclear Cataract	519 (14.6)	514 (14.5)	630 (17.6)
5. Posterior subcapsular cataract	321 (90.1)	314 (8.9)	414 (11.6)
6. Advanced cataract	63 (1.8)	68 (1.9)	118 (3.3)
7. Developmental cataract	3 (0.1)	2 (0.1)	3 (0.1)
8. Traumatic cataract	3 (0.1)	1 (0.1)	4 (0.1)
9. Aphakia	72 (2.0)	74 (2.1)	101 (2.8)
10. Aphakia + PCO	8 (0.2)	8 (0.2)	14 (0.4)
11. Pseudophakia	262 (7.4)	256 (7.2)	381 (10.6)
12. Pseudophakia + PCO	94 (2.6)	89 (2.5)	140 (3.9)
13. Dislocated or subluxated lens/IOL	5 (0.1)	2 (0.1)	7 (0.2)
66. Others (specify)	3 (0.1)	4 (0.1)	5 (0.1)

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Amongst the 3595 persons undergoing ocular examination, 91(0.3%) had pseudoexfoliation, 466(13%) had cortical cataract, 630 (14.6%) had nuclear cataract, 414(11.6%) had posterior subcapsular cataract, 118(3.3%) had advanced cataract, 3(0.1%) had developmental cataract, 4(0.1%) had traumatic cataract, 101(2.8%) had aphakia, 14(0.4%) had aphakia with PCO, 381 (10.6%) had pseudophakia, 140(3.9%) had pseudophakia with PCO, 7(0.2%) had dislocated or subluxated lens or IOL. In remaining 5(0.1%) the lens status was mentioned as early cataract or posterior polar cataract.

Table 25.1: Prevalence of diffirent lens grading in study population at Guwahati

Lens grading	RE	LE	Both Eye
1. Normal	2378 (74.5)	2383 (74.5)	2341 (74.3)
2. Pseudoexfoliation	1 (0.03)	4 (0.1)	5 (0.2)
3. Cortical Cataract	245 (0.77)	256 (8.0)	290 (9.0)
4. Nuclear Cataract	556 (17.4)	566 (17.7)	623 (19.3)
5. Posterior subcapsular cataract	53 (1.7)	58 (1.8)	63 (2.0)
6. Advanced cataract	61 (1.9)	62 (1.9)	94 (2.9)
7. Developmental cataract	0 (0.0)	2 (0.1)	2 (1)
8. Traumatic cataract	0 (0.0)	1 (0.03)	1 (0.03)
9. Aphakia	13 (0.4)	9 (0.3)	17 (0.5)
10.Aphakia + PCO	1 (0.03)	1 (0.03)	2 (0.1)
11.Pseudophakia	83 (2.6)	74 (2.3)	119 (3.7)
12.Pseudophakia + PCO	24 (0.8)	22 (0.7)	37 (1.2)
13.Dislocated or subluxated lens/IOL	2 (0.1)	3 (0.1)	5 (0.2)
66.Others (specify)	3 (0.1)	2 (0.1)	5 (0.2)

Amongst the 3231 persons undergoing ocular examination, 5 (0.2%) had pseudoexfoliation, 290 (9%) had cortical cataract, 623 (19.3%) had nuclear cataract, 63 (2%) had posterior subcapsular cataract, 94 (2.9%) had advanced cataract, 2(1%) had developmental cataract, 1(0.03%) had traumatic cataract, 17 (0.5%) had aphakia, 2 (0.1%) had aphakia with PCO, 119 (3.7%) had pseudophakia, 37 (1.2%) had pseudophakia with PCO, 5 (0.2%) had dislocated or subluxated lens or IOL. In remaining 5(0.2%) the lens status was mentioned as early cataract or posterior polar cataract.

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Table 25.2: Prevalence of diffirent lens grading in study population at Prakasam

Lens grading	RE	LE	Both Eye
1. Normal	1721 (59.5)	1713 (59.1)	1675 (57.8)
2. Pseudoexfoliation	4 (0.1)	3 (0.1)	6 (0.2)
3. Cortical Cataract	33 (1.1)	34 (1.2)	45 (1.6)
4. Nuclear Cataract	697 (24.1)	730 (25.2)	822 (28.3)
5. Posterior subcapsular cataract	33 (1.1)	27 (0.9)	39 (1.3)
6. Advanced cataract	33 (1.1)	35 (1.2)	55 (1.9)
7. Developmental cataract	0 (0.0)	0 (0.0)	0 (0.0)
8. Traumatic cataract	1 (0.03)	0 (0.0)	1 (0.03)
9. Aphakia	36 (1.2)	25 (0.9)	46 (1.6)
10.Aphakia + PCO	5 (0.2)	4 (0.1)	9 (0.3)
11.Pseudophakia	180 (6.2)	158 (5.2)	241 (8.3)
12.Pseudophakia + PCO	150 (5.2)	152 (5.2)	217 (7.5)
13.Dislocated or subluxated lens/IOL	2 (0.1)	3 (0.1)	3 (0.1)
66.Others (specify)	3 (0.1)	4 (0.1)	6 (0.2)

Amongst the 2909 persons undergoing ocular examination, 6 (0.2%) had pseudoexfoliation, 45 (1.6%) had cortical cataract, 822 (28.3%) had nuclear cataract, 39 (1.3%) had posterior subcapsular cataract, 55 (1.9%) had advanced cataract, 1(0.03%) had traumatic cataract, 46 (1.6%) had aphakia, 9 (0.3%) had aphakia with PCO, 241 (8.3%) had pseudophakia, 217 (7.5%) had pseudophakia with PCO, 3 (0.1%) had dislocated or subluxated lens or IOL. In remaining 6 (0.2%) the lens status was mentioned as early cataract or posterior polar cataract or iris pigmentation on lens.

Table 26: Prevalence of various types of cataract in study population

Type of Cataract	Gurgaon Prevalence n(%)	Guwahati Prevalence n(%)	Prakasam Prevalence n(%)
Nuclear	630 (17.6)	619 (20.6)	822 (28.2)
Posterior subcapsular	414 (11.6)	54 (2.0)	39 (1.3)
Cortical	466 (13.0)	243 (8.5)	45 (1.5)

The state of the lens was determined using the slit lamp biomicroscope. Depending on this a person was classified as having posterior subcapsular, cortical, nuclear cataract

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In Gurgaon, nuclear cataract was present in 630(17.6%) participants, posterior subcapsular was found in 414(11.6%) participants, 466(13.0%) participants had cortical cataract.

In Guwahati, nuclear cataract was present in 619(20.6%) people, posterior subcapsular (2.0%) was found in 54 people, 243(8.5%) had cortical cataract.

In Prakasam, nuclear cataract was present in 822(28.2%) people, posterior subcapsular was found in 39(1.3%) people, 45(1.5%) had cortical cataract.

Table 27: Distribution and prevalence of Cataract in study population according to age and gender in Gurgaon

Demographic characteristics	Cataract (n, % in age group)	Cataract Prevalence % (95% C.I.)	P Value
	Present n=1131		
Age (years)			
40-49 (1427)	74 (6.5)	5.2 (4.034, 6.338)	
50-59 (879)	164 (14.5)	18.7 (16.077, 21.238)	
60-69 (743)	400 (35.4)	53.8 (50.243,57.429)	
≥70 (539)	493 (43.6)	91.5 (89.099, 93.832)	<0.001
Total	1131 (100.0)		
Gender			
Male (1612)	495 (43.8)	30.7 (28.453, 32.961)	
Female (1976)	636 (56.2)	32.2 (30.125, 34.248)	0.343
Total	1131 (100.0)		

In Gurgaon, the prevalence of cataract was calculated in these 3595 participants according to age and gender, cataract was found in higher percentage in people aged more than 60 years, 893(79%) out of 1131 participants as compared to 74(6.5%) in age group between 40-49 years. Amongst, 1612 males prevalence of cataract was 43.8% and amongst 1976 females the prevalence of cataract was 56.2%.The association of cataract was statistically significant for age (p<0.001) but not for gender (p=0.343).

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Table 27.1: **Distribution and prevalence of Cataract in study population according to age and gender in Guwahati**

Demographic characteristics	Cataract (n, % in age group)	Cataract Prevalence % (95% C.I.)	P Value
	Present n=828		
Age (years)			
40-49 (1453)	70 (8.5)	4.8 (3.715, 5.920)	
50-59 (800)	161 (19.4)	20.1 (17.341, 22.909)	
60-69 (603)	306 (37.0)	50.7 (46.745, 54.748)	
≥70 (366)	291 (35.1)	79.5 (75.353, 83.663)	<0.001
Total	828 (100.0)		
Gender			
Male (1488)	370 (44.7)	24.9 (22.667, 27.064)	
Female (1734)	458 (55.3)	26.4 (24.3360, 28.490)	0.316
Total (3222)	828 (100.0)		

In Guwahati, the prevalence of cataract was calculated in these 3231 participants according to age and gender, cataract was found in higher percentage in people aged more than 60 years,597(62.1%) out of 648 participants as compared to 70(8.5%) in age group between 40-49 years. Amongst, 1488 males prevalence of cataract was 44.7% and amongst 1734 females the prevalence of cataract was 55.3%.The association of cataract was statistically significant for age (p<0.001) but not for gender (p=0.316).

Table 27.2: **Distribution and prevalence of Cataract in study population according to age and gender in Prakasam**

Demographic characteristics	Cataract (n, % in age group)	Cataract Prevalence % (95% C.I.)	P Value
	Present n=1221		
Age (years)			
40-49 (1117)	110 (9.0)	9.8 (8.098, 11.598)	
50-59 (753)	270 (22.1)	35.9 (32.423, 39.290)	
60-69 (632)	459 (37.6)	72.6 (69.141, 76.112)	<0.001
≥70 (404)	382 (31.3)	94.5 (92.332, 96.777)	
Gender			
Male (1319)	539 (44.1)	40.9 (38.208, 43.521)	0.251
Female (1587)	682(55.9)	43.0 (40.536, 45.412)	
Total	1221 (100.0)		

In Prakasam, the prevalence of cataract was calculated in these 2909 people according to age and gender, cataract was found in higher percentage in people aged more than 60 years, 841(68.9%) out of 1221 people as compared to 110(9%) in age group between 40-

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49 years. Amongst, 1319 males prevalence of cataract was 44.1% and amongst 1587 females the prevalence of cataract was 55.9%. The association of cataract was statistically significant for age (p<0.001) but not for gender(p=0.251).

Table 28: Prevalence of various types of cataract (age and gender-wise) in study population according to clinical examination in Gurgaon

Cataract	Cortical n(%)	Nuclear n(%)	Posterior Subcapsular Cataract n(%)
Age(years)			
40-49	23 (1.6)	32 (2.3)	33 (2.3)
50-59	75 (8.5)	103 (11.7)	51 (5.8)
60-69	175 (23.6)	248 (33.5)	157 (21.2)
≥70	193(36.1)	247 (46.2)	173 (32.5)
Prevalence(%)	466(13.0)	630(17.6)	414(11.6)
Gender			
Male	206 (12.8)	284 (17.7)	189 (11.8)
Female	260 (13.2)	346 (17.6)	225 (11.4)
Prevalence (%)	466(13.0)	630(17.6)	414(11.6)

In Gurgaon,

Age: On analysis by age, distribution of various type of cataract revealed:

- In the age group of 40-49 years, 23(1.6%) had cortical cataract, 32(2.3%) had nuclear cataract, 33(2.3%) had posterior subcapsular cataract.

- In the age group of 50-59 years, 75(8.5%) had cortical cataract, 103(11.7%) had nuclear cataract, 51(5.8%) had posterior subcapsular cataract.

- In the age group of 60-69 years, 175 (23.6%) had cortical cataract, 248(33.5%) had nuclear cataract, 157(22.2%) had posterior subcapsular cataract.

- In the age group of 70 years and above, 160(62.5%) had cortical cataract, 233(84.1%) had nuclear cataract, 143(55.6%) had posterior subcapsular cataract.

Gender: The distribution of cataract according to gender revealed 206(12.8%) males and 260(13.2%) females had cortical cataract; 284(17.7%) males and 346(17.6%) females had nuclear cataract, 189(11.8%) males and 225(11.6%) females had posterior subcapsular cataract.

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Table 29: Prevalence of various types of cataract (age and gender-wise) in study population according to clinical examination in Guwahati

	Cortical n(%)	Nuclear n(%)	Posterior Subcapsular Cataract n(%)
Age(years)			
40-49	27 (1.9)	43 (3.0)	10 (0.7)
50-59	47 (5.9)	119 (14.9)	13 (1.6)
60-69	116 (19.3)	249 (41.3)	25 (4.2)
≥70	100 (27.5)	212 (58.1)	15 (4.1)
Prevalence (%)	290 (9.0)	623 (19.4)	63 (2.0)
Gender			
Male	125 (8.4)	276 (18.6)	28 (1.9)
Female	165 (9.5)	347 (20.0)	35 (2.0)
Prevalence (%)	290(9.0)	623 (19.4)	63 (2.0)

Age: Analysis of age distribution participants by type of cataract revealed:

- Amongst 1454 people in the age group of 40-49 years, 27(1.9%) had cortical cataract, 43(3%) had nuclear cataract, 10(0.7%) had posterior subcapsular cataract.

- Amongst 802 people in the age group of 50-59 years, 47(5.9%) had cortical cataract, 119(14.9%) had nuclear cataract, 13(1.6%) had posterior subcapsular cataract.

- Amongst 603 people in the age group of 60-69 years, 116(19.3%) had cortical cataract, 249(41.3%) had nuclear cataract, 25(4.2%) had posterior subcapsular cataract.

- Amongst 372 people in the age group of 70 years and above, 100(27.5%) had cortical cataract, 212(58.1%) had nuclear cataract, 15(4.1%) had posterior subcapsular cataract.

Gender: The distribution of cataract according to gender revealed 125 males and 165 females had cortical cataract; 276 males and 347 females had nuclear cataract, 28 males and 35 females had posterior subcapsular cataract.

Table 29.1: Prevalence of various types of cataract (age and gender-wise) in study population according to clinical examination in Prakasam

	Cortical n(%)	Nuclear n(%)	Posterior Subcapsular Cataract n(%)
Age (years)			
40-49	2(0.2)	79 (7.1)	11 (0.9)
50-59	15 (2.0)	191 (25.4)	12 (1.6)
60-69	21 (3.3)	314 (49.7)	13 (2.1)
≥70	7 (1.7)	238 (58.9)	3 (0.7)
Prevalence (%)	20(1.1)	714 (28.5)	33 (1.9)
Gender			
Male	20 (1.5)	390 (29.6)	17 (1.3)
Female	25 (1.6)	432 (27.2)	22 (1.4)
Prevalence (%)	20(1.5)	822 (28.3)	39 (1.3)

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Age: Analysis of age distribution participants by type of cataract revealed:

- In the age group of 40-49 years, 2(0.2%) had cortical cataract, 79(7.1%) had nuclear cataract, 11(0.9%) had posterior subcapsular cataract.

- In the age group of 50-59 years, 15(2.0%) had cortical cataract, 191(25.4%) had nuclear cataract, 12(1.6%) had posterior subcapsular cataract.

- In the age group of 60-69 years, 21(3.3%) had cortical cataract, 314(49.7%) had nuclear cataract, 13(2.1%) had posterior subcapsular cataract.

- In the age group of 70 years and above, 7(1.7%) had cortical cataract, 238(58.9%) had nuclear cataract, 3(0.7%) had posterior subcapsular cataract.

Gender: The distribution of cataract according to gender revealed 12 males and 8 females had cortical cataract; 330 males and 384 females had nuclear cataract, 13 males and 20 females had posterior sub capsular cataract.

10.2.6. Dry Eye

Schirmers Test

Methodology

A strip of commercially available pre-sterilized Whatman 41 filter paper, measuring 5mm x 35mm is folded at 5mm from one end. This end is inserted into the lower fornix at the junction of medial two third and lateral one third of the eyelid margin. The amount of wetting from the fold, in millimeters is noted after 5 minutes. Schirmers test < 10 mm was taken as dry eye.

Tear Break Up Time (TBUT)

Methodology

The tear film break up time is estimated from the time between a complete blink and first appearance of random dark spot. It is recorded in seconds.

Both eyes were assessed sequentially. For measuring break up time, pre-sterilized fluorescein strips were applied on the inferior temporal bulbar conjunctiva of the

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participant's eye. Then the participant was asked to blink once in order to distribute the fluorescein equally over the cornea. The participant was instructed to keep the lid open and for examination under cobalt blue light. The examiner should not touch the lids to avoid stimulated secretion from the lacrimal and meibomian glands. The normal value is greater than 10 seconds. A tear film break up time of less than 10 seconds is taken as abnormal tear film break up pattern.

For prevalence of dry eye,[7]Tear film breakup time and Schirmers <10 in either of eye was considered as presence of dry eye.

Table 30: Categorisation of study participants according to Schirmers and TBUT:

	Gurgaon		Guwahati		Prakasam	
	Schirmers n(%)	Breakup Time n(%)	Schirmers n(%)	Breakup Time n(%)	Schirmers n(%)	Breakup Time n(%)
Abnormal	929 (26.2)	1980 (56.0)	282 (8.8)	976 (30.5)	2620 (96.4)	2279 (83.7)
Normal	2619 (73.8)	1559 (44.0)	2921 (91.2)	2227 (69.5)	97 (3.6)	444 (16.3)
Total	3548*(100.0)	3539*(100.0)	3203*(100.0)	3203*(100.0)	2717*(100.0)	2723*(100.0)

In Gurgaon, 3548 participants were evaluated for dry eye by using Schirmers and 3539 participants underwent Tear film breakup time test. 2619(73.8%) had abnormal Schirmers alone. 1559(44.0%) had abnormal TBUT alone. For prevalence of dry eye,Tear film breakup time and/or Schirmers <10 in either of eye was considered as presence of dry eye. Among the examined subjects, 817(22.7%) had dry eye based on these criteria.

In Guwahati, 3203 people were evaluated for dry eye by using Schirmers and Tear film breakup time test. 282(8.8%) had abnormal Schirmers alone 977(30.5%) had abnormal TBUT alone. For prevalence of dry eye,[7] Tear film breakup time and/or Schirmers < 10 in either of eye was considered as presence of dry eye. Among the examined subjects, 185(5.7%) had dry eye based on these criteria.

In Prakasam, 2717 people were evaluated for dry eye by using Schirmers and 2723 people underwent Tear film breakup time test. 2620(96.4%) had abnormal Schirmers alone 2279(83.7%) had abnormal TBUT alone.

For prevalence of dry eye,[7] Tear film breakup time and/or Schirmers <10 in either of eye was considered as presence of dry eye. Among the examined subjects, 41(1.5%) had dry eye based on these criteria.

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Table 31: Catergorisation of study participants according to prevalence of dry eye at various sites

Disease	Gurgaon n(%)	Guwahati n(%)	Prakasam n(%)
Dry eye	817 (22.7)	185 (5.8)	41 (1.5)

The prevalence of dry eye according to the above criteria was 22.7% in Gurgaon, 5.8% in Guwahati, and 1.5% in Prakasam.

10.2.7. Pterygium

Table 32: Prevalence of various ocular surface disorders in study participants

Disorder of ocular surface	Gurgaon n(%)	Guwahati n(%)	Prakasam n(%)
Pterygium	403 (11.2)	293 (9.0)	584 (20.1)
Pingecula	1380 (38.4)	753 (23.3)	361 (12.4)

Pterygium[21] is a fibrovascular proliferative disease affecting the ocular surface. Pinguecula is one of the most common degenerative conditions of the conjunctiva and is characterized by the appearance of yellowish to brown nodules on the bulbar conjunctiva near the sclerocorneal junction.

In Gurgaon, amongst the 3595 participants, 403 had pterygium and 1380 had pingecula. Hence, the prevalence of pterygium and pingecula was 11.2% and 38.4% respectively.

In Guwahati, amongst the 3231 participants, 293 had pterygium and 753 had pingecula. Hence, the prevalence of pterygium and pingecula was 9.0% and 23.3% respectively.

In Prakasam, amongst the 2909 participants, 584 had pterygium and 361 had pingecula. Hence, the prevalence of pterygium and pingecula was 20.1% and 12.4% respectively.

10.2.7.1. Conjunctival Ultra Violet Auto Fluorescence (UVAF)[26] done in normal and participants with pterygium

In NCR Delhi, conjunctival UV photography was done in 14 clusters of NCR Delhi namely in Harchandpur, Wazirpur, Daulatabad(2 clusters), Badha, Bhorakalan(2 clusters), Bhorakhurad, Bhudaka, Bilaspur, Mau, Mirjapur, and Rathiwas. The exposure of an individual to UVR(especially harmful UVB) is influenced by environmental factors, temporal factors and personal protective behaviours. The ozone layer acts as a physical barrier that limits the amount of UVR reaching the surface of the earth. It prevents virtually all short wavelengths (ie, those >290 nm and including all of UVC) as well as 90% of UVB(wavelength 280–315nm). The wavelength determines the percentage of

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UVR absorbed by the different components of the eye, with the overwhelming majority of shorter wavelengths being absorbed by the cornea and conjunctiva. There is a sharp rise in UVB transmission by the cornea at 308nm and 60–80% of transmission of UVR to the cornea and aqueous occurs at wavelengths >300 nm. For this reason, it is expected to see the greatest degree of damage attributed to UVB radiation in the most superficial segment of the eye and this area is where much of the absorption occurs, especially in the corneal epithelium and Bowman's membrane. Simple questionnaires collecting retrospective data about sunlight exposure and lifestyle habits are prone to significant recall bias. A sophisticated model for calculating the exposure of an individual to harmful UVB was developed and implemented in the Chesapeake Bay waterman study, and the Beaver Dam Eye Study. This model of exposure collected information regarding lifetime personal ocular exposure, UVR meteorological data (including laboratory and field measurements of harmful UVB exposure) and ocular protective factors.

Methodology

Conjunctival Ultra-Violet Auto-fluorescence (UVAF) images were captured using the camera system in 13 villages of Gurgaon , NCR by the trained optometrist .This system consisted of a height adjustable table equipped with subject head-rest, camera positioning assembly, digital single-lens reflex camera, macro lens and filtered electronic flash. Each eye was photographed at 0.94 magnification, with separate views of the nasal and temporal regions of both eyes. Coloured low-voltage light emitting diodes were positioned on stands in the visual field of the subject at 35. To the camera–subject axis to aid fixation. The UV-induced fluorescence photography was based on standard principles, using a specially adapted electronic flash system fitted with UV-transmission filters (transmittance range 300–400nm, peak 365nm) as the excitation source. Subject fluorescence was recorded with a Nikon D100 (Nikon, Melville, NY, USA) digital camera and 105mm f/2.8 Micro Nikon (Nikon) lens fitted with infrared and UV barrier filters. Thus, only fluorescence was recorded by the camera. Images were saved in RGB format at the D100 settings of JPEG fine(1:4 compression) and large resolution. Some unwanted red light allowed by the UV transmission filter was eliminated by removal of the red channel in Adobe Photoshop (Adobe Systems Inc., San Jose, CA, USA), equivalent to the use of a cyan filter on the camera lens.

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Each photograph could be verified immediately after it was taken and recaptured, if necessary, to obtain an enhanced image. Imaging software was then used to calculate the area of UVAF. Four photos were analysed per person (right nasal/left nasal/right temporal/left temporal). The Figure 1 Photograph of UVAF system used in the Study demonstrating the seating of a model participant. The settings required for the UVAF analysis were pixel length=3216 and logical length=2.4. The resultant area is expressed in mm^2. The camera system detects a fairly uniform area of AF, and the area analysed corresponds to the summation of all of the areas. However, the area analysed is of varying intensity of AF, and it may be difficult to determine the specific area of the conjunctiva that needs to be determined. In most cases, only one discreet area of AF is found. However, in cases in which multiple areas of AF exist, each area was calculated separately and the total area is calculated for that eye.

Table 33: Distribution of Conjunctival Ultra-Violet Auto-Fluorescence (UVAF)[26] mm^2: Gurgaon

	R nasal n=1148	R temporal n=1147	L nasal n=1149	L temporal n=1149	R (total) n=1147	L (total) n=1149	Nasal (total) n=1146	Temporal (total) n=1145	Individual total n=1145
Median	4.8	4.2	9.3	4.8	4.4	9.9	10.1	9.4	19.7
Mean	6.2	5.9	12.1	6.2	6.5	12.7	13.4	12.4	24.8
Range	0.0-46.4	0.0-50.7	0.0-75.3	0.0-55.1	0.0-55.1	0.0-78.3	0.0-84.6	0.0-83.3	0.0-142.4
IQR*	1.0-9.3	0.0-8.7	4.3-17.2	0.0-9.4	0.0-9.5	3.6-18.7	4.1-17.7	3.2-17.5	9.4-34.3
Skewness	1.6	1.9	1.7	1.9	1.9	1.6	1.5	1.8	1.6
Kurtosis	6.8	8.8	7.6	9.4	8.1	6.2	6.6	7.3	6.6

A total of 1145 individuals underwent Ultra Violet Auto Fluorescence. Out of 1145 individuals undergoing UV photography 93 had pterygium and 1055 were without pterygium. Four measurements were recorded for each person (nasal, temporal each for both the eyes), which resulted in nine different groups. The mean area was 24.8mm^2 there were 518 males and 627 females.

Table 33.1: Distribution of Conjunctival Ultra-Violet Auto-Fluorescence (UVAF)[26] mm^2: Guwahati

	R nasal n=133	R temporal (n=133)	L nasal (n=133)	L temporal (n=133)	R (total) (n=133)	L (total) (n=133)	Nasal (total) (n=133)	Temporal (total) (n=133)	Individual total
Median	4.26	3.01	8.99	4.62	5.38	11.07	9.87	9.38	21.65
Mean	5.10	5.80	10.90	6.25	6.78	13.03	11.36	12.58	23.94
Range	0.00-24.31	0.00-29.01	0.00-48.86	0.00-25.23	0.00-39.10	0.00-63.39	0.00-46.54	0.00-51.92	0.00-93.60
IQR	0.02-7.47	0.02-9.32	1.97-17.93	0.02-8.94	0.02-10.21	2.97-20.06	2.41-16.34	0.04-19.47	5.02-36.08

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Skewness	1.18	1.20	0.95	1.19	1.33	1.23	1.12	1.08	0.94
Kurtosis	4.23	3.76	3.50	3.66	5.16	5.03	4.05	3.59	3.85

A total of 133 individuals underwent Ultra Violet Auto Fluorescence. Out of 133 individuals undergoing UV photography 13 had pterygium and 120 were without pterygium. Four measurements were recorded for each person (nasal, temporal each for both the eyes), which resulted in nine different groups. The mean area was 12.6mm^2 there were 60 males and 73 females

Table 34: Age and gender association of Conjunctival Ultra Violet Auto Fluorescence (UVAF) in the study population in persons with pterygium: Gurgaon

Category	First quartile		Second quartile		Third quartile		Fourth quartile		P (for trend)
	N	%	N	%	N	%	N	%	
Gender									
Male(n=40)	11	27.5	11	27.5	6	15.0	12	30.0	P <0.230
Female(n=53)	11	20.8	11	20.8	18	34.0	13	24.5	
Age group(years)									
40-49	8	26.7	7	23.3	6	20.0	9	30.0	P <0.886
50-59	4	15.4	8	30.8	7	26.9	7	26.9	
60-69	6	22.2	5	18.5	9	33.3	7	25.9	
≥70	4	40.0	2	20.0	2	20.0	2	20.0	

All the 93 individuals with pterygium in Gurgaon were divided into quartiles according to area of exposure. It was observed that there was no significant association of age and gender with this area.

Table 34.1: Age and gender association of Conjunctival Ultra Violet Auto Fluorescence (UVAF) in the study population in persons with pterygium: Guwahati

Category	First quartile		Second quartile		Third quartile		Fourth quartile		P (for trend)
	N	%	N	%	N	%	N	%	
Gender									
Male	2	18.18	1	9.09	4	36.36	4	36.36	P=0.630
Gender	1	50.00	0	0.00	1	50.00	0	0.00	
Age group (years)									
40-49	2	50.00	0	0.00	2	50.00	0	0.00	P=0.264
50-59	1	25.00	1	25.00	1	25.00	1	25.00	
60-69	0	0.00	0	0.00	2	40.00	3	60.00	
≥70									

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All these 13 individuals in Guwahati with pterygium were divided into quartiles according to area of exposure. It was observed that there was no significant association of age and gender with this area.

Table 35: Prevalence of various ocular diseases according to age in study population

Age(Years)	Gurgaon			Guwahati			Prakasam		
	Cataract (n=1131)	Dry Eye (n=817)	Pterygium (n=403)	Cataract (n=828)	Dry Eye (n=185)	Pterygium (n=293)	Cataract (n=1221)	Dry Eye (n=41)	Pterygium (n=584)
40-49	74(5.2)	242(17.0)	127(8.9)	70(4.8)	68(4.7)	115(7.9)	110 (9.9)	9 (0.8)	200(17.9)
50-59	164(18.7)	205(23.4)	98(11.1)	161(20.1)	40(5.0)	77 (9.6)	270(35.9)	8 (1.1)	159(21.1)
60 -69	400(53.8)	209(28.2)	98(13.1)	306(50.8)	42(7.0)	64(10.6)	459(72.6)	11(1.9)	149(23.6)
≥70	493(91.5)	161(30.3)	80(14.8)	291(79.5)	35(9.7)	37 (10.0)	382(94.5)	13 (3.9)	76(18.8)
Gender									
Male	495(30.7)	357(22.2)	201(12.5)	370(24.9)	86(5.8)	164(11.0)	539(40.9)	19 (1.5)	225(17.1)
Female	636(17.7)	460(23.5)	202 (10.2)	458(26.4)	99(5.7)	129(7.4)	682(43.0)	22 (1.4)	359(22.6)
Total	1131 (31.5)	817 (22.9)	403 (11.2)	828(25.7)	185(5.8)	293(9.1)	1221 (42.1)	41 (1.5)	584 (20.1)

In Gurgaon, in the age group of 40-49 years, 74(5.2%) participants had cataract, 242(17%) participants had dry eye, 127(8.9%) had pterygium, In the age group of 50-59 years, 164(18.7%) participants had cataract, 205 (23.4%) participants had dry eye, 98(11.1%) had pterygium, In the age group of 60-69 years, 400(53.8%) participants had cataract, 209(28.2%) participants had dry eye, 98(13.1%) had pterygium, In the age group of 70 years and above, 493(91.5%) participants had cataract, 161(30.3%) participants had dry eye, 80(14.8%) had pterygium.

In Guwahati, in the age group of 40-49 years, 70(4.8%) participants had cataract, 68(4.7%) participants had dry eye, 115(7.9%) had pterygium, In the age group of 50-59 years, 161 (20.1%) participants had cataract, 40(5.0%) participants had dry eye, 77(9.6%) had pterygium, In the age group of 60-69 years, 306(50.7%) participants had cataract, 42(7.0 %) participants had dry eye, 64(10.6%) had pterygium, In the age group of 70 years and above, 291(79.5%) participants had cataract, 35(9.7%) participants had dry eye, 37(9.9%) had pterygium.

In Prakasam, in the age group of 40-49 years, 110(9.9%) participants had cataract, 9(0.8%) participants had dry eye, 200(17.9%) had pterygium, In the age group of 50-59 years, 270(35.9%) participants had cataract, 8(1.1%) participants had dry eye,

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159(21.1%) had pterygium, In the age group of 60-69 years, 459(72.6%) participants had cataract, 11(1.9 %) participants had dry eye, 149(23.6%) had pterygium, In the age group of 70 years and above, 382(94.5%) participants had cataract, 13(3.9%) participants had dryeye,76(18.8%) had pterygium.

In Gurgaon, of these 1131 participants with cataract, 495 were males and 636 were females, Of the 817 participants with dry eye, 357 were males and 460 were females, of the 403 participants with pterygium, 201 were males and 202 were females. The Prevalence of cataract in males was 30.7% and in females was 17.7%.The prevalence of dry eye in males was 22.2% and in females was 23.5%.The prevalence of pterygium in males was 12.5% and in females was 10.2%.

In Guwahati, of these 828 people with cataract, 370 were males and 458 were females, Of the 185 people with dry eye, 86 were males and 99 were females, of the 293 people with pterygium, 164 were males and 129 were females. The Prevalence of cataract in males was 24.9% and in females was 26.7%. The prevalence of dry eye in males was 5.8% and in females was 5.7%. The prevalence of pterygium in males was 11% and in females was 7.4%.

In Prakasam, of these 1221 people with cataract, 539 were males and 682 were females, Of the 41 people with dry eye, 19 were males and 22 were females, Of the 584 people with pterygium, 225 were males and 359 were females. The Prevalence of cataract in males was 40.9% and in females was 42.1%. The prevalence of dry eye in males was 1.5% and in females was 1.4%. The prevalence of pterygium in males was 17.0% and in females was 22.6%.

In Gurgaon, The prevalence of cataract was 1135(31.5%), prevalence of dry eye was 817(22.7%) and prevalence of pterygium was 403(11.2%).

In Guwahati, The prevalence of cataract was 828(25.7%), prevalence of dry eye was 185 (5.8%) and prevalence of pterygium was 293(9.1%).

In Prakasam, The prevalence of cataract was 1221(42%), prevalence of dry eye was 41(1.5%) and prevalence of pterygium was 584(20.1%).

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**Table 36: Distribution of study population into quantiles according to duration of Sun Exposure in
Gurgaon**

Quantiles of Total Exposure	Number of participants (n=3595)	Mean (Min-Max)
1st quantile	719 (20.0%)	50.5 (7.3, 73.8)
2nd quantile	729 (20.2%)	88.4 (73.8, 101.2)
3rd quantile	714 (19.9%)	114.2 (101.2, 127.5)
4th quantile	715 (19.9%)	143.1 (127.5, 160.4)
5th quantile	718 (20.0%)	189.3 (160.4, 314.1)

All these study participants were divided into quantiles according to mean duration of sun exposure, There were 719 participants in 1st quantile with a mean exposure of 50.5 thousand hours), there were 729 participants in 2nd quantile with a mean exposure of 88.4 thousand hours. There were 714 study participants in 3rd quantile with a mean exposure of 114.2 thousand hours. There were 715 study participants in 4th quantile with a mean exposure of 143.1 thousand hours. There were 718 study participants in 5th quantile with a mean exposure of 189.3 thousand hours.

**Table 36.1: Distribution of study population into quantiles according to duration of Sun Exposure in
Guwahati:**

Quantiles of Total Exposure	Number of participants (n=3567)	Mean (Min-Max)
1st quantile	716 (20.1%)	46.3 (7.3, 55.5)
2nd quantile	711(19.9%)	61.2 (55.5, 66.8)
3rd quantile	714(20.0%)	72.9 (66.8, 80.2)
4th quantile	713(20.0%)	88.4 (80.2, 98.0)
5th quantile	713(20.0%)	120.5 (98.1, 223.8)

All these study participants were divided into quantiles according to mean duration of sun exposure, There were 716 participants in 1st quantile with a mean exposure of 46.3 thousand hours), there were 711 participants in 2nd quantile with a mean exposure of 61.2 thousand hours. There were 714 study participants in 3rd quantile with a mean exposure of 72.9 thousand hours. There were 713 study participants in 4th quantile with a mean exposure of 88.4 thousand hours. There were 713 study participants in 5th quantile with a mean exposure of 120.5 thousand hours.

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Table 36.2: **Distribution of study population into quantiles according to duration of Sun Exposure in Prakasam**

Quantiles of Total Exposure	Number of participants (n=3129)	Mean (Min-Max)
1st quantile	626 (20.0%)	21.7 (7.3, 60.9)
2nd quantile	679 (21.7%)	85.8 (61.4, 100.0)
3rd quantile	601 (19.2%)	110.1 (100.0, 119.2)
4th quantile	605 (19.3%)	133.4 (119.2, 148.6)
5th quantile	618 (19.7%)	174.1 (149.1, 252.2)

All these study participants were divided into quantiles according to mean duration of sun exposure, There were 626 participants in 1st quantile with a mean exposure of 21.7 thousand hours), there were 679 participants in 2nd quantile with a mean exposure of 85.8 thousand hours. There were 601 study participants in 3rd quantile with a mean exposure of 110.1 thousand hours. There were 605 study participants in 4th quantile with a mean exposure of 133.4 thousand hours. There were 618 study participants in 5th quantile with a mean exposure of 174.1 thousand hours.

Association between cataract, dry eye and pterygium with selected demographic indicators and risk factors

10.2.8. Association tables of various ocular diseases with risk factors

10.2.8.1. Logistic regression table showing association of cataract with various risk factors

Table 37: Association of Cataract with various risk factors (Unadjusted odds ratio): Gurgaon

Cataract	Total	Present	Unadjusted OR (95% CI)	P value
Age(years)	**(n=3588)**	**(n=1131)**		
40-49	1427	74 (5.2)	1	
50-59	879	164 (18.7)	4.2(3.14, 5.60)	<0.001
60-69	743	400 (53.8)	21.3(16.20, 28..07)	<0.001
≥70	539	493 (91.5)	196.0(133.72, 287.16)	<0.001
Gender	**(n=3588)**	**(n=1131)**		
Male	1612	495 (30.7)	1	
Female	1976	636 (32.2)	1.1 (0.93, 1.23)	0.343
Education	(n=3588)	(n=1131)		
Illiterate	1763	746 (42.3)	1	
Can read & write	532	138 (25.9)	0.5 (0.38, 0.59)	<0.001
Intermediate	1191	227 (19.1)	0.3 (0.27, 0.38)	<0.001
Graduation	102	20 (19.6)	0.3 (0.20, 0.55)	<0.001
Occupation	(n=3588)	(n=1131)		
House work	1711	441 (25.8)	1	
Unemployed	800	496 (73.2)	7.8 (6.41, 9.60)	<0.001

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Unskilled	399	147 (18.4)	0.6 (0.52, 0.80)	<0.001
Skilled	678	47 (11.8)	0.4 (0.28, 0.53)	<0.001
Land area	(n=3588)	(n=1131)		
No Land	2070	664 (32.1)	1	
1 to 5 acres	1227	362 (29.5)	0.9 (0.76, 1.03)	0.123
>5 acres	291	105 (36.1)	1.2 (0.92, 1.54)	0.173
Cumulative Exposure (Outdoor)	(n=3588)	(n=1131)		
Less than Mean	1856	303 (16.3)	1	
More than Mean	1732	828 (47.8)	4.7 (4.02, 5.48)	<0.001
Quantiles of total Exposure	(n=3588)	(n=1131)		
1st quantile	717	87(12.1)	1	
2nd quantile	727	124(17.1)	1.5 (1.11, 2.00)	0.008
3rd quantile	713	173(24.3)	2.3 (1.75, 3.08)	<0.001
4th quantile	715	279(39.0)	4.6 (3.54, 6.07)	<0.001
5th quantile	716	468(65.4)	13.7(10.41,17.94)	<0.001
Peak Hour Exposure	(n=3588)	(n=1131)		
Less than Mean	1839	338 (18.4)	1	
More than Mean	1749	793 (45.3)	3.7 (3.17, 4.28)	<0.001
Smoking (pack years)	(n=3588)	(n=1131)		
No Smoker	1600	411 (25.7)	1	
>0 to ≤1	264	79 (29.9)	1.2 (0.93, 1.64)	0.148
>1 to <5	571	141 (24.7)	0.9 (0.76, 1.8)	0.640
≥5	1152	500 (43.4)	2.2 (1.89, 2.61)	<0.001
Others	1	0 (100.0)	-	-
Bad fuel used for cooking (years)	(n=3588)	(n=1131)		
Nil Bad Fuel Exposure	1,278	382 (29.9)	1	
1 to 25	156	6 (3.9)	0.1 (0.04, 0.21)	<0.001
26 to 50	1,549	287 (18.5)	0.5 (0.45, 0.64)	<0.001
>50	605	456 (75.4)	7.2 (5.76, 8.95)	<0.001

Association of Cataract with various risk factors: Uni-variable Analysis

Age- It was observed that cataract was increasing with the increasing age with the most significant association in participants more than 70 years (OR 196.0; 133.7, 287.1) (p<0.001)

Gender- There was no significant association between cataract and gender (OR 1.1; 0.9, 1.2).

Education- There was a significant negative association between cataract and higher education categories.(OR 0.3; 95% CI .2-.5) (p<0.001).

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Occupation- Cataract prevalence was lower among people involved in skilled and unskilled occupation as compared to unemployed participants (OR 7.8 ; 95% CI 6.4, 9.6) (p<0.001).

Land Area- There was no association between cataract and ownership of land area (1.2; 95% CI 0.9, 1.5) (p=0.173).

Cumulative Exposure (Outdoor)- The sun exposure was calculated in study population by history of remaining outside their houses between 9am-5pm. (Table 40) Mean cumulative life-time duration of sun exposure calculated according to Melbourne visual impairment project model was 116.96 thousand hours with a range of (115.33 to 118.58 hours). Cataract was significantly higher among participants with higher than average total sun exposure (more than 116.96 thousand hours of exposure to sun light in their lifetime) with (OR 4.9 ;95% CI 4.1,5.7) (p<0.001).

Quantiles of sun exposure- All these study participants were divided according to quantiles of sun exposure using mean duration of sun exposure calculated according to Melbourne formula. There was a significant association between increasing quantiles and occurence of cataract (OR 13.7; 95% CI 11.3,19.8) (p<0.001).

Exposure during peak UV hours - Similarly average sun exposure during peak hours (between 11am-3pm) was 30.1 thousand hours. Cataract was significantly associated with cumulative peak hours exposure of more than 30.1 thousand hours (OR 3.7; 95% CI 3.26, 4.43) (p<0.001).

Smoking- Cataract was significantly associated in participants with exposure ≥ 5 smoke pack years (OR 2.2; 95% CI 1.8, 2.7) (p<0.001).

Cooking fuel (Years of exposure) – Cataract was significantly present in participants with more than 50 years of bad fuel usage (OR 7.2; 95% CI 5.7, 8.9) (p<0.001).

Table 37.1: Association of Cataract with various risk factors (Unadjusted odds ratio):Guwahati

Cataract	Total	Present	Unadjusted OR (95% CI)	P value
Age(years)	**(n=3222)**	**(n=828)**		
40-49	1453	70 (4.8)	1	
50-59	800	161 (20.1)	5.0 (3.70, 6.69)	<0.001
60-69	603	306 (50.8)	20.4 (15.26, 27.16)	<0.001
≥70	366	291 (79.5)	76.7 (54.05, 108.72)	<0.001
Gender	**(n=3222)**	**(n=828)**		
Male	1488	370 (24.9)	1	
Female	1734	458 (26.4)	1.1 (0.93, 1.27)	0.316
Education	**(n=3222)**	**(n=828)**		

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Illiterate	1299	465 (35.8)	1	
Can read & write	778	183 (23.5)	0.6 (0.45, 0.67)	<0.001
Intermediate	1035	169 (16.3)	0.4 (0.29, 0.43)	<0.001
Graduation	101	10 (9.9)	0.2 (0.10, 0.38)	<0.001
Not known	9	1 (11.1)	0.2 (0.03, 1.80)	0.159
Occupation	**(n=3222)**	**(n=828)**		
House work	1525	358 (23.5)	1	
Unskilled	914	152 (16.6)	0.7 (0.53, 0.80)	<0.001
Skilled	396	41 (10.4)	0.4 (0.27, 0.53)	<0.001
Unemployed	381	276 (72.4)	8.6 (6.65, 11.05)	<0.001
Others	6	1 (16.7)	0.7 (0.08, 5.60)	0.697
Land area	**(n=3212)**	**(n=825)**		
No Land	280	206 (26.4)	1	
1 to 5 acres	2425	615 (25.4)	0.9 (0.79, 1.14)	0.559
>5 acres	7	4 (57.1)	3.7 (0.82, 16.74)	0.087
Cumulative Exposure (Outdoor)	**(n=3220)**	**(n=827)**		
Less than Mean	1838	230 (12.5)	1	
More than Mean	1382	597 (43.2)	5.3 (4.47, 6.33)	<0.001
Quantiles of total Exposure	**(n=3220)**	**N=827**		
1st quantile	639	51 (8.0)	1	
2nd quantile	647	66 (10.2)	1.3 (0.89, 1.92)	0.167
3rd quantile	640	136 (21.3)	3.1 (2.21, 4.38)	<0.001
4th quantile	645	224 (34.7)	6.1 (4.41, 8.52)	<0.001
5th quantile	649	350 (53.9)	13.5 (9.75, 18.68)	<0.001
Peak Hour Exposure	**(n=3216)**	**(n=825)**		
Less than Mean	1810	280 (15.5)	1	
More than Mean	1406	545 (38.8)	3.5 (2.93, 4.09)	<0.001
Smoking (pack years)	**(n=3222)**	**(n=828)**		
No Smoker	2499	601 (24.1)	1	
>0 to ≤1	168	32 (19.1)	0.7 (0.50, 1.10)	0.141
>1 to <5	325	95 (29.2)	1.3 (1.01, 1.69)	0.042
≥5	201	89 (44.3)	2.5 (1.87, 3.36)	<0.001
Others	29	11 (37.9)	1.9 (0.91, 4.11)	0.088
Fuel used for cooking(years)	**(n=3222)**	**(n=828)**		
No bad fuel exposure	277	73 (26.4)	1	
1 to 25	79	3 (3.8)	0.1 (0.03, 0.36)	<0.001
26 to 50	2205	320(14.5)	0.4(0.35, 0.63)	<0.001
>50	661	432(65.4)	5.2(3.86,7.19)	<0.001

Age- It was observed that cataract was increasing with the increasing age with the most significant association in participants more than 70 years (OR 78.2 ; 95% CI 54.5, 112.26) (p<0.001)

Gender- There was no significant association between cataract and gender (OR 1.1; 95% CI 0.9,1.3) (p=0.237).

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Education- There was a significant negative association between cataract and higher education categories (OR 0.1; 95% CI 0.08, 0.3) (p<0.001).

Occupation- Cataract prevalence was lower among people involved in skilled and unskilled occupation as compared to unemployed participants (OR 8.75;95% CI 6.7, 11.36) (p<0.001).

Land Area- There was no association between cataract and ownership of land area (4.21; 95% CI 0.9, 18.9) (p=0.062).

Quantiles of sun exposure- All these study participants were divided according to quantiles of sun exposure using mean duration of sun exposure calculated according to Melbourne formula. There was a significant association between increasing quantiles and occurence of cataract (OR 12.38; 95% CI 8.8, 17.3) (p<0.001).

Cumulative exposure (Outside) - The sun exposure was calculated in study population by history of remaining outside their houses between 9am-5pm. (Table 40) Mean cumulative life-time duration of sun exposure calculated according to Melbourne visual impairment project model was 781.45 thousand hours. Cataract was significantly higher among participants with higher than average total sun exposure (more than 781.45 thousand hours of exposure to sun light in their lifetime) with (OR 4.9 ;95% CI 4.1,5.7) (p<0.001).

Exposure during peak UV hours - Similarly average sun exposure during peak hours (between 11am-3pm) was 22.8 thousand hours. Cataract was significantly associated with cumulative peak hours exposure of more than 22.8 thousand hours (OR 3.51; 95% CI 2.9, 4.1) (p<0.001).

Smoking- Cataract was significantly associated in participants with exposure ≥ 5 smoke pack years (OR 2.5; 95% CI 1.8, 3.3) (p<0.001).

Cooking fuel (Years of exposure) – Cataract was significantly present in participants with more than 50 years of bad fuel usage (OR 5.2 ;95% CI 3.8,7.1) (p<0.001).

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Table 37.2: Association of Cataract with various risk factors (Unadjusted odds ratio): Prakasam

Cataract	Total	Present	Unadjusted OR (95% CI)	P value
Age(years)	**(n=2906)**	**(n=1221)**		
40-49	1117	110 (9.8)	1	
50-59	753	270 (35.9)	5.1 (4.0, 6.55)	<0.001
60-69	632	459 (72.6)	24.3 (18.7, 31.6)	<0.001
≥70	404	382 (94.5)	158.9 (99.08, 255.0)	<0.001
Gender	**(n=2906)**	**(n=1221)**		
Male	1319	539 (40.9)	1	
Female	1587	682 (42.1)	1.09 (0.94, 1.26)	0.251
Education	**(n=2906)**	**(n=1221)**		
Illiterate	1923	930 (48.4)	1	
Can read & write	487	178 (36.5)	0.61 (0.50, 0.75)	<0.001
Intermediate	430	109 (25.3)	0.36 (0.28, 0.45)	<0.001
Graduation	65	4 (6.1)	0.07 (0.02, 0.19)	<0.001
Other	1	0 (0.0)	-	
Occupation	**(n=2906)**	**(n=1221)**		
House work	471	231 (49.0)	1	
Unskilled	1674	558 (33.3)	0.45 (0.42, 0.63)	<0.001
Skilled	320	81 (25.3)	0.35 (0.25, 0.48)	<0.001
Unemployed	438	349 (76.7)	4.07 (3.03, 5.47)	<0.001
Other	3	2 (66.7)		
Land area	**(n=2906)**	**(n=1221)**		
No Land	1761	754 (42.8)	1	
1-5 acres	1043	434 (41.6)	0.95 (0.81, 1.11)	0.532
>5 acres	102	33 (32.3)	0.63 (0.41, 0.97)	0.039
Cumulative Exposure (Outdoor)	**(n=2904)**	**(n=1220)**		
Less than Mean	1283	355 (27.7)	1	
More than Mean	1621	865 (53.4)	2.99 (2.55, 3.49)	<0.001
Quantiles of total exposure	**(n=2904)**	**(n=1220)**		
1st quantile	569	189 (33.2)	1	
2nd quantile	615	138 (22.4)	0.58 (0.44, 0.75)	0.001
3rd quantile	563	151 (26.8)	0.73 (0.57, 0.95)	0.019
4th quantile	567	282 (49.7)	1.98 (1.56, 2.52)	<0.001
5th quantile	590	460 (77.9)	7.11 (5.47, 9.23)	<0.001
Peak Hour Exposure	**(n=2904)**	**(n=1221)**		
Less than Mean	1363	416 (30.5)	1	
More than Mean	1541	804 (52.2)	2.48 (2.13, 2.89)	<0.001
Smoking (pack years)	**(n=2906)**	**(n=1221)**		
No Smoker	2039	818 (40.1)	1	
>0 to ≤1	60	22 (36.7)	0.86 (0.50, 1.47)	0.591
>1 to <5	190	70 (36.8)	0.87 (0.64, 1.18)	0.378
≥5	305	125 (40.9)	1.03 (0.81, 1.32)	0.774
Not applicable	312	186 (59.6)	2.20 (1.72, 2.80)	<0.001
Fuel used for cooking(years)	**(n=2906)**	**(n=1221)**		
Zero bad fuel exposure	1264	517 (40.9)	1	
1 to 25	120	13 (10.8)	0.17 (0.09, 0.31)	<0.001
25 to 50	1163	378 (32.5)	0.69 (0.58, 0.82)	<0.001
>50	359	313 (87.2)	9.83 (7.07, 13.6)	<0.001

Others Information for education and occupatipon not available

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Age- It was observed that cataract was increasing with the increasing age with the most significant association in participants more than 70 years (OR 158.9; 95% CI 99.08, 255.0) (p<0.001)

Gender- There was no significant association between cataract and gender (OR 1.09 ; 95% CI 0.9, 1.2) (p=0.251).

Education- There was a significant negative association between cataract and higher education categories (OR 0.07 ; 95% CI 0.02, 0.19)(p<0.001).

Occupation- Cataract prevalence was lower among people involved in skilled and unskilled occupation as compared to unemployed participants (OR 4.07; 95% CI 3.03, 5.4) (p<0.001).

Land Area- There was a significant association between cataract and ownership of land area (0.63; 95% CI 0.4, 0.9) (p=0.039).

Cumulative Exposure (Outdoor)- The sun exposure was calculated in study population by history of remaining outside their houses between 9am-5pm. (Table 40) Mean cumulative life-time duration of sun exposure calculated according to Melbourne visual impairment project model was 105.19 thousand hours. Cataract was significantly higher among participants with higher than average total sun exposure (more than 105.19 thousand hours of exposure to sun light in their lifetime) with (OR 4.9 ;95% CI 4.1,5.7) (p<0.001).

Quantiles of sun exposure- All these study participants were divided according to quantiles of sun exposure using mean duration of sun exposure calculated according to Melbourne formula. There was a significant association between increasing quantiles and occurence of cataract (OR 7.11 ; 95% CI 5.4, 9.2) (p<0.001).

Exposure during peak UV hours - Similarly average sun exposure during peak hours (between 11am-3pm) was 35.9 thousand hours. Cataract was significantly associated with cumulative peak hours exposure of more than 35.9 thousand hours (OR 2.48 ;95% CI 2.13, 2.89) (p<0.001).

Smoking- There was no significant association between the participants with increased duration of smoking and cataract (OR 1.03 ; 95% CI 0.8, 1.3) (p=0.774).

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Cooking fuel (Years of exposure) – Cataract was significantly present in participants with more than 50 years of bad fuel usage (OR 9.83 ;95% CI 7.07, 13.6) (p<0.001).

Table 38: Association of Cataract with various risk factors (adjusted odds ratio): Gurgaon

Cataract	Total	Present	Adjusted OR (95% CI)	P value
Age(years)	**(n=3588)**	**(n=1131)**	-	
40-49	1427	242 (5.2)	-	-
50-59	879	205 (18.7)	-	-
60-69	743	209 (53.8)	-	-
≥70	539	161 (91.5)	-	-
Gender	**(n=3588)**	**(n=1131)**		
Male	1612	495 (30.7)	1	
Female	1976	636 (32.2)	0.9 (0.60, 1.44)	0.745
Education	**(n=3588)**	**(n=1131)**		
Illiterate	1763	746 (42.3)	1	
Can read & write	532	138 (25.9)	0.7 (0.57, 0.96)	0.024
Intermediate	1191	227 (19.1)	0.5 (0.37, 0.62)	<0.001
Graduation	102	20 (19.6)	0.6 (0.32, 1.10)	0.095
Occupation	**(n=3588)**	**(n=1131)**		
House work	1711	441 (25.8)	1	
Unemployed	800	496 (73.2)	5.1 (3.75, 7.09)	<0.001
Unskilled	399	147(18.4)	0.8 (0.57, 1.14)	0.227
Skilled	678	47 (11.8)	0.7 (0.46, 1.10)	0.127
Cumulative Exposure (Outdoor)	**(n=3588)**	**(n=1131)**		
Less than Mean	1856	303 (16.3)	1	
More than Mean	1732	828 (47.8)	1.1 (0.75, 1.62)	0.622
Quantiles of total exposure	**(n=3588)**	**(n=1131)**		
1st quantile	717	87(12.1)	1	
2nd quantile	727	124(17.1)	1.1(0.82, 1.58)	0.449
3rd quantile	713	173(24.3)	1.4 (0.95, 2.00)	0.091
4th quantile	715	279(39.0)	1.7 (1.03, 2.92)	0.038
5th quantile	716	468(65.4)	2.8 (1.65, 4.90)	<0.001
Peak Hour Exposure	**(n=3588)**	**(n=1131)**		
Less than Mean	1839	338 (18.4)	1	
More than Mean	1749	793 (45.3)	1.1 (0.86, 1.42)	0.449
Smoking (pack years)	**(n=3588)**	**(n=1131)**		
No Smoker	1600	411 (25.7)	1	
>0 to ≤1	264	79 (29.9)	1.2 (0.88, 1.76)	0.208
>1 to <5	571	141 (24.7)	0.9 (0.64, 1.13)	0.268
≥5	1,152	500 (43.4)	1.5 (1.18, 1.93)	<0.001
Others	1	0 (100.0)		
Bad fuel used for cooking (years)	**(n=3588)**	**(n=1131)**		
Nil Bad Fuel Exposure	1278	382 (29.9)	1	
1 to 25	156	6 (3.9)	0.3 (0.12, 0.64)	0.003
26 to 50	1,549	287 (18.5)	0.7 (0.53, 1.04)	0.085
>50	605	456 (75.4)	3.6 (2.50, 5.15)	<0.001

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Association of Cataract with various risk factors: Multi-variable Analysis

In Gurgaon: Multivariable analysis included gender, education, occupation, sun exposure, smoke pack years and type of fuel. Cataract was significantly associated with unemployed participants, increasing quantile of exposure during peak UV hours (p<0.001), increased smoke pack years more than 5 years and increased history of use of bad fuel >50 years (p<0.001). There was a significant association of cataract with participants educated till intermediate grades (p<0.001).

Table 38.1: Association of Cataract with various risk factors (adjusted odds ratio): Guwahati

Cataract	Total	Present	Ad OR (95% CI)	P value
Age(years)	**(n=3222)**	**(n=828)**		
40-49	1453	70 (4.8)		
50-59	800	161 (20.1)		
60-69	603	306 (50.8)		
≥70	366	291 (79.5)		
Gender	**(n=3222)**	**(n=828)**		
Male	1488	370 (24.9)	1	
Female	1734	458 (26.4)	0.7 (0.49, 1.06)	0.100
Education	**(n=3222)**	**(n=828)**		
Illiterate	1299	465 (35.8)	1	
Can read & write	778	183 (23.5)	0.7 (0.57, 0.93)	0.011
Intermediate	1035	169 (16.3)	0.6 (0.47, 0.78)	<0.001
Graduation	101	10 (9.9)	0.5 (0.22, 1.04)	0.063
Not known	9	1 (11.1)	0.3 (0.02, 2.69)	0.257
Occupation	**(n=3222)**	**(n=828)**		
House work	1525	358 (23.5)	1	
Unskilled	914	152 (16.6)	0.4 (0.27, 0.59)	<0.001
Skilled	396	41 (10.4)	0.5 (0.29, 0.75)	0.002
Unemployed	381	276 (72.4)	2.4 (1.71, 3.36)	<0.001
Others	6	1 (16.7)	0.4 (0.04, 3.87)	0.419
Cumulative Exposure (Outdoor)	**(n=3220)**	**(n=827)**		
Less than Mean	1838	230 (12.5)	1	
More than Mean	1382	597 (43.2)	1.1 (0.60, 1.87)	0.834
Quantiles of total exposure	**(n=3220)**	**N=827**		
1st quantile	639	51 (8.0)	1	
2nd quantile	647	66 (10.2)	1.0 (0.70, 1.54)	0.858
3rd quantile	640	136 (21.3)	1.9 (1.32, 2.81)	0.001
4th quantile	645	224 (34.7)	2.3 (1.20, 4.58)	0.013
5th quantile	649	350 (53.9)	2.7 (1.38, 5.44)	0.004
Peak Hour Exposure	**(n=3216)**	**(n=825)**		
Less than Mean	1810	280 (15.5)	1	
More than Mean	1406	545 (38.8)	1.3 (1.03, 1.64)	<0.001
Smoking (pack years)	**(n=3222)**	**(n=828)**		

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No Smoker	2499	601 (24.1)	1	
>0 to ≤1	168	32 (19.1)	1.1 (1.69, 1.85)	0.628
>1 to <5	325	95 (29.2)	1.3 (0.90, 1.84)	0.168
≥5	201	89 (44.3)	1.5 (1.01, 2.28)	0.042
Others	29	11 (37.9)	2.2 (0.90, 5.48)	0.083
Fuel used for cooking(years)	**(n=3222)**	**(n=828)**		
No bad fuel exposure	277	73 (26.4)	1	
1 to 25	79	3 (3.8)	0.2 (0.06, 0.68)	0.010
26 to 50	2205	320 (14.5)	0.6 (0.40, 0.82)	0.002
>50	661	432 (65.4)	2.2 (1.52, 3.22)	<0.001

Others Information for education and occupatipon not available

Association of Cataract with various risk factors: Multi-variable Analysis

In Guwahati: Multivariable analysis included gender, education, occupation, sun exposure, smoke pack years and type of fuel. Cataract was significantly associated with unemployed participants and unskilled participants, increasing quantile of exposure during peak UV hours (p<0.004), increased smoke pack years more than 5 years (p=0.04) and increased history of use of bad fuel >50 years (p<0.001). There was a significant association of cataract with participants educated till intermediate grades (p<0.001).

Table 38.2: Association of Cataract with various risk factors (adjusted odds ratio): Prakasam

Cataract	Total	Present	Ad OR (95% CI)	P value
Age(years)	**(n=2906)**	**(n=1221)**		
40-49	1117	110 (9.8)	-	
50-59	753	270 (35.9)	-	-
60-69	632	459 (72.6)	-	-
≥70	404	382 (94.5)	-	-
Gender	**(n=2906)**	**(n=1221)**		
Male	1319	539 (40.9)	1	
Female	1587	682 (42.1)	0.66 (0.40, 1.09)	0.106
Education	**(n=2906)**	**(n=1221)**		
Illiterate	1923	930 (48.4)	1	
Can read & write	487	178 (36.5)	0.63 (0.49, 0.81)	<0.001
Intermediate	430	109 (25.3)	0.43 (0.32, 0.58)	<0.001
Graduation	65	4 (6.1)	0.06 (0.02, 0.22)	<0.001
Other	1	0 (0.0)	-	
Occupation	**(n=2906)**	**(n=1221)**		
House work	471	231 (49.0)	1	
Unskilled	1674	558 (33.3)	0.33 (0.25, 0.43)	<0.001
Skilled	320	81 (25.3)	0.47 (0.32, 0.68)	<0.001
Unemployed	4338	349 (79.7)	2.15 (1.51, 3.08)	<0.001
Other	3	2 (66.7)	8.28 (0.21, 324.84)	0.259
Cumulative Exposure (Outdoor)	**(n=2904)**	**(n=1220)**		
Less than Mean	1283	355 (27.7)	1	

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More than Mean	1621	865 (53.4)	0.98 (0.67, 2.04)	0.946
Quantiles of total exposure	**(n=2904)**	**(n=1220)**		
1st quantile	569	189 (33.2)	1	
2nd quantile	615	138 (22.4)	0.75 (0.55, 1.02)	0.072
3rd quantile	563	151 (26.8)	1.09 (0.64, 1.87)	0.727
4th quantile	567	282 (49.7)	2.69 (1.44, 5.02)	0.002
5th quantile	590	460 (77.9)	6.17 (3.23, 11.81)	<0.001
Peak Hour Exposure	**(n=2904)**	**(n=1220)**		
Less than Mean	1363	416 (30.5)	1	
More than Mean	1541	804 (52.2)	0.76 (0.56, 1.02)	0.072
Smoking (pack years)	**(n=2906)**	**(n=1221)**		
No Smoker	2039	818 (40.1)	1	
>0 to ≤1	60	22 (36.7)	0.9 (0.48, 1.84)	0.883
>1 to <5	190	70 (36.8)	1.2 (0.77, 1.70)	0.484
≥5	305	125 (40.9)	1.3 (0.93, 1.82)	0.116
Not applicable	312	186 (59.6)	1.6 (1.19, 2.24)	0.002
Fuel used for cooking(years)	**(n=2906)**	**(n=1221)**		
Zero bad fuel exposure	1264	517 (40.9)	1	
1 to 25	120	13 (10.8)	0.4 (0.17, 0.76)	0.008
25 to 50	1163	378 (32.5)	1.3 (0.81, 2.04)	0.285
>50	359	313 (87.2)	6.2 (3.59, 10.73)	<0.001

Others Information for education and occupatipon not available

Association of Cataract with various risk factors: Multi-variable Analysis

In Prakasam: Multivariable analysis included gender, education, occupation, sun exposure, smoke pack years and type of fuel. Cataract was significantly associated with unemployed participants and unskilled participants, increasing quantile of exposure during peak UV hours (p<0.001), there was no significant association between increased smoke pack years more than 5 years with cataract and increased history of use of bad fuel > 50 years (p<0.001).

Table 39: Association of ocular diseases with bad fuel usage among female participants: Gurgaon

Cataract	Total	Present	Adjusted OR (95% CI)	P value
Fuel used for cooking(years)	**(n=1966)**	**(n=608)**		
1 to 25	140	6 (4.3)	1	
26 to 50	1324	240 (18.1)	4.9 (2.16, 11.34)	<0.001
>50	502	388 (77.3)	76.0 (32.68, 176.79)	<0.001
Dry eye	**Total**	**Present**		
Fuel used for cooking(years)	**(n=1952)**	**(n=457)**		
1 to 25	140	29 (20.7)	1	
26 to 50	1317	279 (21.2)	1.0 (0.67, 1.58)	0.897
>50	495	149 (30.1)	1.6 (1.05, 2.59)	0.030
Pterygium	**Total**	**Present**		

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Fuel used for cooking(years)	(n=1970)	(n=202)		
1 to 25	140	11 (7.9)	1	
26 to 50	1326	122 (9.2)	1.2 (0.62, 2.26)	0.599
>50	504	69 (13.7)	1.8 (0.96, 3.62)	0.068

In **Gurgaon**, Amongst 1946 female participants with history of working in the kitchen and evaluated for cataract, 608 had cataract. There was a highly significant association of increased duration of usage of bad fuels >50 years (76.3; 95% CI 32.7, 177.7) (p<0.001)

Amongst 1952 female participants with history of working in the kitchen and evaluated for dry eye, 457 had dry eye, there was a highly significant association of increased duration of usage of bad fuels >50 years (1.6; 95% CI 1.0, 2.6) (p=0.030).

Amongst 1970 female participants with history of working in the kitchen and evaluated for pterygium, 202 had developed pterygium. There was a highly significant association of increased duration of usage of bad fuels >50 years (1.8; 95% CI 0.9, 3.6) (p=0.068).

Table 39.1: Association of ocular diseases with bad fuel usage among female participants: Guwahati

Cataract	Total	Present	Adjusted OR (95% CI)	P value
Fuel used for cooking(years)	(n=1718)	(n=451)		
1 to 25	62	3 (4.8)	1	
26 to 50	1293	207 (16.0)	3.7 (1.16, 12.07)	0.027
>50	363	241 (66.4)	38.8 (11.93, 126.46)	<0.001
Dry eye	Total	Present		
Fuel used for cooking(years)	(n=1718)	(n=98)		
1 to 25	62	4 (6.5)	1	
26 to 50	1294	67 (5.2)	0.8 (0.28, 2.25)	0.661
>50	362	27 (7.5)	1.2 (0.39, 3.46)	0.779
Pterygium	Total	Present		
Fuel used for cooking(years)	(n=1722)	(n=129)		
1 to 25	62	2	1	
26 to 50	1294	90	2.2 (0.54, 9.32)	0.267
>50	366	37	3.4 (0.79, 14.37)	0.100

In **Guwahati**, Amongst 1718 female participants with history of working in the kitchen and evaluated for cataract, 451 had cataract. There was a highly significant association of increased duration of usage of bad fuels >50 years (38.8; 95% CI 11.9, 126.4) (p<0.001)

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Amongst 1718 female participants with history of working in the kitchen and evaluated for dry eye, 98 had dry eye, there was no significant association of increased duration of usage of bad fuels> 50 years (1.2; 95% CI0.3, 3.4) (p=0.779).

Amongst 1718 female participants with history of working in the kitchen and evaluated for pterygium, 129 had developed pterygium. There was a no significant association of increased duration of usage of bad fuels >50 years (3.4; 95% CI 0.7, 14.3) (p=0.100).

Table 39.2: Association of ocular diseases with bad fuel usage among female participants: Prakasam

Cataract	Total	Present	Adjusted OR (95% CI)	P value
Fuel used for cooking(years)	**(n=1554)**	**(n=660)**		
1 to 25	112	12 (10.7)	1	
26 to 50	1104	355 (32.2)	3.9 (2.14, 7.28)	<0.001
>50	338	293 (86.7)	54.3 (27.60, 106.68)	<0.001
Dry eye	**Total**	**Present**		
Fuel used for cooking(years)	**(n=1462)**	**(n=20)**		
1 to 25	109	2 (1.8)	1	
26 to 50	1062	13 (1.2)	0.7 (0.15, 2.98)	0.592
>50	291	5 (1.7)	0.9 (0.18, 4.89)	0.937
Pterygium	**Total**	**Present**		
Fuel used for cooking(years)	**(n=1555)**	**(n=351)**		
1 to 25	112	11 (9.8)	1	
26 to 50	1105	274 (24.8)	3.0 (1.60, 5.72)	0.001
>50	338	66 (19.5)	2.2 (1.13, 4.39)	0.021

In Prakasam, Amongst 1554 female participants with history of working in the kitchen and evaluated for cataract, 660 had cataract. There was a highly significant association of increased duration of usage of bad fuels >50 years (54.3; 95% CI 27.6, 106.6) (p<0.001)

Amongst 1446 female participants with history of working in the kitchen and evaluated for dry eye, 20 had dry eye, there was a highly significant association of increased duration of usage of bad fuels >50 years (0.9; 95% CI 0.1,4.8) (p=0.93).

Amongst 1555 female participants with history of working in the kitchen and evaluated for pterygium, 351 had developed pterygium. There was a highly significant association of increased duration of usage of bad fuels >50 years (2.2; 95% CI 1.1, 4.3) (p=0.021).

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10.2.8.2. Logistic regression table showing association of dry eye with various risk factors

Table 40: Association of Dry eye with various risk factors (Unadjusted odds ratio): Gurgaon

Dry eye	Total	Present	Unadjusted OR (95% CI)	P value
Age(years)	**(n=3570)**	**(n=817)**		
40-49	1423	242 (17.0)	1	
50-59	876	205 (23.4)	1.5 (1.2,1.8)	<0.001
60-69	740	209 (28.2)	1.9 (1.6,2.4)	<0.001
≥70	531	161 (30.3)	2.1 (1.7,2.7)	<0.001
Gender	**(n=3570)**	**(n=817)**		
Male	1608	357 (22.2)	1	
Female	1962	460 (23.5)	1.1 (0.9,1.3)	0.379
Education	**(n=3570)**	**(n=817)**		
Illiterate	1752	444 (25.3)	1	
Can read & write	527	121 (23.0)	0.9 (0.7,1.1)	0.267
Intermediate	1189	236 (19.9)	0.7 (0.6,0.9)	0.001
Graduation	102	16 (15.7)	0.5 (0.3,1.0)	0.030
Occupation	**(n=3570)**	**(n=817)**		
House work	1699	376 (22.1)	1	
Unemployed	672	202 (30.1)	1.5 (1.2,1.8)	<0.001
Unskilled	801	163 (20.4)	0.9 (0.7,1.1)	0.312
Skilled	398	76 (19.1)	0.8 (0.6,1.1)	0.185
Land Area	**(n=3570)**	**(n=817)**		
No Land	2062	501 (24.3)	1	
1 to 5 acres	1218	248 (20.4)	0.8 (0.7,1.1)	0.010
>5 acres	290	68 (23.4)	0.9 (0.7,1.3)	0.752
Cumulative Exposure (Outdoor)	**(n=3570)**	**(n=817)**		
Less than Mean	1852	373 (20.1)	1	
More than Mean	1718	444 (25.8)	1.4 (1.2,1.6)	<0.001
Quantile of total exposure	**(n=3570)**	**(n=817)**		
1st uantile	715	146 (20.4)	1	
2nd quantile	726	146 (20.1)	1.0 (0.8,1.3)	0.884
3rd quantile	709	154 (21.7)	1.1 (0.8,1.4)	0.547
4th quantile	710	165 (23.2)	1.2 (0.9,1.5)	0.198
5th quantile	710	206 (29.01)	1.6 (1.3,2.0)	<0.001
Peak Hour Exposure	**(n=3570)**	**(n=817)**		
Less than Mean	1829	363 (19.9)	1	
More than Mean	1741	454 (26.1)	1.4 (1.2,1.7)	<0.001
Smoking (Pack Years)	**(n=3570)**	**(n=817)**		
No Smoker	1588	334 (21.0)	1	
>0 to ≤1	263	57 (21.7)	1.0 (0.8,1.4)	0.814
>1 to <5	574	131 (22.8)	1.1 (0.9,1.4)	0.371
≥ 5	1144	295 (25.8)	1.3 (1.0,1.5)	0.004
Others	1	0 (0.0)		
Bad fuel used for cooking (years)	**(n=3570)**	**(n=817)**		
Nil bad fuel exposure	1277	264 (20.7)	1	
1 to 25	156	30 (19.2)	0.9 (0.5,1.4)	0.674
26 to 50	1541	338 (21.9)	1.1 (0.9,1.3)	0.417
>50	596	185 (31.0)	1.7 (1.4,2.2)	<0.001

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Age- Dry eye was increasing with increasing age with the most significant association in participants aged more than 70 years.(OR 2.18; 95% CI 1.4, 3.3) (p<0.001).

Gender- Dry eye was significantly associated with females (OR 1.1; 95% CI 0.9, 1.3).

Education- Though dry eye was found less in educated people (graduates), the association was not statistically significant. (OR 0.5; 95% CI 0.3, 0.9)

Occupation- Dry eye has significant positive association with participants involved in unskilled and skilled occupation as compared to unemployed participants. (OR 1.5; 95% CI 1.2, 1.8) (p<0.001).

Land Area- There was a significant association between dry eye and ownership of land area between 1-5 acres and not in participants with land area >5 acres (OR 0.9; 95% CI 0.7, 1.3) (p=0.752)

Cumulative Exposure (Outdoor)- The sun exposure was calculated in study population by history of remaining outside their houses between 9am-5pm(Table 39) Mean cumulative life-time duration of sun exposure calculated according to Melbourne visual impairment project model was 116.96 thousand hours with a range of (115.33 to118.58 hours). Dry eye was significantly higher among participants with higher than average total sun exposure (more than 116.96 thousand hours of exposure to sun light in their lifetime) with (OR 1.4; 95% CI 1.2,1.6) (p<0.001).

Quantiles of sun exposure- All these study participants were divided according to quantiles of sun exposure using mean duration of sun exposure calculated according to Melbourne formula. There was a significant association between increasing quantiles and occurrence of dry eye (OR 1.6; 95% CI 1.2,2.0) (p<0.001).

Exposure during peak UV hours - Similarly average sun exposure during peak hours (between 11am-3pm) was 30.1 thousand hours during their life time. Dry eye was significantly associated with cumulative peak hours exposure of more than 30.1 thousand hours (OR 1.4; 95% CI 1.2,1.7) (p<0.001).

Smoking - Dry eye had a significant association in participants with higher smoke pack years ≥ 5 pack years. (OR1.3;95% CI 1.0,1.5) (p<0.001).

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Cooking fuel (Years of exposure) - Dry eye had significant association in participants with history of bad fuel usage >50 years (1.7; 95% CI 1.4,2.2) (p<0.001).

Table 40.1: Association of Dry eye with various risk factors (Unadjusted odds ratio):Guwahati

Dry eye	Total	Present	Unadjusted OR (95% CI)	P value
Age(years)	**(n=3216)**	**(n=185)**		
40-49	1452	68 (4.7)	1	
50-59	800	40 (5.0)	1.07 (0.72, 1.60)	0.736
60-69	602	42 (7.0)	1.53 (1.03, 2.27)	0.037
≥70	362	35 (9.7)	2.18 (1.42, 3.33)	<0.001
Gender	**(n=3216)**	**(n=185)**		
Male	1482	86 (5.8)	1	
Female	1734	99 (5.7)	0.98 (0.73, 1.32)	0.910
Education	**(n=3216)**	**(n=185)**		
Illiterate	1298	85 (6.6)	1	
Can read & write	776	45 (5.8)	0.88 (0.61, 1.27)	0.496
Intermediate	1033	51 (4.9)	0.74 (0.52, 1.06)	0.100
Graduation	100	4 (4.0)	0.59 (0.21, 1.66)	0.320
Not known	9	0 (0.0)	-	-
Occupation	**(n=3216)**	**(n=185)**		
House work	1526	90 (5.9)	1	
Unskilled	914	44 (4.8)	0.81 (0.56, 1.17)	0.256
Skilled	393	16 (4.1)	0.68 (0.39, 1.17)	0.160
Unemployed	377	35 (9.3)	1.63 (1.09, 2.46)	0.018
Others	6	0 (0.0)	-	-
Land Area	**(n=3206)**	**(n=183)**		
0-1 acres	781	42 (5.4)	1	
1.5-5 acres	2418	141 (5.8)	1.09 (0.76, 1.55)	0.635
>5 acres	7	0 (0.0)	-	-
Cumulative Exposure (Outdoor)	**(n=3214)**	**(n=184)**		
Less than Mean	1835	80 (4.4)	1	
More than Mean	1379	104 (7.5)	1.79 (1.33, 2.42)	<0.001
Quantiles of total exposure	**(n=3214)**	**(n=184)**		
1st quantile	636	26 (4.1)	1	
2nd quantile	647	26 (4.0)	0.98 (0.56, 1.71)	0.950
3rd quantile	640	33 (5.2)	1.28 (0.75, 2.16)	0.365
4th quantile	644	38 (5.9)	1.47 (0.88, 2.45)	0.139
5th quantile	647	61 (9.4)	2.44 (1.52, 3.92)	<0.001
Peak Hour Exposure	**(n=3210)**	**(n=184)**		
Less than Mean	1809	82 (4.5)	1	
More than Mean	1401	102 (7.3)	1.65 (1.22, 2.23)	0.001
Smoking	**(n=3216)**	**(n=185)**		

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No Smoker	2495	141 (5.7)	1	
>0 to ≤1	168	8 (4.7)	0.83 (0.40, 1.73)	0.628
>1 to <5	324	17 (5.2)	0.92 (0.55, 1.55)	0.766
≥5	200	16 (8.0)	1.41 (0.84, 2.48)	0.175
Others	29	3 (10.3)	1.92 (0.57, 6.44)	0.287
Fuel used for cooking(years)	**(n=3216)**	**(n=185)**		
No bad fuel exposure	277	16 (5.8)	1	
1 to 25	79	5 (6.3)	1.10 (0.39, 3.11)	0.854
26 to 50	2203	109 (5.0)	0.85 (0.49, 1.46)	0.553
>50	657	55 (8.4)	1.49 (0.84, 2.65)	0.174

Others Information for education and occupatipon not available

Age- Dry eye was increasing with increasing age with the most significant association in participants aged more than 70 years.(OR 2.1; 95% CI 1.4, 3.3) (p<0.001).

Gender- There was no significant association of dry eye with gender (OR 0.9; 95% CI 0.7, 1.3) (p=0.910).

Education- Though dry eye was found less in educated people (graduates), the association was not statistically significant. (OR 0.5; 95% CI 0.2, 1.6) (p=0.32)

Occupation- Dry eye has significant positive association with participants involved in unskilled and skilled occupation as compared to unemployed participants. (OR 1.6; 95% CI1.09, 2.4) (p=0.001).

Land Area- There was no significant association between dry eye and ownership of land area between 1-5 acres and not in participants with land area >5 acres.

Cumulative Exposure (Outdoor)- The sun exposure was calculated in study population by history of remaining outside their houses between 9a.m.-5p.m. (Table 39) Mean cumulative life-time duration of sun exposure calculated according to Melbourne visual impairment project model was 781.45 thousand hours. Dry eye was significantly higher among participants with higher than average total sun exposure (more than 781.45 thousand hours of exposure to sun light in their lifetime) with (OR 1.7 ; 95% CI 1.3, 2.4) (p<0.001).

Quantiles of sun exposure- All these study participants were divided according to quantiles of sun exposure using mean duration of sun exposure calculated according to

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Melbourne formula. There was a significant association between increasing quantiles and occurrence of dry eye (OR 2.4 ; 95% CI 1.5, 3.9) (p<0.001).

Exposure during peak UV hours - Similarly average sun exposure during peak hours (between 11am-3pm) was 22.8 thousand hours during their life time. Dry eye was significantly associated with cumulative peak hours exposure of more than 30.1 thousand hours (OR 1.6; 95% CI 1.2, 2.2) (p<0.001).

Smoking - Dry eye had no significant association in participants with higher smoke pack years ≥ 5 pack years. (1.4 ; 95% CI 0.8, 2.4) (p=0.23).

Cooking fuel (Years of exposure)- Dry eye had no significant association in participants with history of bad fuel usage >50 years (OR1.4 ;95% CI 0.84, 2.6) (p-0.17).

Table 40.2: Association of Dry eye with various risk factors (Unadjusted odds ratio):Prakasam

Dry eye	Total	Presen	Unadjusted OR (95% CI)	P value
Age(years)	**(n=2750)**	**(n=41)**		
40-49	1093	9 (0.8))	1	
50-59	728	8 (1.1)	1.34 (0.51, 3.48)	0.551
60-69	595	11 (1.9)	2.27 (0.93, 5.51)	0.070
≥70	334	13 (3.9)	4.88 (2.07, 11.52)	<0.001
Gender	**(n=2750)**	**(n=41)**		
Male	1259	19 (1.5)	1	
Female	1491	22 (1.5)	0.98 (0.53, 1.81)	0.942
Education	**(n=2750)**	**(n=41)**		
Illiterate	1807	26 (1.4)	1	
Can read & write	473	9 (1.9)	1.33 (0.62, 2.85)	0.466
Intermediate	408	6 (1.5)	1.02 (0.42, 2.50)	0.961
Graduation	61	0 (0.0)	1	-
Others	1	0 (0.0)	1	-
Occupation	**(n=2750)**	**(n=41)**		
House work	440	18 (4.1)	1	
Unskilled	1643	14 (0.9)	0.20 (0.10, 0.41)	<0.001
Skilled	311	3 (1.0)	0.23 (0.07, 0.78)	0.019
Unemployed	353	6 (1.7)	0.41 (0.16, 1.03)	0.058
Others	3	0 (0.0)	1	
Land Area	**(n=2750)**	**(n=41)**		
No Land	1660	31 (1.9)	1	
1-5 acres	997	10 (1.0)	0.53 (0.26, 1.09)	0.085
>5 acres	93	0 (0.0)	1	-
Cumulative Exposure (Outdoor)	**(n=2749)**	**(n=41)**		
Less than Mean	1207	19 (1.6)	1	
More than Mean	1542	22 (1.4)	0.90 (0.49, 1.68)	0.752
Quantiles of total exposure	**(n=2749)**	**(n=41)**		
1st quantile	525	14 (2.7)	1	

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2nd quantile	586	4 (0.7)	0.25 (0.08, 0.77)	0.015
3rd quantile	549	2 (0.4)	0.13 (0.03, 0.59)	0.008
4th quantile	541	7 (1.3)	0.48 (0.19, 1.20)	0.114
5th quantile	548	14 (2.6)	0.96 (0.45, 2.03)	0.908
Peak Hour Exposure	**(n=2749)**	**(n=41)**		
Less than Mean	1284	19 (1.5)	1	
More than Mean	1465	22 (1.5)	1.02 (0.55, 1.88)	0.962
Smoking(pack years)	**(n=2750)**	**(n=41)**		
No Smoker	1931	29 (1.5)	1	
>0 to ≤1	57	0 (0.0)	1	
>1 to <5	182	2 (1.1)	0.73 (0.17, 3.08)	0.667
≥ 5	291	5 (1.7)	1.15 (0.44, 2.99)	0.779
Fuel used for cooking(years)	**(n=2750)**	**(n=41)**		
Zero bad fuel exposure	1205	19 (1.6)	1	
1 to 25	117	2 (1.7)	1.09 (0.25, 4.72)	0.913
25 to 50	1119	14 (1.3)	0.79 (0.39, 1.58)	0.508
>50	309	6 (1.9)	1.24 (0.49, 3.12)	0.654

Others Information for education and occupatipon not available

Age- Dry eye was increasing with increasing age with the most significant association in participants aged more than 70 years.(OR 4.8 ;95% CI 2.07, 11.5) (p<0.001).

Gender- There was no significant association of dry eye with gender (OR 0.9; 95% CI 0.5, 1.8) (p=0.942).

Education- There was no significant association of dry eye with education

Occupation- Dry eye has significant positive association with participants involved in unskilled and unemployed participants. (OR 0.4; 95% CI 0.16, 1.03) (p<0.001).

Land Area- There was no significant association between dry eye and ownership of land area between 1-5 acres and not in participants with land area > 5 acres (p=0.08)

Cumulative Exposure (Outdoor)- The sun exposure was calculated in study population by history of remaining outside their houses between 9am-5pm(Table 39) Mean cumulative life-time duration of sun exposure calculated according to Melbourne visual impairment project model was 105.19 thousand hours. Dry eye had no significant association in participants with higher than average total sun exposure (more than 105.19 thousand hours of exposure to sun light in their lifetime) (p=0.75).

Quantiles of sun exposure- All these study participants were divided according to quantiles of sun exposure using mean duration of sun exposure calculated according to

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Melbourne formula. There was no significant association between increasing quantiles and occurrence of dry eye (p0.90).

Exposure during peak UV hours - Similarly average sun exposure during peak hours (between 11am-3pm) was 35.9 thousand hours during their life time. Dry eye was not significantly associated with cumulative peak hours exposure of more than 35.9 thousand hours (p=0.96).

Smoking – There was no significant association between dry eye and in participants with higher smoke pack years ≥ 5 pack years. (p=0.76).

Cooking fuel (Years of exposure) - There was no significant association between dry eye and in participants with history of bad fuel usage >50 years (p=0.65).

Table 41: Association of Dry eye with various risk factors (adjusted odds ratio): Gurgaon

Dry eye	Total	Present	Adjusted OR (95% CI)	P value
Age(years)	**(n=3570)**	**(n=817)**		
40-49	1423	242 (17.0)	-	-
50-59	876	205 (23.4)	-	-
60-69	740	209 (28.2)	-	-
≥70	531	161 (30.3)	-	-
Gender	**(n=3570)**	**(n=817)**		
Male	1608	357 (22.2)	1	
Female	1962	460 (23.5)	1.9 (0.6, 1.3)	0.505
Education	**(n=3570)**	**(n=817)**		
Illiterate	1752	444 (25.3)	1	
Can read & write	527	121 (23.0)	1.0 (0.8, 1.2)	0.899
Intermediate	1189	236 (19.9)	0.8 (0.6, 1.0)	0.083
Graduation	102	16 (15.7)	0.6 (0.3, 1.1)	0.109
Occupation	**(n=3570)**	**(n=817)**		
House work	1699	376 (22.1)	1	
Unemployed	672	202 (30.1)	1.4 (1.1, 1.8)	0.009
Unskilled	801	163 (20.4)	0.9 (0.7, 1.4)	0.958
Skilled	398	76 (19.1)	1.0 (0.7, 1.5)	0.841
Cumulative Exposure (Outdoor)	**(n=3570)**	**(n=817)**		
Less than Mean	1852	373 (20.1)	1	
More than Mean	1718	444 (25.8)	1.2 (0.9, 1.8)	0.236
Quantile of total exposure	**(n=3570)**	**(n=817)**		
1st quantile	715	146 (20.4)	1	
2nd quantile	726	146 (20.1)	0.8 (0.7, 1.2)	0.250
3rd quantile	709	154 (21.7)	0.8 (0.6, 1.1)	0.086
4th quantile	710	165 (23.2)	0.6 (0.4, 0.9)	0.034
5th quantile	710	206 (29.01)	0.7 (0.4, 1.1)	0.119

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Peak Hour Exposure	(n=3570)	(n=817)		
Less than Mean	1829	363 (19.9)	1	
More than Mean	1741	454 (26.1)	1.3 (1.02, 1.7)	0.033
Smoking (Pack Years)	**(n=3570)**	**(n=817)**		
No Smoker	1588	334 (21.03)	1	
>0 to ≤1	263	57 (21.7)	1.0 (0.7, 1.4)	0.877
>1 to <5	574	131 (22.8)	1.1 (0.9, 1.5)	0.245
≥5	1145	295 (25.8)	1.2 (1.0, 1.6)	0.030
Fuel used for cooking(years)	**(n=3570)**	**(n=817)**		
Nil Bad Fuel Exposure	1277	264 (20.7)	1	
1 to 25	156	30 (19.2)	1.3 (0.8, 2.3)	0.215
26 to 50	1541	338 (21.9)	1.4 (1.0, 1.9)	0.020
>50	596	185 (31.0)	1.7 (1.2, 2.3)	<0.001

Association of Dry eye with various risk factors: Multi-variable Analysis

Multivariable analysis included gender, education, occupation, sun exposure, smoke pack years and type of fuel. Dry eye was significantly associated with unemployed participants (p=0.009), participants with increased mean duration of Exposure during peak UV hours (p=0.03), increased smoke pack years (≥5 pack years), participants with increased duration of bad fuels usage in the kitchen >50 years (p<0.001) and educated till intermediate grade. There was no significant association of dry eye with gender (p=0.168) and type of cooking fuel used (p=0.630).

Table 41.1: Association of Dry eye with various risk factors (adjusted odds ratio): Guwahati

Dry eye	Total	Present	Adjusted OR (95% CI)	P value
Age(years)	**(n=3216)**	**(n=185)**	-	-
40-49	1452	68 (4.7)	-	-
50-59	800	40 (5.0)	-	-
60-69	602	42 (7.0)	-	-
≥70	362	35 (9.7)	-	-
Gender	**(n=3216)**	**(n=185)**		
Male	1482	86 (5.8)	1	
Female	1734	99 (5.7)	0.61 (0.34, 1.09)	0.096
Education	**(n=3216)**	**(n=185)**		
Illiterate	1298	85 (6.6)	1	
Can read & write	776	45 (5.8)	0.94 (0.63, 1.40)	0.756
Intermediate	1033	51 (4.9)	0.88 (0.58, 1.32)	0.528
Graduation	100	4 (4.0)	0.79 (0.26, 2.42	0.678
Not known	9	0 (0.0)	-	-
Occupation	**(n=3216)**	**(n=185)**		
House work	1526	90 (5.9)	1	
Unskilled	914	44 (4.8)	0.48 (0.27, 0.88)	0.018
Skilled	393	16 (4.1)	0.54 (0.26, 1.13)	0.102
Unemployed	377	35 (9.3)	0.93 (0.54, 1.60)	0.781

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Others	6	0 (0.0)	-	-
Sun Exposure (Outdoor)	**(n=3214)**	**(n=184)**		
Less than Mean	1835	80 (4.4)	1	
More than Mean	1379	104 (7.5)	0.95 (0.32, 2.80)	0.925
Quantile of total exposure	**(n=3214)**	**(n=184)**		
1st quantile	636	26 (4.1)	1	
2nd quantile	647	26 (4.0)	0.95 (0.54, 1.67)	0.859
3rd quantile	640	33 (5.2)	1.10 (0.62, 1.96)	0.741
4th quantile	644	38 (5.9)	1.27 (0.38, 4.28)	0.698
5th quantile	647	61 (9.4)	1.96 (0.58, 6.67)	0.282
Peak Hour Exposure	**(n=3210)**	**(n=184)**		
Less than Mean	1809	82 (4.5)	1	
More than Mean	1401	102 (7.3)	1.20 (0.81, 1.77)	0.371
Smoking	**(n=3183)**	**(n=181)**		
No Smoker	2495	141 (5.7)	1	
>0 to ≤1	168	8 (4.7)	0.83 (0.40, 1.73)	0.628
>1 to <5	324	17 (5.2)	0.92 (0.55, 1.55)	0.766
≥5	200	16 (8.0)	1.45 (0.84, 2.48)	0.175
Others	29	3 (10.3)	1.92 (0.57, 6.44)	0.287
Fuel used for cooking(years)	**(n=3216)**	**(n=185)**		
No bad fuel exposure	277	16 (5.8)	1	
1 to 25	79	5 (6.3)	1.64 (0.54, 5.01)	0.381
26 to 50	2203	109 (5.0)	1.03 (0.56, 1.90)	0.914
>50	657	55 (8.4)	1.02 (0.53, 1.93)	0.964

Others Information for education and occupatipon not available

Association of Dry eye with various risk factors: Multi-variable Analysis

Multivariable analysis included gender, education, occupation, sun exposure, smoke pack years and type of fuel. Dry eye was significantly associated with unskilled participants (p=0.018). There was no significant exposure of dry eyes in participants with gender (p=0.09), increased mean duration of Exposure during peak UV hours (p=0.37), increased smoke pack years ≥5 pack years (p=0.17), participants with increased duration of bad fuels usage in the kitchen >50 years (p=0.96)

Table 41.2: Association of Dry eye with various risk factors (adjusted odds ratio): Prakasam

Dry eye	Total	Present	Adjusted OR (95% CI)	P value
Age(years)	**(n=2750)**	**(n=41)**		
40-49	1093	9 (0.8))		
50-59	728	8 (1.1)		
60-69	595	11 (1.9)		
≥70	334	13 (3.9)		
Gender	**(n=2750)**	**(n=41)**		
Male	1259	19 (1.5)	1	
Female	1491	22 (1.5)	0.59 (0.10, 3.45)	0.562

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Education	**(n=2750)**	**(n=41)**		
Illiterate	1807	26 (1.4)	1	
Can read & write	473	9 (1.9)	1.08 (0.48, 2.43)	0.856
Intermediate	408	6 (1.5)	0.88 (0.32, 2.38)	0.795
Graduation	61	0 (0.0)	1	-
Others	1	0 (0.0)	1	-
Occupation	**(n=2750)**	**(n=41)**		
House work	440	18 (4.1)	1	
Unskilled	1643	14 (0.9)	0.21 (0.09, 0.48)	<0.001
Skilled	311	3 (1.0)	0.19 (0.05, 0.74)	0.017
Unemployed	353	6 (1.7)	0.29 (0.10, 0.82)	0.019
Others	3	0 (0.0)	1	-
Sun Exposure (Outdoor)	**(n=2749)**	**(n=41)**		
Less than Mean	1207	19 (1.6)	1	
More than Mean	1542	22 (1.4)	0.21 (0.09, 0.48)	<0.001
Quantile of Total Exposure	**(n=2749)**	**(n=41)**		
1st quantile	525	14 (2.7)	1	
2nd quantile	586	4 (0.7)	0.37 (0.11, 1.24)	0.108
3rd quantile	549	2 (0.4)	0.51 (0.06, 4.44)	0.540
4th quantile	541	7 (1.3)	2.30 (1.10, 51.42)	0.599
5th quantile	548	14 (2.6)	4.23 (0.19, 96.60)	0.366
Peak Hour Exposure	**(n=2749)**	**(n=41)**		
Less than Mean	1284	19 (1.5)	1	
More than Mean	1465	22 (1.5)	1.26 (0.27, 5.80)	0.770
Smoking(pack years)	**(n=2750)**	**(n=41)**		
No Smoker	1931	29 (1.5)	1	
>0 to ≤1	57	0 (0.0)	1	
>1 to <5	182	2 (1.1)	0.77 (0.16, 3.73)	0.750
≥5	291	5 (1.7)	1.14 (0.36, 3.56)	0.826
Others	289	5 (1.7)	0.87 (0.29, 2.65)	0.808
Fuel used for cooking(years)	**(n=2750)**	**(n=41)**		
Zero bad fuel exposure	1205	19 (1.6)	1	
1 to 25	117	2 (1.7)	0.56 (0.07, 4.88)	0.603
26 to 50	1119	14 (1.3)	0.82 (0.16, 4.28)	0.811
>50	309	6 (1.9)	0.89 (0.15, 5.12)	0.892

Others Information for education and occupatipon not available

Association of Dry eye with various risk factors: Multi-variable Analysis

Multivariable analysis included gender, education, occupation, sun exposure, smoke pack years and type of fuel. No significant association was found between dry eye and gender, education, occupation, sun exposure, smoke pack years and type of fuel.

10.2.8.3. Logistic regression table showing association of pterygium with various risk factors

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Table 42: Association of Pterygium with various risk factors (Unadjusted odds ratio): Gurgaon

Pterygium	Total	Present	Unadjusted OR (95% CI)	P value
Age(years)	**(n=3595)**	**(n=403)**		
40-49	1427	127 (8.9)	1	
50-59	881	98 (11.1)	1.3 (1.0, 1.7)	0.081
60-69	746	98 (13.1)	1.5 (1.2, 2.1)	0.002
≥70	541	80 (14.8)	1.8 (1.3, 2.4)	<0.001
Gender	**(n=3595)**	**(n=403)**		
Male	1614	201 (12.5)	1	
Female	1981	202 (10.2)	0.8 (0.6, 1.0)	0.033
Education	**(n=3595)**	**(n=403)**		
Illiterate	1769	219 (12.4)	1	
Can read & write	532	67 (12.6)	1.0 (0.8, 1.4)	0.896
Intermediate	1192	107 (9.0)	0.7 (0.5, 0.9)	0.004
Graduation	102	10 (9.8)	0.8 (0.4, 1.5)	0.441
Occupation	**(n=3595)**	**(n=403)**		
House work	1712	167 (9.8)	1	
Unemployed	683	92 (13.5)	1.4 (1.1, 1.9)	0.008
Unskilled	801	103 (12.9)	1.4 (1.1, 1.8)	0.020
Skilled and professional	399	41 (10.3)	1.1 (0.7, 1.5)	0.753
Land area	**(n=3595)**	**(n=403)**		
No Land	2076	224 (10.8)	1	
1 to 5 acres	1228	140 (11.4)	1.1 (0.8,1.3)	0.588
>5 acres	291	39 (13.4)	1.3 (0.9,1.8)	0.185
Cumulative Exposure (Outdoor)	**(n=3595)**	**(n=403)**		
Less than Mean	1861	162 (8.7)	1	
More than Mean	1734	241 (13.9)	1.7 (1.4, 2.1)	<0.001
Quantile of Total Exposure	**(n=3595)**	**(n=403)**		
1st quantile	719	51 (7.1)	1	
2nd quantile	729	66 (9.1)	1.3 (0.9, 1.9)	0.172
3rd quantile	714	75 (10.5)	1.5 (1.1, 2.2)	0.023
4th quantile	715	85 (11.9)	1.8 (1.2, 2.5)	0.002
5th quantile	718	126 (17.6)	2.8 (2.0, 3.9)	<0.001
Peak Hour Exposure	**(n=3595)**	**(n=403)**		
Less than Mean	1843	164 (8.9)	1	
More than Mean	1752	239 (13.6)	1.6 (1.3,1.9)	<0.001
Smoking (Pack Years)	**(n=3595)**	**(n=403)**		
No Smoker	1601	158 (9.9)	1	
>0 to ≤1	266	23 (8.7)	0.8 (0.5, 1.4)	0.533
>1 to <5	574	64 (11.1)	1.1 (0.8, 1.5)	0.385
≥ 5	1153	158 (13.7)	1.4 (1.1, 1.8)	0.002
Others	1	0 (0.00)		
Bad fuel used for cooking(years)	**(n=3587)**	**(n=402)**		
Nil bad fuel exposure	1281	158 (12.3)	1	
1 to 25	156	11 (7.1)	0.5 (0.3, 1.0)	0.057
26 to 50	1551	145 (9.3)	0.7 (0.6, 0.9)	0.011
>50	607	89 (14.7)	1.2 (0.9, 1.6)	0.162

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Age- Pterygium was increasing with increasing age with the most significant association in participants more than 70 years (OR 1.8; 95% CI 1.3, 2.4) (p<0.001).

Gender- Females had lesser pterygium than males (OR 0.7; 95% CI 0.6, 0.98) (p value <0.03)

Education- Participants in higher education categories had lesser pterygium (OR 0.7; 95% CI 0.4, 1.5)

Occupation- Pterygium was significantly associated with unemployed people (OR 1.4; 95% CI 1.0, 1.8; p value <0.001)

Land Area- There was a significant association between pterygium and lesser land area (OR 1.1; 95% CI 0.8, 1.4; p value = 0.003)

Cumulative Exposure (Outdoor)-The sun exposure was calculated in study population by history of remaining outside their houses between 9am-5pm. (Table 39) Mean cumulative life-time duration of sun exposure calculated according to Melbourne visual impairment project model was 116.95 thousand hours. Pterygium was significantly higher among participants with higher than average total sun exposure (more than 116.95 thousand hours of exposure to sun light in their lifetime) with (OR 1.6; 95% CI 1.3, 2.0; p value <0.001).

Quantiles of sun exposure- All these study participants were divided according to quantiles of sun exposure using mean duration of sun exposure calculated according to Melbourne formula. There was a significant association between increasing quantiles and occurrence of pterygium (OR 2.8; 95% CI 2.0, 3.9).

Exposure during peak UV hours - Similarly average sun exposure during peak hours (between 11am-3pm) was 30.1 thousand hours during their life time. Pterygium was significantly associated with cumulative peak hours exposure of more than 30.1 thousand hours (OR 1.6; 95% CI 1.3, 1.9; p<0.001).

Smoking- Pterygium had a significant association with higher smoking pack years. (OR 1.4; 95% CI 1.0, 1.8; p value=0.045).

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Cooking fuel (years of bad fuel usage) - Pterygium was found more in participants with history of bad fuel usage > 50 years (1.2 ; 95% CI 0.9, 1.6; p=0.162)

Table 42.1:   Association of Pterygium with various risk factors (Unadjusted odds ratio): Guwahati

Pterygium	Total	Present	Unadjusted OR (95% CI)	P value
Age(years)	**(n=3229)**	**(n=293)**		
40-49	1454	115 (7.9)	1	
50-59	801	77 (9.6)	1.24 (0.91, 1.68)	0.166
60-69	603	64 (10.6)	1.38 (1.00, 1.91)	0.048
≥70	371	37 (10.0)	1.29 (0.87, 0.90)	0.200
Gender	**(n=3229)**	**(n=293)**		
Male	1491	164 (11.0)	1	
Female	1738	129 (7.4)	0.65 (0.51, 0.83)	<0.001
Education	**(n=3229)**	**(n=293)**		
Illiterate	1305	133 (10.2)	1	
Can read & write	778	62 (8.0)	0.76 (0.56, 1.05)	0.093
Intermediate	1036	91 (8.8)	0.85 (0.64, 1.12)	0.250
Graduation	101	6 (5.9)	0.56 (0.24, 1.29)	0.928
Not known	9	1 (11.1)	1.10 (0.14, 8.88)	0.928
Occupation	**(n=3229)**	**(n=293)**		
House work	1526	116 (7.6)	1	
Unskilled	915	110 (12.0)	1.66 (1.26, 2.19)	<0.001
Skilled and professional	396	30 (7.6)	1.00 (0.66, 1.51)	0.986
Unemployed	386	37 (9.6)	1.29 (0.87, 1.90)	0.200
Others	6	0 (0.0)	-	-
Land area	**(n=3219)**	**(n=292)**		
No land	782	62 (7.9)	1	
1 to 5 acres	2430	230 (9.5)	1.21 (0.91, 1.63)	0.194
>5 acres	7	0 (0.0)	-	-
Cumulative Exposure (Outdoor)	**(n=3227)**	**(n=293)**		
Less than Mean	1838	151 (8.2)	1	
More than Mean	1389	142 (10.2)	1.27 (1.0, 1.6)	0.050
Quantile of Total Exposure	**(n=3227)**	**(n=184)**		
1st quantile	639	43 (6.7)	1	
2nd quantile	647	60 (9.3)	1.42 (0.94, 2.13)	0.094
3rd quantile	640	58 (9.1)	1.38 (0.92, 2.08)	0.123
4th quantile	646	56 (8.7)	1.32 (0.87, 1.99)	0.193
5th quantile	655	76 (11.6)	1.82 (1.23, 2.69)	0.003
Peak Hour Exposure	**(n=3223)**	**(n=292)**		
Less than Mean	1812	146 (8.1)	1	
More than Mean	1411	146 (10.4)	1.3 (1.04,1.68)	0.025
Smoking(pack years)	**(n=3229)**	**(n=293)**		
No Smoker	2506	212 (8.5)	1	
>0 to ≤1	168	16 (9.5)	1.13 (0.66, 1.94)	0.633
>1 to <5	325	47 (14.5)	1.82 (1.30, 2.56)	<0.001
≥5	201	15 (7.5)	0.87 (0.50, 1.50)	0.624

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Others	29	3 (10.3)	1.24 (0.37, 4.15)	0.718
Fuel used for cooking(years)	**(n=3229)**	**(n=293)**		
Zero bad fuel exposure	278	24 (8.6)	1	
1 to 25	79	3 (3.8)	0.42 (0.12, 1.43)	0.163
26 to 50	2206	190 (8.6)	1.00 (0.64, 1.56)	0.991
>50	666	76 (11.4)	1.36 (0.84, 2.21)	0.208

Others Information for education and occupatipon not available

Age- Though pterygium was increasing with increasing age but there was no significant association in participants more than 70 years (OR 1.29 ;95% CI 0.8, 0.90) (p=0.200)

Gender- Females had lesser pterygium than males (OR 0.65 ;95% CI 0.51, 0.83) (p<0.001)

Education- Participants in higher education categories had lesser pterygium (OR 0.7; 95% CI 0.4, 1.5)

Occupation- Pterygium was significantly associated with unskilled people (OR 1.66; 95% CI 1.2, 2.19; p value < 0.001) as compared to unemployed and skilled participants

Land Area- There was no significant association between pterygium and lesser land area (OR 1.21 ;95% CI 0.91, 1.63) (p value=0.19)

Cumulative Exposure (Outdoor)- The sun exposure was calculated in study population by history of remaining outside their houses between 9am-5pm. (Table 39) Mean cumulative life-time duration of sun exposure calculated according to Melbourne visual impairment project model was 781.45 thousand hours. Pterygium was significantly higher among participants with higher than average total sun exposure (more than 781.45 thousand hours of exposure to sun light in their lifetime) with (OR 1.27 ;95% CI 1.0, 1.6); p value=0.05).

Quantiles of sun exposure- All these study participants were divided according to quantiles of sun exposure using mean duration of sun exposure calculated according to Melbourne formula. There was a significant association between increasing quantiles and occurrence of pterygium (OR 1.82 ;95% CI 1.23, 2.69)(p=0.03).

Exposure during peak UV hours - Similarly average sun exposure during peak hours (between 11am-3pm) was 22.8 thousand hours during their life time. Pterygium was

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significantly associated with cumulative peak hours exposure of more than 22.8 thousand hours (OR 1.3 ;95% CI 1.04,1.68; p=0.025).

Smoking- Pterygium had a significant association with 1-5 smoke pack years. (OR 1.8 ;95% CI 1.3, 2.5; p value<0.001) but not with ≥5 smoke pack years.

Cooking fuel (years of bad fuel usage) - Pterygium was not significantly associated in participants with history of bad fuel usage > 50 years (1.36; 95% CI 0.8, 2.2) (p=0.20)

Table 42.2: Association of Pterygium with various risk factors (Unadjusted odds ratio): Prakasam

Pterygium	Total	Present	Unadjusted OR (95% CI)	P value
Age(years)	**(n=2909)**	**(n=584)**		
40-49	1117	200 (17.9)	1	
50-59	755	159 (21.1)	1.22 (0.97, 1.54)	0.089
60-69	632	149 (23.5)	1.41 (1.11, 1.80)	0.004
≥70	405	76 (18.8)	1.06 (0.79, 1.42)	0.700
Gender	**(n=2909)**	**(n=584)**		
Male	1321	225 (17.0)	1	
Female	1588	359 (22.6)	1.42 (1.18, 1.71)	<0.001
Education	**(n=2909)**	**(n=584)**		
Illiterate	1925	461 (23.9)	1	
Can read & write	487	82 (16.8)	0.64 (0.50, 0.83)	0.001
Intermediate	431	37 (8.6)	0.30 (0.21, 0.42)	<0.001
Graduation	65	3 (4.6)	0.15 (0.05, 0.49)	0.002
Others	1	1 (100.0)	1	-
Occupation	**(n=2909)**	**(n=584)**		
House work	471	63 (13.4)	1	
Unskilled	1676	411 (24.5)	2.10 (1.58, 2.81)	<0.001
Skilled and professional	320	27 (8.4)	0.60 (0.37, 0.96)	0.033
Unemployed	439	83 (18.9)	1.51 (1.06, 2.16)	0.024
Others	3	0 (0.0)	1	-
Land area	**(n=2909)**	**(n=584)**		
No Land	1761	302 (17.2)	1	
1-5 acres	1046	252 (24.1)	1.53 (1.27, 1.85)	<0.001
>5 acres	102	30 (29.4)	2.01 (1.29, 3.14)	0.002
Cumulative Exposure (Outdoor)	**(n=2907)**	**(n=583)**		
Less than Mean	1284	195 (15.2)	1	
More than Mean	16223	388 (23.9)	1.75 (1.45, 2.12)	<0.001
Quantile of Total Exposure	**(n=2907)**	**(n=583)**		
1st quantile	570	56 (9.8)	1	
2nd quantile	615	116 (18.9)	2.13 (1.52, 3.00)	<0.001
3rd quantile	563	123 (21.9)	2.57 (1.83, 3.61)	<0.001
4th quantile	568	136 (23.9)	2.89 (2.06, 4.05)	<0.001
5th quantile	591	152 (25.7)	3.18 (2.28, 4.43)	<0.001
Peak Hour Exposure	**(n=2907)**	**(n=583)**		
Less than Mean	1365	204 (15.0)	1	
More than Mean	1542	379 (24.6)	1.85 (1.54, 2.24)	<0.001
Smoking(years)	**(n=2909)**	**(n=584)**		
No Smoker	2040	442 (21.7)	1	

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>0 to ≤1	60	14 (23.3)	1.10 (0.59, 2.01)	0.758
>1 to <5	191	33 (17.3)	0.75 (0.51, 1.11)	0.158
>= 5	305	31 (10.2)	0.40 (0.27, 0.60)	<0.001
Not Applicable	313	64 (20.4)	0.92 (0.69, 1.24)	0.625
Fuel used for cooking(years)	**(n=2897)**	**(n=584)**		
Zero bad fuel exposure	1266	223 (17.6)	1	
1 to 25	120	11 (9.2)	0.47 (0.25, 0.89)	0.021
25 to 50	1164	280 (24.1	1.48 (1.22, 1.80)	<0.001
>50	359	70 (19.5)	1.13 (0.84, 1.53)	0.413

Others Information for education and occupatipon not available

Age- Pterygium was significantly associated in participants with 60 -69 years age group (OR 1.06 ;95% CI 0.7, 1.4) (p=0.004).

Gender- Females had more pterygium than males (OR 1.42 ;95% CI 1.1, 1.7) (p value 0.001)

Education- Participants in higher education categories had lesser pterygium (p=0.002)

Occupation- Pterygium was significantly associated with unemployed and unskilled participants (p value < 0.001) as compared to skilled and professional persons.

Land Area- There was a significant association between pterygium and lesser land area (OR 2.01 ;95% CI 1.2, 3.1; p value = 0.002)

Cumulative Exposure (Outdoor)- The sun exposure was calculated in study population by history of remaining outside their houses between 9am-5pm. (Table 39) Mean cumulative life-time duration of sun exposure calculated according to Melbourne visual impairment project model was 105.19 thousand hours. Pterygium was significantly higher among participants with higher than average total sun exposure (more than 105.19 thousand hours of exposure to sun light in their lifetime) with (OR 1.75 ;95% CI 1.4, 2.1; p<0.001)

Quantiles of sun exposure- All these study participants were divided according to quantiles of sun exposure using mean duration of sun exposure calculated according to Melbourne formula. There was a significant association between increasing quantiles and occurrence of pterygium (OR 3.18 ;95% CI 2.2, 4.4; p<0.001) .

Exposure during peak UV hours - Similarly average sun exposure during peak hours (between 11am-3pm) was 35.9 thousand hours during their life time. Pterygium was

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significantly associated with cumulative peak hours exposure of more than 35.9 thousand hours (OR 1.85 ;95% CI 1.5, 2.2; p<0.001).

Smoking- Pterygium had a significant association with higher smoking pack years. (OR 0.40 ;95% CI 0.2, 0.5; p value<0.001).

Cooking fuel (years of bad fuel usage) - Pterygium was found more in participants with history of bad fuel usage between 25-50 years (1.48; 95% CI 1.22, 1.80; p<0.001)

Table 43: Association of Pterygium with various risk factors adjusted odds ratio: Gurgaon

Pterygium	Total	Present	Adjusted OR (95% CI)	P value
Age(years)	**(n=3595)**	**(n=403)**		
40-49	1427	127 (8.9)	-	-
50-59	881	98 (11.1)	-	-
60-69	746	98 (13.1)	-	-
≥70	541	80 (14.8)	-	-
Gender	**(n=3595)**	**(n=403)**		
Male	1614	201 (12.5)	1	
Female	1981	202 (10.2)	0.7 (0.4, 1.2)	0.209
Education	**(n=3595)**	**(n=403)**		
Illiterate	1769	219 (12.4)	1	
Can read & write	532	67 (12.6)	1.0 (0.7, 1.4)	0.889
Intermediate	1192	107 (9.0)	0.7 (0.5, 0.9)	0.009
Graduation	102	10 (9.8)	0.9 (0.4, 1.7)	0.606
Occupation	**(n=3595)**	**(n=403)**		
House work	1712	167 (9.8)	1	
Unemployed	683	92 (13.5)	1.0 (0.7, 1.4)	0.891
Unskilled	801	103 (12.9)	1.3 (0.9, 1.9)	0.169
Skilled and professional	399	41 (10.3)	1.3 (0.8, 2.0)	0.359
Cumulative Exposure (Outdoor)	**(n=3595)**	**(n=403)**		
Less than Mean	1861	162 (8.7)	1	
More than Mean	1734	241 (13.9)	0.9 (0.6, 1.5)	0.764
Quantile of total exposure	**(n=3595)**	**(n=403)**		
1st quantile	719	51 (7.1)	1	
2nd quantile	729	66 (9.1)	1.3 (0.9, 1.9)	0.213
3rd quantile	714	75 (10.5)	1.6 (1.1, 2.5)	0.051
4th quantile	715	85 (11.9)	1.9 (1.0, 3.7)	0.068
5th quantile	718	126 (17.6)	3.0 (1.4, 5.5)	0.003
Peak Hour Exposure	**(n=3595)**	**(n=403)**		
Less than Mean	1843	164 (8.9)	1	
More than Mean	1752	239 (13.6)	0.9 (0.7, 1.3)	0.713
Smoking (Pack Years)	**(n=3595)**	**(n=403)**		
No Smoker	1601	158 (9.9)	1	
>0 to ≤1	266	23 (8.7)	0.8 (0.5, 1.3)	0.364
>1 to <5	574	64 (11.1)	0.9 (0.7, 1.4)	0.865
≥ 5	1154	158 (13.7)	1.0 (0.8, 1.4)	0.745
Bad fuel used for cooking(years)	**(n=3587)**	**(n=402)**		

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Nil bad fuel exposure	1281	158 (12.3)	1	
1 to 25	156	11 (7.1)	1.1 (0.5, 2.3)	0.817
26 to 50	1551	145 (9.3)	1.0 (0.7, 1.5)	0.954
>50	607	89 (14.7)	1.2 (0.04, 1.8)	0.453

Association of Pterygium with various risk factors: Multi-variable Analysis

Multivariable analysis included gender, education, occupation, sun exposure, smoke pack years and years of usage of bad fuel. Pterygium was significantly associated with increased quantiles for mean duration of exposure during peak UV hours(p=0.003) and educated till intermediate grade(0.009). There was no significant association of pterygium with gender(p=0.209), increased smoke pack years(0.745) and years of usage of bad fuel used even more than 50 years(p=0.453).

Table 43.1: Association of Pterygium with various risk factors adjusted odds ratio: Guwahati

Pterygium	Total	Present	Adjusted OR (95% CI)	P value
Age(years)	**(n=3229)**	**(n=293)**		
40-49	1454	115 (7.9)	-	-
50-59	801	77 (9.6)	-	-
60-69	603	64 (10.6)	-	-
≥70	371	37 (10.0)	-	-
Gender	**(n=3229)**	**(n=293)**		
Male	1491	164 (11.0)	1	
Female	1738	129 (7.4)	0.55 (0.34, 0.91)	0.019
Education	**(n=3229)**	**(n=293)**		
Illiterate	1305	133 (10.2)	1	
Can read & write	778	62 (8.0)	0.66 (0.48, 0.93)	0.017
Intermediate	1036	91 (8.8)	0.77 (0.56, 1.06)	0.111
Graduation	101	6 (5.9)	0.55 (0.22, 1.38)	0.204
Not known	9	1 (11.1)	1.76 (0.20, 15.17)	0.607
Occupation	**(n=3229)**	**(n=293)**		
House work	1526	116 (7.6)	1	
Unskilled	915	110 (12.0)	1.08 (0.66, 1.77)	0.749
Skilled and professional	396	30 (7.6)	0.83 (0.46, 1.50)	0.532
Unemployed	386	37 (9.6)	0.80 (0.49, 1.31)	0.381
Others	6	0 (0.0)	-	-
Cumulative Exposure (Outdoor)	**(n=3227)**	**(n=293)**		
Less than Mean	1838	151 (8.2)	1	
More than Mean	1389	142 (10.2)	1.36 (0.66, 2.84)	0.407
Quantile of Total Exposure	**(n=3227)**	**(n=184)**		
1st quantile	639	43 (6.7)	1	
2nd quantile	647	60 (9.3)	1.34 (0.88, 2.04)	0.169
3rd quantile	640	58 (9.1)	1.15 (0.73, 1.81)	0.553
4th quantile	646	56 (8.7)	0.80 (0.34, 1.88)	0.603

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5th quantile	655	76 (11.6)	1.09 (0.45, 2.61)	0.849
Peak Hour Exposure	**(n=3223)**	**(n=292)**		
Less than Mean	1812	146 (8.1)	1	
More than Mean	1411	146 (10.4)	1.00 (0.74, 1.37)	0.972
Smoking(pack years)	**(n=3229)**	**(n=293)**		
No Smoker	2506	212 (8.5)	1	
>0 to ≤1	168	16 (9.5)	0.87 (0.49, 1.52)	0.632
>1 to <5	325	47 (14.5)	1.30 (1.88, 1.91)	0.172
≥5	201	15 (7.5)	0.57 (0.31, 1.01)	0.056
Others	29	3 (10.3)	1.02 (0.30, 2.70)	0.963
Fuel used for cooking(years)	**(n=3229)**	**(n=293)**		
Zero bad fuel exposure	278	24 (8.6)	1	
1 to 25	79	3 (3.8)	0.73 (0.21, 2.57)	0.623
26 to 50	2206	190 (8.6)	1.20 (0.75, 1.94)	0.450
>50	666	76 (11.4)	1.56 (0.92, 2.66)	0.100

Others Information for education and occupatipon not available

Association of Pterygium with various risk factors: Multi-variable Analysis

Multivariable analysis included gender, education, occupation, sun exposure, smoke pack years and years of usage of bad fuel. Pteygium was found less in females(p=0.019). There was no significant association between pterygium and education, occupation, sun exposure, smoke pack years and years of usage of bad fuel.

Table 43.2: Association of Pterygium with various risk factors adjusted odds ratio: Prakasam

Pterygium	Total	Present	Adjusted OR (95% CI)	P value
Age(years)	**(n=2909)**	**(n=584)**		
40-49	1117	200 (17.9)		
50-59	755	159 (21.1)		
60-69	632	149 (23.5)		
≥70	405	76 (18.8)		
Gender	**(n=2909)**	**(n=584)**		
Male	1321	225 (17.0)	1	
Female	1588	359 (22.6)	1.50 (0.85, 2.65)	0.157
Education	**(n=2909)**	**(n=584)**		
Illiterate	1925	461 (23.9)	1	
Can read & write	487	82 (16.8)	0.87 (0.66, 1.15)	0.340
Intermediate	431	37 (8.6)	0.48 (0.33, 0.71)	<0.001
Graduation	65	3 (4.6)	0.32 (0.10, 1.06)	0.063
Others	1	1 (100.0)	1	-
Occupation	**(n=2909)**	**(n=584)**		
House work	471	63 (13.4)	1	
Unskilled	1676	411 (24.5)	1.72 (1.25, 2.37)	0.001
Skilled and professional	320	27 (8.4)	1.00 (0.60, 1.66)	0.996
Unemployed	439	83 (18.9)	1.35 (0.92, 1.99)	0.124
Others	3	0 (0.0)	1	-
Cumulative Exposure (Outdoor)	**(n=2907)**	**(n=583)**		

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Less than Mean	1284	195 (15.2)	1	
More than Mean	16223	388 (23.9)	0.82 (0.48, 1.40)	0.473
Quantile of Total Exposure	(n=2907)	(n=583)		
1st quantile	570	56 (9.8)	1	
2nd quantile	615	116 (18.9)	1.54 (1.06, 2.24)	0.024
3rd quantile	563	123 (21.9)	1.85 (1.03, 3.33)	0.041
4th quantile	568	136 (23.9)	2.31 (1.18, 4.55)	0.015
5th quantile	591	152 (25.7)	2.73 (1.37, 5.45)	0.004
Peak Hour Exposure	**(n=2907)**	**(n=583)**		
Less than Mean	1365	204 (15.0)	1	
More than Mean	1542	379 (24.6)	1.13 (0.84, 1.52)	0.426
Smoking(pack years)	**(n=2909)**	**(n=584)**		
Smokin	2040	442 (21.7)	1	
No Smoker	60	14 (23.3)	1.26 (0.65, 2.41)	0.485
>0 to ≤1	191	33 (17.3)	0.80 (0.51, 1.24)	0.326
>1 to <5	305	31 (10.2)	0.51 (0.33, 0.78)	0.002
Others	313	64 (20.4)	0.81 (0.58, 1.14)	0.241
Fuel used for cooking(years)	**(n=2897)**	**(n=584)**		
Zero bad fuel exposure	1266	223 (17.6)	1	
1 to 25	120	11 (9.2)	0.62 (0.27, 1.43)	0.262
25 to 50	1164	280 (24.1)	0.90 (0.52, 1.55)	0.706
>50	359	70 (19.5)	0.58 (0.32, 1.04)	0.067

Others Information for education and occupatipon not available

Association of Pterygium with various risk factors: Multi-variable Analysis

Multivariable analysis included gender, education, occupation, sun exposure, smoke pack years and years of usage of bad fuel. Pterygium was significantly associated with increased quantiles for mean duration of exposure during peak UV hour(p=0.004), increased smoke pack years(p=0.002), educated till intermediate grad(<0.001) and unemployed activities(p<0.001). There was no significant association of pterygium with gender(p=0.181), and years of usage of bad fuel used even more than 50 years(p=0.06).

10.2.8.4. Prevalence of other posterior segment disorders

Table 44: Prevalence of ARMD in study participants by gender and age: Gurgaon

	Total n(%)	Present n(%)	P value
Age (Years)			
40-50	1427	13(0.9)	
50-60	881	38(4.3)	
60-70	746	96(12.9)	<0.001
70-80	541	134(24.8)	
Total	3595	281(7.8)	
Gender			

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Male	1614	125(7.8)	0.885
Female	1981	156(7.9)	
Total	3595	281(7.8)	

In these 3595 participants categorized for ARMD[18] (Age Related Macular Degeneration). It was observed that out of 1614 males, 125(7.8%) had ARMD and out of 1981 females examined, 156(7.9%) had ARMD. There was an increased occurrence of ARMD in age group ≥ 60 years. (230 participants in age group more than 60 years as compared to 51 people in age less than 60 years). The prevalence of ARMD was 7.8%. The association of ARMD was statistically significant for age (p<0.001) and gender (p=0.88).

Table 44.1: Prevalence of ARMD in study participants by gender and age: Guwahati

	Total n(%)	Present n(%)	P value
Age (Years)			
40-50	1444 (99.3)	10 (0.7)	
50-60	784 (97.9)	17 (2.1)	
60-70	572 (94.9)	31 (5.1)	0.039
70-80	351 (94.6)	20 (5.4)	
Total	3,151 (97.6)	78 (2.4)	
Gender			
Male	1,446 (97.0)	45(3.0)	<0.001
Female	1,705 (98.1)	33(1.9)	
Total	3,151 (97.6)	78(2.4)	

In these 3231 participants categorized for ARMD[24] (Age Related Macular Degeneration). It was observed that out of 1491 males, 45 (3%) had ARMD and out of 1738 females examined, 33 (1.9%) had ARMD. There was an increased occurrence of ARMD in age group ≥ 60 years. (51 participants in age group more than 60 years as compared to 27 people in age less than 60 years). The prevalence of ARMD was 2.4%. The association of ARMD was statistically significant for age (p<0.001) and gender (p=0.03).

Table 44.2: Prevalence of ARMD in study participants by gender and age: Prakasam

	Total n(%)	Present n(%)	P value
Age (Years)			
40-50	1117	1 (0.1)	
50-60	755	0 (0.0)	
60-70	632	1 (0.2)	0.412
70-80	405	2 (0.5)	

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Total	2909	4 (0.1)	
Gender			
Male	1321	1 (0.1)	0.172
Female	1588	3 (0.2)	
Total	2909	4(0.1)	

In these 2909 participants categorised for ARMD[25] (Age Related Macular Degeneration). It was found that out of 1321 males, 1(0.08%)had ARMD and out of 1588 females examined, 3 (0.2%) had ARMD. There was a increased occurrence of ARMD in age group ≥60 years.(3 participants in age group more than 60 years as compared to 1 participant in age less than 60 years). The prevalence of ARMD was 0.14%. The association of ARMD with age and gender was not statistically significant.

Table 45: Prevalence of diabetic retinopathy by age and gender in study participants: Gurgaon

	Total n(%)	Present n(%)	P value
Age (years)			
40-50	1427	33 (2.3)	
50-60	881	41 (4.7)	
60-70	746	31 (4.2)	
70-80	541	24 (4.4)	0.010
Gender			
Male	1614	66 (4.1)	
Female	1981	63 (3.2)	0.145
Total	3595	129 (3.6)	

Of 3595 participants examined for presence of diabetic retinopathy,[24] diabetic retinopathy was more in age group ≥50 years, 41(4.7%) participant was compared to 33(2.3%) participants in age group less than 50 years, this association of diabetic retinopathy with age was found to be significant (p=0.010).

Table 45.1: Prevalence of diabetic retinopathy by age and gender in study participants: Guwahati

	Total n(%)	Present n(%)	P value
Age (Years)			
40-50	1444 (99.3)	10 (0.7)	
50-60	784 (97.9)	17 (2.1)	
60-70	572 (94.9)	31 (5.1)	0.039
70-80	351 (94.6)	20 (5.4)	
Total	3,151 (97.6)	78 (2.4)	
Gender			
Male	1,446 (97.0)	45(3.0)	<0.001
Female	1,705 (98.1)	33(1.9)	
Total	3,151 (97.6)	78(2.4)	

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Of 3231 participants examined for presence of diabetic retinopathy, diabetic retinopathy was more in age group ≥50 years,76 participants as compared to 29 participants in age group less than 50 years, this association of diabetic retinopathy with age was found to be significant (p<0.001). The prevalence of diabetic retinopathy was 3.9% in the study participants.

There were 67(4.5%) males and 58(3.3%) females with diabetic retinopathy. The association of Diabetic retinopathy with gender was not significant. (p=0.131)

Table 45.2: Prevalence of diabetic retinopathy by age and gender in study participants: Prakasam

	Total n(%)	Present n(%)	P value
Age (Years)			
40-50	1117	1 (0.1)	
50-60	755	0 (0.0)	
60-70	632	1 (0.2)	0.412
70-80	405	2 (0.5)	
Total	2909	4 (0.1)	
Gender			
Male	1321	1 (0.1)	0.172
Female	1588	3 (0.2)	
Total	2909	4(0.1)	

Of 2909 participants examined for presence of diabetic retinopathy, diabetic retinopathy was more in age group ≥50 years, 240 participants was compared to 98 participants in age group less than 50 years , this association of diabetic retinopathy with age was found to be significant (p=0.003). The prevalence of diabetic retinopathy was 11.6% in the study participants.

There were 173(13.1%) males and 165(10.4%) females with diabetic retinopathy. The association of Diabetic retinopathy with gender was not significant. (p=0.074)

10.3.   Methods and Results (Objective-III)

To collect the existing data on prevalence of eye diseases with available measurements of UVR and suspended particles in the initial first year of the project and subsequently plan a long term monitoring mechanism

As already mentioned in the High power meeting in 2011-2012, there was no available data in the past regarding relationship between UVR and ocular diseases so the data collected from the current study will serve as a cohort for future studies.

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11. Summary

11.1. Conclusions summarizing the achievements and indication of scope for future work.

It is the first study in India where environmental risk factors have been studied in relation to eye health including ocular surface diseases. From environmental estimates, UVA and UVB measurements have been done separately first time in India. Dueto difference in Suspended particulate matter (SPM) there is apparently a different pattern of ocular diseases in Guwahati. Modifiablerisk factors for various eye diseases have been identified in the study.[9,10,13]

Collection of environmental data from National Physical Laboratory was done with help ofRegional Meteorological Center, Guwahati.The average column ozone concentration at Guwahati, was 288±22, 276±7, 257±8, 259±12 DU during summer, monsoon, post-monsoon and winter respectively. The seasonal averaged UV irradiance values at local noon were 150±25, 178±22, 247±18 and 248±22 mW/m^2 during winter, post-monsoon, monsoon and summer season respectively.

At Guwahati, the concentrations RSPM (Respiratory suspended particulate matter) were within the permissible levels. The values of SPM and RSPM for Guwahati were 178±42.2μg/m^3 and 114.2±26.5μg/m^3 respectively.

Table 46: Environmental and ocular data at all the study sites:

Environmental Data	Gurgaon	Guwahati	Prakasam
UVA	1.54 to 19.4 w/m^2	1.8 to 11.9 w/m^2	6.6 to 12.8 W/m^2
UVB	0.03 to 0.53 w/m^2	0.04 to 0.3 w/m^2	0.19 to 0.42 W/m^2
SPM	397±95.4 μg/m^3	178 ±42.2 μg/ m^3	-
RSPM	144.9±26.5 μg/ m^3	114.2 ±26.5 μg/ m^3	-
Ocular diseases in population aged 40 years and above	**Prevalence (NCR) (3595/ 18015)***	**Prevalence (Guwahati) (3231/ 15072)***	**Prevalence (Prakasam) (2909/10313)***
Cataract	31.5%	25.7%	42%
Dry eye	22.9%	5.8%	1.5%
Pterygium	11.2%	9.1%	20.1%
VKC in children aged 5 to 15 years	**Prevalence (NCR) N= 3695****	**Prevalence (Guwahati) N=3244****	
VKC	0.35%	0.18%	

* Total number of people examined above age of 40 years out of total number of people enumerated in all the clusters of that region.

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*** Total number of people examined below age of 16 years out of total number of people enumerated in all the clusters of that region.*

11.1.1. In Gurgaon

Population Covered: A total population of 18015people residing in that area for more than 6 months were enumerated, 4353people were more than 40 years of age, of which 3942(90.6%) people were interviewed for risk assessment questionnaire and 3595(82.6%) underwent clinical examination

Ocular findings- In total 3595 people aged above 40 years, the prevalence of cataract was 1131(31.5%), dry eye was 817(22.7%), pterygium was 403(11.2%). Amongst 3695 children the prevalence of vernal kerato conjunctivitis (VKC) was 0.35% in children aged between 5-15 years. The prevalence of nuclear cataract was higher in all the age groups 17.6% followed by cortical cataract 13% followed by posterior subcapsular cataract 11.6%.

Environmental risk factors for these ocular diseases- Various risk factors covered in the study were type of occupation along with the duration of sun exposure that was calculated according to Melbourne study formula[13], all the study participants were divided into quantiles of sun exposure. Other environmental risk factors were analysed in the form of type of fuels[9] (safe and unsafe fuels) along with duration of exposure, and smoke pack years[10] were calculated according to the standard formula. The association of these risk factors was analysed with the presence of various ocular diseases using standard statistical formulas.

Association of various ocular diseases with risk factors:

 For cataract- For Sun exposure, on applying univariable analysis, it was observed that cataract was significantly higher among participants among participants in later quantiles with higher than Cumulative total sun exposure with OR 13.7(95% CI 10.4,17.9; p value <0.001). On applying multivariable analysis, it was observed that there was a significant association of cataract with sun exposure.

For Sun exposure, on applying univariable analysis, it was observed that Cataract was significantly higher among participants with higher than cumulative total sun exposure (more than 116.95 thousand hours of exposure to sun light in their lifetime) with OR 4.7

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(95% CI 4.02,5.48) and also cataract was significantly associated with cumulative peak hours exposure of more than 30.1 thousands (OR 3.7; 95% CI 3.1, 4.2).

For dry eye- For sun exposure, on applying univariable analysis, it was observed that dry eye was significantly higher among participants with cumulative hours of exposure more than 116.96 thousand hours(OR 1.4; 95% CI 1.2,1.7) ($p<0.001$). On applying multivariable analysis, it was observed that this association remained significant between dry eye and sun exposure.

For pterygium- On applying univariable analysis, it was observed that prevalence of pterygium was significantly higher among participants in later quantiles with higher than cumulative total sun exposure (more 116.96 thousand hours of exposure to sun light in their lifetime) with (OR 1.7.8; 95% CI 1.4, 2.1). On applying multivariable analysis, it was observed that sun exposure remained as a risk factor for pterygium.

11.1.2. In Guwahati

Population Covered: A total population of 15072 people residing in that area for more than 6 months were enumerated, 4140 people were more than 40 years of age, of these 4140 individuals aged more than 40 years, 3572(86.3%) people were interviewed for risk assessment questionnaire and 3231 (78%) underwent clinical examination.

Ocular findings- In total 3231 people aged above 40 years, the prevalence of cataract was 828(25.7%), dry eye was 185(5.8%), pterygium was 293(9.1%). Amongst 3244 children the prevalence of vernal kerato conjunctivitis (VKC) was 0.18% in children aged between 5-15 years. The prevalence of nuclear cataract was higher in all the age groups 20.6% followed by cortical cataract 8.5% followed by posterior subcapsular cataract 2%.

Environmental risk factors for these ocular diseases- Various risk factors covered in the study were type of occupation along with the duration of sun exposure that was calculated according to Melbourne study formula[13], all the study participants were divided into quantiles of sun exposure. Other environmental risk factors were analysed in the form of type of fuels[9] (safe and unsafe fuels) along with duration of exposure, and smoke pack years[10] were calculated according to the standard formula. The association of these risk factors was analysed with the presence of various ocular diseases using standard statistical formulas.

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Association of various ocular diseases with risk factors:

For cataract-For Sun exposure, on applying univariable analysis, it was observed that cataract was significantly higher among participants among participants in later quantiles with higher than cumulative sun exposure with OR 13.5(95% CI 9.7,18.6; p value <0.001).On applying multivariable analysis, it was observed that there was a significant association of cataract with sun exposure.

For Sun exposure, on applying univariable analysis, it was observed that cataract was significantly higher among participants with higher than cumulative total sun exposure (more than 781.45 thousand hoursof exposure to sun light in their lifetime) with OR 5.3 (95% CI 4.4,6.3) and also cataract was significantly associated with cumulative peak hours exposure of more than 22.8 thousand hours(OR 3.5; 95% CI 2.9, 4.09).

For dry eye- For sun exposure, on applying univariable analysis, it was observed that dry eye had a significant association with higher than cumulative total sun exposure (more than 781.45 thousand hours hours of exposure to sun light in their lifetime) with OR 1.7(95% CI 1.3,2.4).Similarly, dry eye was significantly associated with peak hours of exposure more than 781.45 thousand hours. (OR 1.6; 95% CI 1.2, 2.2)

On applying multivariable analysis, it was observed that age is an independent risk factor for dry eye with increased prevalence of dry eye within the aging population. There was no significant association of dry eye with sun exposure.

For pterygium- On applying univariable analysis, it was observed that prevalence of pterygium showed no significant association among participants with higher than average total sun exposure (more than 781.45 thousand hours of exposure to sun light in their lifetime) with OR 1.2 (95% CI 1.1, 1.6) (p value 0.05). There was a significant association of pterygium with peak hours of exposure more than 781.45 thousand hours (OR1.3; 95% CI 1.04,1.6) (p value 0.025).On applying multivariable analysis, it was observed that age and sun exposure are not an independent risk factor for pterygium in participants in Guwahati.

11.1.3. In Prakasam

Population Covered: A total population of 10313 people residing in that (rural and urban) area for more than 6 months were enumerated, 3528 people were more than 40

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years of age, of these 3528 individuals aged more than 40 years, 3132 (88.7%) people were interviewed for risk assessment questionnaire and 2909 (82.5%) underwent clinical examination.

Ocular findings- In total 2909 people aged above 40 years, the prevalence of cataract was 1221(42%), dry eye was 41(1.5%), pterygium was 584 (20.1%). The prevalence of nuclear cataract was higher in all the age groups 28.2% followed by cortical cataract 1.5% followed by posterior subcapsular cataract 1.3%.

Environmental risk factors for these ocular diseases- Various risk factors covered in the study were type of occupation along with the duration of sun exposure that was calculated according to Melbourne study formula[13], all the study participants were divided into quantiles of sun exposure. Other environmental risk factors were analysed in the form of type of fuels[9] (safe and unsafe fuels) along with duration of exposure, and smoke pack years[10] were calculated according to the standard formula. The association of these risk factors was analysed with the presence of various ocular diseases using standard statistical formulas.

Association of various ocular diseases with risk factors:

For cataract-For Sun exposure, on applying univariable analysis, it was observed that cataract was significantly higher among participants among participants in later quantiles with higher than average total sun exposure with OR 7.1(95% CI 5.4,9.2; p value <0.001).On applying multivariable analysis, it was observed that there was a significant association of cataract with sun exposure.

For Sun exposure, on applying univariable analysis, it was observed that cataract was significantly higher among participants with higher than cumulative sun exposure (more than 105.19 thousand hours of exposure to sun light in their lifetime) with OR 2.9 (95% CI 2.5,3.4) and also cataract was significantly associated with peak hours exposure of more than 35.9 thousand hours (OR 2.4; 95% CI 2.1, 2.8).

For dry eye- For sun exposure, on applying univariable analysis, it was observed that dry eye had no significant association with cumulative sun exposure(more than 105.9 thousand hours of exposure to sun light in their lifetime) with OR 0.9(95% CI

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0.4,1.6).Similarly, dry eye was not associated with peak hours of exposure more than 105.19 thousand hours (OR 1.02; 95% CI 0.5,1.8)

On applying multivariable analysis, it was observed that age is an independent risk factor for dry eye with increased prevalence of dry eye within the aging population. There was no significant association of dry eye with sun exposure.

For pterygium- On applying univariable analysis, it was observed that prevalence of pterygium was significantly higher among participants with higher than cumulative total sun exposure (more than 105.19 thousand hours of exposure to sun light in their lifetime) with OR 1.7 (95% CI 1.4, 2.1) (p value <0.001). Similarly there was a significant association of pterygium with peak hours of exposure more than 35.9 thousand hours (OR1.8; 95% CI 1.5,2.2) (p value <0.001).On applying multivariable analysis, it was observed that age and sun exposure have no significant association with occupation pterygium in participants in Prakasam.

Indication of scope for future work- A long term monitoring for at least ten years to study the effect of environmental changes and global warming on eye health and assess for changing trends with time is required. Moreover there is need for extending the work to include the effect of these factors on retinal diseases. The study cohort is a valuable resource which should be nurtured for long term as has been done with the Beaver Dam study in Australia and Blue Mountain study in USA.

VKC among children has emerged as another important eye health problem apparently linked with environmental factors and further study is required with larger sample size to assess the association and impact of modifiable environmental risk factors.

12. S&T benefits accrued:

  I.   List of research publications with complete details:

        Authors, Title of paper, Name of Journal, Vol., page, year : **Nil**

  II.   Manpower trained on the project:

        a. Research Scientists or Research Fellows-**5**

        b. No. of Ph.Ds produced- **Nil**

        c. Other Technical Personnel trained-30

  III. Patents taken, if any: **Nil**

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IV. Products developed, if any- **Nil**

13. Abstract (300 words for possible publication in ICMR Bulletin)

The stratospheric ozone depletion due to the potential increase in the solar UVR has emerged as one of the most important effects of global change.If the eye is exposed to excessive oxidative stress due to UVR and ozone exposure, the scavengers normally present in the tear fluid are exhausted and apparently no longer capable of preventing damage. To find this association of ocular conditions with the environmental factors a cross sectional study was done that aimed at estimating the role of ultraviolet rays in National Capital Region (NCR), the North East region, hilly areas and Coastal areas of the country and also to determine the effect of environmental factors and UVA & B radiation, suspended particles on the prevalence and/or exacerbation of eye diseases like cataract, dry eye, pterygium and vernal keratoconjunctivitis (VKC) in all the study regions of the country. The study intended to cover 18000(minimum 14,000) population in 35 clusters with population of 400-600 in each cluster. The study population consisted of people more than 40 years for detailed eye and demographic information and population less than 15 years in children for screening forvernalkeratoconjunctivitis.

The major findings reported from the study in Gurgaon, were that amongst total of 18015 people enumerated, 3595 underwent detailed ocular examination amongst these the prevalence of cataract was 1131(31.5%), dry eye was 817(22.9%), pterygium was 403(11.2%). In Guwahati, amongst 15072 people enumerated 3231 underwent ocular examination. Amongst these the prevalence of cataract was 828(25.7%), 185(5.8%), 293(9.1%) underwent ocular examination. In Prakasam, amongst 10313 people enumerated 2909 underwent ocular examination. Amongst these the prevalence of cataract was 1221(42%), dry eye was 41(1.5%), pterygium was 584(20.1%).The association of ocular diseases with various risk factors showed that on univariable analysis there was a significant association of cataract, dry eye and pterygium with sun exposure and even on multivariable analysis the association remained significant for all these 3 ocular diseases. All these 3 diseases namely cataract, dryeye and pterygium were found more in people with increased smoke pack years >5 years and exposure to unsafe kitchen fuels more than 15 years in Gurgaon but in Guwahati there was a significant association of sun exposure and smoke pack years >5 years with cataract but not with dry eye and pterygium. While in Prakasam no significant association of these risk factors was

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found with occurrence of dry eye but a significant association was found between sunexposure and smoke pack years >5 years. To conclude, a general awareness among the people should be created regarding the use of head gear, UV protective glasses, good and safe kitchen fuel, measures to reduce environmental pollution, stop smoking, encourage diet rich in antioxidants etc. to prevent from harmful effect of ultraviolet radiation and other environmental risk factors.

14. Procurement/usage of Equipment

a.

Table 46: Details of usage of equipment at Gurgaon

S. No	Name of Equipment	Qty	Cost FE/Rs	Date of Installation	Utilization rate%	Conditions
1	Body Fat Analyzer	01	8500/-	02.08.2010	100%	Non Functional
2	Trial Set	02	9660/-	04.08.2010	100%	Functional
3	B.P.Apparatus :- Omron Sem-1 Fully automatic T9P model Omron Sem-1	01 01 02	1838/- 8925/- 3676/-	24.07.2010 04.08.2010 18.09.2010	100%	Non Functional Non Functional Non Functional
4	Digital Weighing Scale	01 01 01	1575/- 2000/- 1575/-	17.07.2010 07.08.2011 04.07.2012	100%	Non Functional Non Functional Non Functional
5	Portable Slip Lamp Appaswamy Heine HSL150	02 01	1,40,000/- 96,600/-	30.03.2011	100%	Functional Functional
6	Desktop	01	79957/-	07.02.2011	100%	Functional
7	Laptop	01		07.02.2011	100%	Functional
8	Handycam	01	15000/-	19.01.2011	100%	Functional
9	Portable Non contact Tonometer (PT100)	01	3,10,716/-	27.05.2011	100%	Functional
10	Woods Lamp Waldmann Germany DHLL 404 M	01	19,9400/-	07.03.2012	100%	Functional
11	Autorefractometer with keratometer Model:PRK 5000, Potec-Korea	01	2,52,840/-	26.02.2013	100%	Functional
12	LOCS III Transparency sets	03	41516.65	13.01.2012	100%	Functional

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Table 47: Details of usage of equipment at Guwahati

S.No.	Name of Equipment	Cost FE/Rs	Date of Installation	Utilization rate%	Remarks regarding maintenance/ breakdown
1	Laptop with Accessories	58990/-	23.12.2010	100%	Nil
2	Camera with Accessories	14790/-	22.12.2010	100%	Nil
3	Handycam with accessories	19790/-	22.12.2010	100%	Nil
4	Computer Printer	8150/-	21.12.2010	100%	Nil
5	Height Scale	1200/-	25.01.2011	100%	Nil
6	B.P. Instrument	620/-	25.01.2011	100%	Nil
7	Stethoscope	240/-	25.01.2011	100%	Nil
8	Weight Scale	2400/-	19.11.2012	100%	Nil
9	Torch	95/-	19.11.2012	100%	Nil
10	Vision Box	4528/-	15.10.2011	100%	Nil
11	Handheld Portable Slit Lamp	1,40,000/-	06.06.2011	100%	Nil
12	Glucocard kit	2840/-	21.07.2011	100%	Nil
13	NidekAutorefractometer + Courier charge	4,12,187/- +45216= 4,57,402/-	08.08.2011	100%	Nil
14	LOCS III Transparency Set	600 US dollar	08.08.2011	100%	Nil
15	Non contact Tonometer	3,10,716/-	28.11.2011	100%	Nil
16	Ophthalmoscope	15225/-	28.11.2011	100%	Nil
17	Streak Retinoscope	18375/-	28.11.2011	100%	Nil
18	Digital B.P.Monitor	10500/-	19.11.2012	100%	Nil
19	Desktop UPS Printer	34700/-	02.07.2012	100%	Nil

Table 48: Details of usage of equipment at Prakasam

S.No.	Name of Equipment	Cost FE/Rs	Date of Installation	Utilization rate%	Remarks regarding maintenance/ breakdown
1	Portable Slit Lamp	150,000	--	100%	Nil
2	BP Apparatus,Weighing & Ht Scale	25,000	--	100%	Nil
3	Ophthalmoscope	14,000	--	100%	Nil
4	Streak Retinoscope	14,000	--	100%	Nil
5	Portable Trail sets-2	10,000	--	100%	Nil
6	Torches and Misc.Equipment	20,000	--	100%	Nil
7	Laptop computer	80,000	--	100%	Nil
8	Digital Camera/ Camcorder	35,000	--	100%	Nil
9	UV Fluorescence Photography System	350,000	--	100%	Nil
10	LOCS with translides	40,000	--	100%	Nil

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11	Retroilluminated ETDRS(4 sets)	20,000	--	100%	Nil
12	Portable Autorefractometer	450,000	--	100%	Nil
13	Non Contact Tonometer	350,000	--	100%	Nil
Total		6,706,576	--	100%	Nil

b. Suggestions for disposal of equipment(s): As per rules.

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Name and signature with date

1. _____

(Principal Investigator)

2. _____

(Co-Investigator)

Annexure – 1: Lists of tables of study done at R.P Centre

Table 1: Details of Village clusters (Delhi, Gurgaon) included

S. No.	Village	Total Population	40+ population	Risk Assessment(%)	Clinical Examination (%)
1	KHAWASPUR	406	135	123 (91.1)	115 (85.2)
2	SAMPKA	460	116	107 (92.2)	96 (82.8)
3	BASUNDA	508	124	114 (91.9)	103 (83.1)
4	KALIAWAS	580	125	112 (89.6)	100 (80.0)
5	SULTANPUR	444	115	106 (92.2)	99 (86.1)
6	BERKA	613	123	111 (90.2)	103 (83.7)
7	DAULA	523	123	109 (88.6)	101 (82.1)
8	GAIRATPUR BAS	545	121	112 (92.6)	98 (81.0)
9	HARCHANDPUR	621	118	107 (90.7)	97 (82.2)
10	LOH SINGHANI	547	115	102 (88.7)	97 (84.3)
11	CHUHADPUR	524	114	108 (94.7)	95 (83.3)
12	ULLAWAS	629	113	100 (88.5)	91 (80.5)
13	MANESAR1	522	111	101 (91.0)	90 (81.1)
14	MANESAR2	418	101	85 (84.2)	82 (81.2)
15	MANESAR3	549	112	111 (99.1)	97 (86.6)
16	BAJGHERA	513	123	112 (91.1)	104 (84.6)
17	WAZIRPUR	537	139	119 (85.6)	110 (79.1)
18	DAULTABAD1	519	127	114 (89.8)	105 (82.7)
19	DAULTABAD2	493	123	112 (91.1)	99 (80.5)
20	BADHA	583	122	112 (91.8)	102 (83.6)
21	BHORAKALAN1	527	129	118 (91.5)	104 (80.6)
22	BHORAKALAN2	487	128	112 (87.5)	107 (83.6)
23	BHORAKALAN3	517	131	118 (90.1)	108 (82.4)
24	BHORAKHURAD	486	124	111 (89.5)	101 (81.5)
25	BHUDAKA	491	129	120 (93.0)	108 (83.7)
26	BILASPUR	495	122	108 (88.5)	98 (80.3)
27	GADAIPUR	434	130	118 (90.8)	108 (83.1)
28	GUDHANA	528	141	128 (90.8)	117 (83.0)
29	HUSAINKA	457	115	103 (89.6)	95 (82.6)
30	KHOR	441	137	124 (90.5)	111 (81.0)
31	MAU	587	132	118 (89.4)	112 (84.8)
32	MIRJAPUR	496	127	112 (88.2)	102 (80.3)
33	PALASOLI	462	118	109 (92.4)	104 (88.1)
34	RATHIWAS	553	136	128 (94.1)	110 (80.9)
35	TATARPUR	520	154	138 (89.6)	126 (81.8)
	Total	**18015**	**4353**	**3942 (90.6)**	**3595 (82.6)**

Age and gender distribution of study population

Age Distribution

Age group	Count (%)
0-4 years	1721 (9.6)
5-15 years	4081 (22.7)
16-39 years	7860 (43.7)
40-49 years	1822 (10.0)
50-59 years	1084 (6.0)
60-69 years	845 (4.7)
>70 years	602 (3.3)

Gender Distribution

Male: 9489 (52.7)
Female: 8526 (47.3)
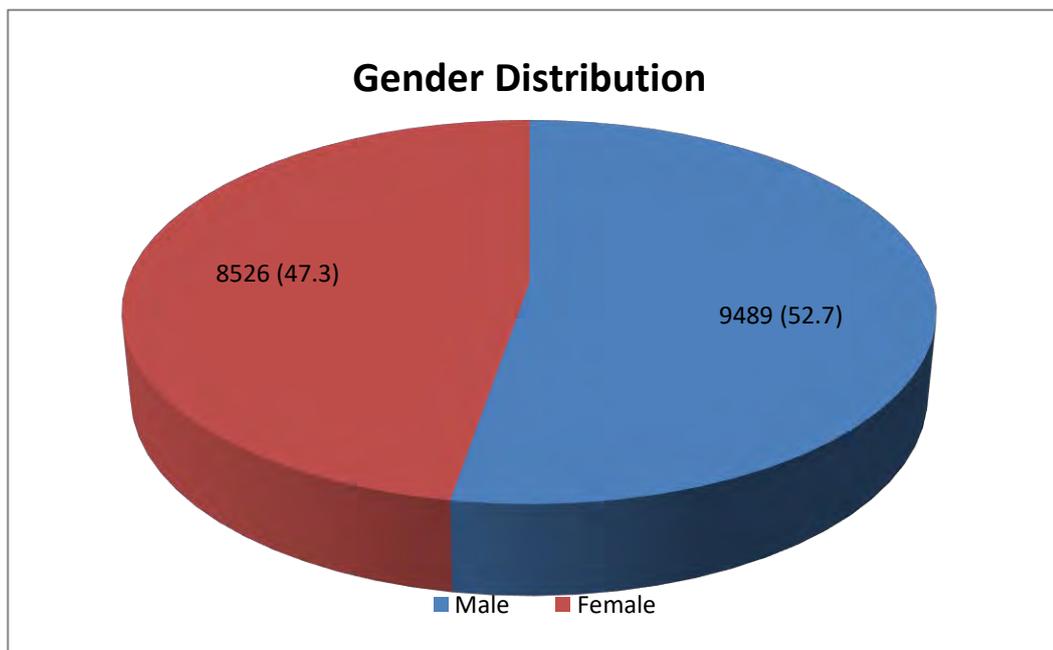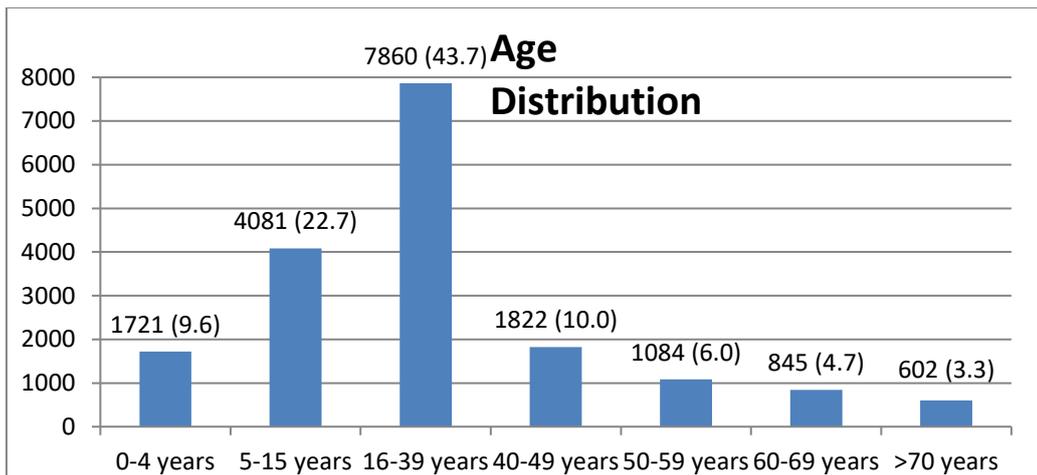
Table 2: Demographic profile of population enumerated and eligible for the study (all ages and population aged more than 40 years) in the 35 village clusters of NCR, Gurgaon

	Total Enumerated (all ages) n=18,015	Population (40+ years) n=4,353
Age	**18,015**	**4,353**
0-4 years	1,721 (9.6)	-
5-15 years	4,081 (22.7)	-
16-39 years	7,860 (43.7)	-
40-49 years	1,822 (10.0)	1,822 (100)
50-59 years	1,084 (6.0)	1,084 (100)
60-69 years	845 (4.7)	845 (100)
≥70 years	602 (3.3)	602 (100)
Gender	**18,015**	**4,353**
Male	9,489 (52.7)	2,159 (22.7)
Female	8,526 (47.3)	2,194 (25.7)
Education	**18,015**	**4,353**
Illiterate	2,671 (14.8)	2,023 (75.7)
Can read & write upto primary	3,189 (17.7)	639 (20.0)
Primary to intermediate	8,762 (48.6)	1,556 (17.8)
Graduation and above	952 (5.3)	135 (14.2)
Others*	2,441 (13.6)	-
Marital Status	**18,015**	**4,353**
Married	8,786 (48.8)	3,536 (40.3)
Unmarried	8,347 (46.3)	26 (0.3)
Others (Divorced, separated, widow/widower, Not applicable)	882 (4.9)	791 (89.7)
Occupation	**18,015**	**4,353**
House work	4,828 (26.8)	1,885 (39.0)
Unskilled	2,773 (15.4)	1,100 (39.7)
Skilled and professionals	1,865 (10.4)	605 (32.4)
Unemployed	970 (5.4)	763 (78.7)
Others**	7,579 (42.0)	-
Religion	**18,015**	**4,353**
Hindu	17,666 (98.1)	4,294 (24.3)
Muslim	349 (1.9)	59 (16.9)
Cultivable land	**18,015**	**4,353**
No Land	11368 (63.1)	2550 (22.4)
1 to 5 acres	5428 (30.1)	1471 (27.1)
>5 acres	1219 (6.8)	332 (27.2)
Family Income / month	**18,015**	**4,353**
< 4999	795 (4.4)	210 (4.8)
5000 to 9999	4,903 (27.2)	1,050 (21.4)
10000 to 14999	3,958 (22.0)	945 (23.9)
15000 to 19999	3,164 (17.6)	832 (26.3)
20000 to 24999	2,188 (12.2)	583 (26.7)
25000 to 29999	1,291 (7.2)	321 (24.9)
30000 and above	1,716 (9.5)	412 (24.0)

*Others for educational information as they are children less than 7 years.
** Others-Students and children less than 7 years therefore not applicable for occupational status.

Table 3: Demographic Characteristics of the enumerated and examined sample population (population aged more than 40 years)

	Enumerated Study Population (40+ years)	Population assessed for risk factors
Age	**4,353**	**3942**
40-49 years	1,822 (41.9)	1589 (87.2)
50-59 years	1,084 (24.9)	979 (90.3)
60-69 years	845 (19.4)	802 (94.9)
>70 years	602 (13.8)	572 (95.0)
Gender	**4,353**	**3942**
Male	2,159 (49.6)	1828 (84.7)
Female	2,194 (50.4)	2114 (96.4)
Education	**4,353**	**3942**
Illiterate	2,023 (46.5)	1910 (94.4)
Can read & write upto primary	639 (14.7)	578 (90.5)
Primary to intermediate	1,556 (35.8)	1340 (86.1)
Graduation and above	135 (3.0)	114 (84.4)
Marital Status	**4,353**	**3942**
Married	3,536 (81.2)	3163 (89.5)
Unmarried	26 (0.6)	24 (92.3)
Others (Divorced Separated Widow/widower)	791 (18.2)	755 (95.4)
Occupation	**4,353**	**3942**
House work	1,885 (43.3)	1825 (96.8)
Unskilled	1,100 (25.3)	920 (83.6)
Skilled	605 (13.9)	468 (77.4)
Unemployed	763 (17.5)	729 (95.5)
Religion	**4,353**	**3942**
Hindu	4,294 (98.6)	3889 (90.6)
Muslim	59 (1.4)	53 (89.8)
Cultivable land	**4,353**	**3942**
No Land	2550 (58.6)	2293 (89.9)
1 to 5 acres	1471 (33.8)	1342 (91.2)
>5 acres	332 (7.6)	307 (92.5)
Family Income	**4, 353**	**3942**
< 4999	210 (4.8)	198 (94.3)
5000 to 9999	1,050 (24.1)	951 (90.6)
10000 to 14999	945 (21.7)	847 (89.6)
15000 to 19999	832 (19.1)	750 (90.1)
20000 to 24999	583 (13.4)	523 (89.7)
25000 to 29999	321 (7.4)	300 (93.5)
30000 and above	412 (9.5)	373 (90.5)
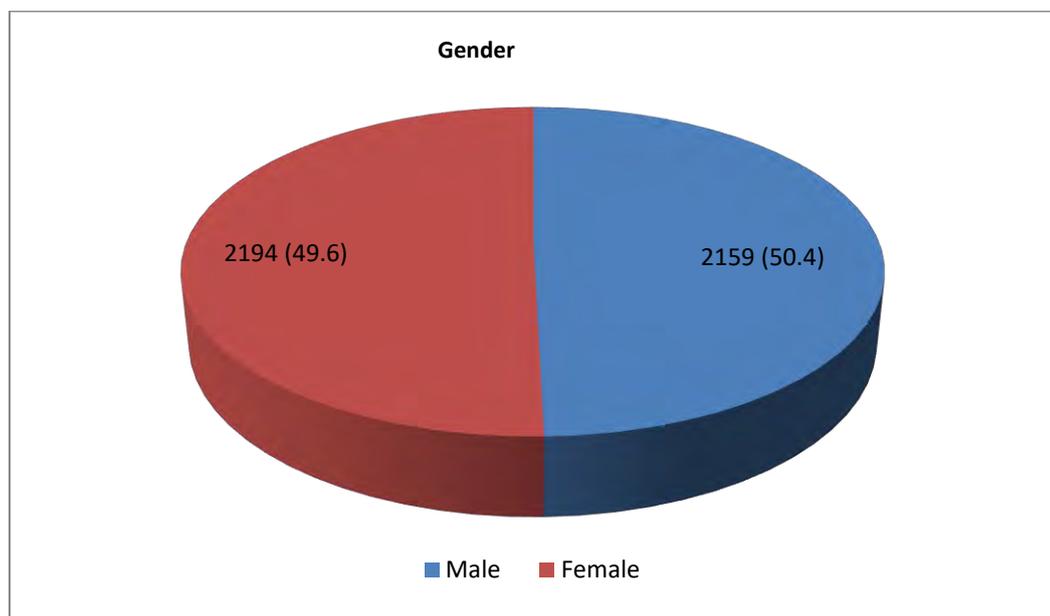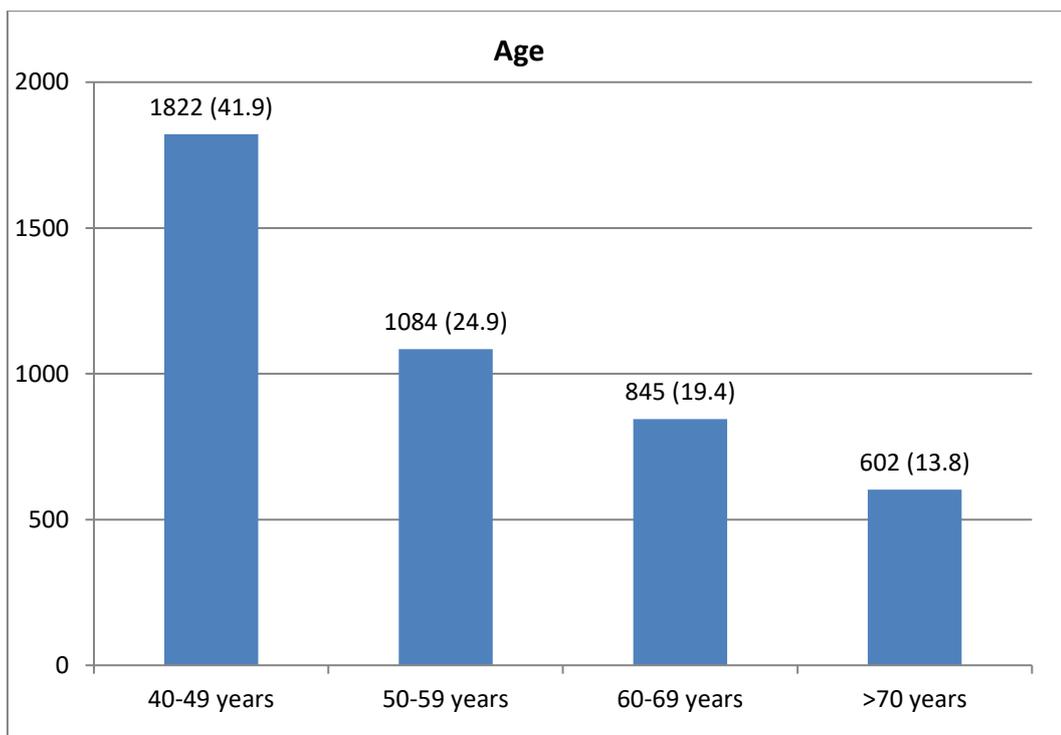
Age

- 40-49 years: 1822 (41.9)
- 50-59 years: 1084 (24.9)
- 60-69 years: 845 (19.4)
- >70 years: 602 (13.8)

Gender

- Male: 2159 (50.4)
- Female: 2194 (49.6)

Table 4: Distribution of study participants according to type of activities done in present, past and remote past

Type of work	Present n=3,942	Past n=2,661*	Remote Past n=656**
Agricultural work	1,125(28.5%)	1,663 (62.5%)	343 (52.3%)
Outdoor Non Agricultural Work	3,287(83.4%)	2,568 (96.5%)	636 (96.9%)
Indoor work	3,769 (95.6%)	2,540 (95.4%)	620 (94.5%)

Table 5: Mean cumulative duration of sun exposure in present, past and remote past reported by the study participants

Number of People (n)	Mean duration of sun exposure (Thousand Hours)	95% CI
Present (n=3942)	28.06	27.1-29.0
Past (n=2661)	61.39	60.0-62.8
Remote Past (n=656)	19.66	18.4-21.0
Total (n=3942)	72.77	71.8-73.8

Table 6: Prevalence of smoking in present or past in study participants

History of Smoking	Total study population, n (%)
Smokers	2208 (56.0)
Non smokers	1734 (44.0)
Total	3942 (100.0)

Table 7: Type of tobacco products used at present in the study participants

Type of smoked tobacco product	Present n (%)*
Cigarette	31 (1.3)
Bidi	1582 (65.4)
Hukka	804 (33.2)
Others (Specify)	1 (0.05)
Total	**2208 (100.0)**

Table 8: Distribution of study participants according to pack years of smoking5

Pack Years of Smoking	Study population, n (%)
Non Smoker	1734 (44.0)
>0 to ≤1 pack years	288 (7.3)
>1 to <5 pack years	651 (16.5)
≥5 pack years	1268 (32.2)
Other Smoker	1 (0.03)

Table 9: Distribution of study participants according to duration of years of cooking food/spending time in the kitchen6

Number of years	Study population n (%)
0.5-9	225 (9.0)
10-19	98 (3.9)
20-30	712 (28.4)
> 30	1471 (58.7)
Total	2506 (100,0)

Table 10: Distribution of study participants for total OSDI score according to age and gender[7]

OSDI	Score<35(Normal) n (%)	Score>35 (Dry Eye) n (%)
Age		
40-49 years	1136 (71.49)	453 (28.5)
50-59 years	681 (69.6)	298 (30.4)
60-69 years	540 (67.3)	262 (32.7)
70+ years	303 (53.0)	269 (47.0)
Gender		
Male	1329 (72.7)	499 (27.3)
Female	1331 (63.0)	783 (37.0)
Total	2660 (67.5)	1282 (32.5)

Table 11: Demographic Characteristics of the enumerated sample population (population aged more than 40 years) undergoing clinical examination

	Study Population (40+ years) 4353 n (%)	Examined Population 3595 n (%)
Age	**4,353**	**3595**
40-49 years	1,822 (41.9)	1427 (78.3)
50-59 years	1,084 (24.9)	881 (81.3)
60-69 years	845 (19.4)	746 (88.3)
≥70 years	602 (13.8)	541 (89.9)
Gender	**4,353**	**3595**
Male	2,159 (49.6)	1614 (74.8)
Female	2,194 (50.4)	1981 (90.3)
Education	**4,353**	**3595**
Illiterate	2,023 (46.5)	1769 (87.4)
Can read & write	639 (14.7)	532 (83.3)
Intermediate	1,556 (35.8)	1192 (76.6)
Graduation	135 (3.0)	102 (75.6)
Marital Status	**4,353**	**3595**
Married	3,536 (81.2)	2887 (81.6)
Unmarried	26 (0.6)	18 (69.2)
Others (Divorced/ Separated/widow/widower)	791 (8.2)	690 (87.2)
Occupation	**4,353**	**3595**
House work	1,885 (43.3)	1712 (90.8)
Unskilled	1,100 (25.3)	801 (72.8)
Skilled	605 (13.9)	399 (66.0)
Unemployed	763 (17.5)	683 (89.5)
Religion	**4,353**	**3595**
Hindu	4,294 (98.6)	3548 (82.6)
Muslim	59 (1.4)	47 (79.7)
Cultivable land	**4,353**	**3595**
No Land	2550 (58.6)	2076 (57.7)
1 to 5 acres	1471 (33.8)	1228 (34.2)
>5 acres	332 (7.6)	291 (8.1)
Family Income	**4, 353**	**3595**
< 5000	210 (4.8)	173 (82.4)
5000 to 9999	1,050(24.1)	865 (82.4)
10000 to 14999	945 (21.7)	771 (81.6)
15000 to 19999	832 (19.1)	689 (82.8)
20000 to 24999	583 (13.4)	480 (82.3)
25000 to 29999	321 (7.4)	272 (84.7)
30000 and above	412 (9.5)	345 (83.7)

Table 12: Distribution of study participants according to place of clinical examination

Place of Examination	Study population n (%)
Central field site	3,406 (94.7)
Home Examination	189 (5.3)
Total	3,595 (100.0)

Table 13: Table 13: Prevalence of random capillary blood glucose levels in study population[8]

Blood Glucose levels	Study population n (%)
<140 mg / dl	2772 (77.6)
≥ 140 mg / dl	800 (22.4)
Total	3572 (100.0)*

Table 14: Prevalence of Blood Pressure in study population[9]

Blood Pressure	Study population n (%)
≥140/90 mmHg	1147(32.0)
<140/90 mmHg	2446(68.0)
Total	3593*

Table 15: Prevalence of study sample according to Body Mass Index (BMI)

BMI*	Study population n (%)
Under Weight (<18.5 kg/m^2)	697 (19.6)
Normal (18.5-24.9 kg/m^2)	1857 (52.2)
Over Weight (25 - 29.9 kg/m^2)	756 (21.2)
Obese (≥30 kg/m2)	250 (7.0)
Total	3560 (100.0)*

Table 16: Prevalence of visual impairment based on presenting visual acuity (PVA) in better eye among study participants according to WHO12

Visual impairment	Study population n (%)
Blind(<3/60)	77 (2.2)
Severe Visual Impairment(<6/60-3/60)	32 (0.8)
Moderate Visual Impairment(6/18-6/60)	436 (12.2)
Mild Visual Impairment(≤6/12-6/18)	567(15.8)
Normal(6/6-6/9)	2480 (69.0)
Total	3592* (100.0)

Table 17: Prevalence of visual impairment based on presenting visual acuity (PVA) in better eye among study participants according to NPCB

Visual impairment	Study population n (%)
Blind(<6/60)	109 (3.0)
Moderate Visual Impairment(6/18-6/60)	436 (12.1)
Mild Visual Impairment(≤6/12-6/18)	567 (15.9)
Normal(6/6-6/9)	2480 (69.0)
Total	3592* (100.0)

Table 18: Distribution of blindness according to WHO and NPCB criteria by age and gender in the study population (based on presenting visual acuity (PVA) in better eye)[19]

	WHO n (%)	NPCB n (%)
Age		
40-49	1 (1.2)	4 (3.7)
50-59	7 (9.1)	11 (10.1)
60-69	12 (15.6)	23 (21.1)
>70	57 (74.1)	71 (65.1)
Gender		
Male	34(44.2)	46(42.2)
Female	43(55.8)	63(57.8)
Total	77 (100)	109 (100.0)

Table 19: Categorization of study population according to history of wearing glasses

History of use of glasses	Study population n (%)
Wearing glasses	299 (8.3)
Not wearing glasses	3296 (91.7)
Total	3595(100.0)

Table 20: Prevalence of myopia according to age and gender in study population for distance vision

Age in years (n) n=3402	Myopia n (%)
40-49 (1376)	70 (5.1)
50-59 (836)	62 (7.4)
60-69 (706)	108 (15.3)
>70 (484)	113 (23.4)
Gender	
Male (1511)	164 (10.9)
Female (1891)	189 (10.0)
Total	353 (10.4)

Table 21: Distribution of severity of myopia in the study population10

Severity of myopia (Dioptre Sphere)	Study population n(%)
Mild (-0.5 to -3.5)	318 (90.1)
Moderate (-3.5to -5.5)	23 (6.5)
Severe (-5.5 to -8)	7 (2.0)
Very Severe (->8)	5 (1.4)
Total	353 (100.0)

Table 22: Prevalence of hypermetropia according to age and gender in study population for distance vision

Age in years n=3402	Hypermetropia n (%)
40-49 (1376)	86 (6.2)
50-59 (836)	165 (19.8)
60-69 (706)	122 (17.2)
>70 (484)	42 (8.7)
Gender(n)	
Male (1511)	147 (9.7)
Female (1891)	268 (14.2)
Total	415 (12.2)

Table 23: Distribution of severity of hypermetropia in the study population[11]

Severity of Hypermetropia (Dioptre Sphere)	Study population n(%)
Mild (+1 to +3.5)	359 (86.4)
Moderate (+3.5 to +5.5)	14 (3.4)
Severe(+5.5 to 8)	9 (2.2)
Very severe (≥ +8)	33 (8.0)
Total	415 (100.0)

Table 24: Association of severity of myopia with age, education, gender and occupation according to subjective acceptance

Categories	Mild (n,%) (-0.5 to -<3 DS) n=318	Moderate (n,%) (>-3 to <-5DS) n=23	Severe (n,%) (> -5 to<-8DS) n=7	Very Severe (n,%) (-≥8DS) n=5
Age in years				
40-49 (n=70)	65 (92.9)	2 (2.8)	2 (2.9)	1 (1.4)
50-59 (n=62)	54 (87.1)	2 (3.2)	3 (4.8)	3 (4.9)
60-69 (n=108)	97 (89.8)	9 (8.4)	1 (0.9)	1 (0.9)
≥70(n=113)	102 (90.3)	10 (8.8)	1 (0.9)	0 (0.0)
			Pearson chi^2 = 15.1084 Pr = 0.088	
Education				
Illiterate (n=201)	185 (91.1)	12 (5.9)	5 (2.5)	1 (0.5)
Can read & write (n=59)	53 (89.8)	2 (3.4)	1(1.7)	3 (5.1)
Intermediate (n=87)	77 (88.5)	9 (10.3)	1 (1.2)	0 (0.0)
Graduation (n=4)	3 (75.0)	0 (0.0)	0 (0.0)	1 (25.0)
			Pearson chi^2= 27.7794 Pr <0.001	
Gender				
Male (n=164)	146 (89.0)	14 (8.5)	0 (0.0)	4 (2.5)
Female (n=189)	172 (91.0)	9 (4.8)	7 (3.7)	1 (0.5)
			Pearson chi^2= 10.2938 Pr = 0.016 (<0.05)	
Occupation				
House work (n=150)	138 (92.0)	7 (4.7)	4 (2.7)	1 (0.6)
Unskilled (n=69)	61 (88.4)	4 (5.8)	1 (1.4)	3 (4.4)
Skilled (n=21)	17 (81.0)	3 (14.3)	0 (0.0)	1 (4.7)
Unemployed (n=113)	102 (90.3)	9 (8.0)	2 (1.7)	0 (0.0)
			Pearson chi^2= 12.3655 Pr = 0.193	

Table 25: Association of severity of hypermetropia for distance vision according to age, education, gender and occupation according to subjective acceptance

Categories (n=415)	Mild (n,%) (+0.5 to <+3DS) n=359	Moderate (n,%) (>+3to+ <5DS) n=14	Severe (n,%) (>+5DS) n=9	Very Severe (n,%) (-≥8DS) n=33
Age in years				
40-49 (n=86)	83 (96.5)	1 (1.2)	2 (2.3)	0 (0.0)
50-59 (n=165)	157 (95.2)	5 (3.0)	2 (1.2)	1 (0.6)
60-69 (n=122)	102 (83.6)	8 (6.6)	3 (2.4)	9 (7.4)
≥70 (n=42)	17 (40.5)	0 (0.0)	2 (4.7)	23(54.8)
			Pearson chi^2 = 155.0888 Pr <0.001	
Education				
Illiterate (n=233)	191 (82.0)	12 (5.1)	3 (1.3)	27 (11.6)
Can read & write (n=49)	45 (91.8)	0 (0.0)	1 (2.0)	3 (6.2)
Intermediate (n=126)	116 (92.0)	2 (1.6)	5 (4.0)	3 (2.4)
Graduation (n=7)	7 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)
			Pearson chi^2= 18.9982 Pr = 0.025	
Gender				
Male (n=147)	127 (86.4)	3 (2.0)	5 (3.4)	12(8.2)
Female (n=268)	232 (86.6)	11 (4.1)	4 (1.5)	21(7.8)
			Pearson chi^2= 2.8065 Pr = 0.422	
Occupation				
House work (n=246)	222 (90.2)	10 (4.1)	3 (1.2)	11(4.5)
Unskilled (n=74)	67 (90.5)	3 (4.1)	3 (4.1)	1(1.3)
Skilled (n=35)	32 (91.4)	0 (0.0)	1 (2.9)	2(5.7)
Unemployed (n=60)	38 (63.3)	1 (1.7)	2 (3.3)	19(31.7)
			Pearson chi^2 = 59.6518 Pr <0.001	

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Table 26: Distribution of study population according to use of myopic glasses

History of wearing spectacles	Study population n (%)
Using Glasses	14 (4.0)
Not using Glasses	339 (96.0)
Total	353 (100.0)

Table 27: Distribution of presbyopia in the study population according to age and gender

Age (Years) n=3293	Presbyopia n (%)
40-49	1331 (40.4)
50-59	825 (25.0)
60-69	690 (21.0)
>70	447 (13.6)
Gender	
Male	1448 (44.0)
Female	1845 (56.0)

Table 28: Association of severity of presbyopia for near vision according to education, occupation according to subjective acceptance

Education (n=3293)	Presbyopia, n (%)
Illiterate	1612 (48.9)
Can read upto primary	498 (15.1)
Intermediate	1092 (33.2)
Graduation	91 (2.8)
Gender	**Presbyopia, n (%)**
House work	1628 (49.4)
Unskilled	739 (22.4)
Skilled	355 (10.8)
Unemployed	571 (17.3)

Table 29: Categorisation of study participants according to Schirmers and TBUT[14]

	Schirmers Test n(%)	Tear Film Break Up Time n(%)
Normal	929 (26.2)	1980 (56.0)
Abnormal	2619 (73.8)	1559 (44.0)
Total	3548*(100.0)	3539*(100.0)

Table 30: Prevalence of study participants according to abnormalities in anterior adnexa on basic Eye Examination[17] (n=3595)

Anterior adnexa abnormalities*	Study population n (%)
Corneal opacity	499 (13.9)
Squint	67 (1.9)
Phthisis/Disorganized globe	25 (0.7)
Adherent Leucoma	24 (0.7)
Anterior staphyloma	6 (0.2)
Nystagmus	4 (0.1)
Corneal Ulcer	1 (0.03)
Others	92 (2.6)

Table 31: Prevalence of Ocular surface disorders in study participants[17,18] (n=3595)

Disorder of ocular surface	Study population n (%)
Pterygium	403 (11.2)
Pingecula	1380 (38.4)

Table 32: Catergorisation of study participants according to prevalence of cataract, dry eye and pterygium at various site

	Gurgaon
Disease	**n (%)**
Cataract	1131 (31.5)
Dry eye	817 (22.7)
Pterygium	403 (11.2)

Table 33: Distribution and prevalence of Cataract in study population according to age and gender: Gurgaon

Demographic characteristics	Cataract (n, % in age group)	Cataract Prevalence % (95% C.I.)	P Value
	Present n=1131		
Age (years)			
40-49 (1427)	74 (6.5)	5.18 (4.034, 6.338)	
50-59 (879)	164 (14.5)	18.66 (16.077, 21.238)	
60-69 (743)	400 (35.4)	53.84 (50.243, 57.429)	<0.001
≥70 (539)	493 (43.6)	91.47 (89.099, 93.832)	
Total	1131 (100.0)		
Gender			
Male (1612)	495 (43.8)	30.71 (28.453, 32.961)	
Female (1976)	636 (56.2)	32.19 (30.125, 34.248)	0.343
Total	1131 (100.0)		

Table 34: Prevalence of various types of cataract (in Person) in study population according to clinical examination

Type of Cataract	Prevalence n(%)
Nuclear	630 (17.6)
Posterior subcapsular (PSC)	414 (11.6)
Cortical	466 (13.0)

Table 35: Distribution of various ocular diseases according to gender in study population

	Cataract (n=1,131)	Dry Eye (n=817)	Pterygium (n=403)
Male	495 (43.8)	357 (43.7)	201 (49.9)
Female	636 (56.2)	460 (56.3)	202 (50.1)

Table 36: Distribution of various ocular diseases according to age in study population

Age in Years (n)	Cataract n (%)	Dry Eye n (%)	Pterygium n (%)
40-49	74 (6.5)	242 (29.6)	127 (31.5)
50-59	164 (14.5)	205 (25.1)	98 (24.3)
60 -69	400 (35.4)	209 (25.6)	98 (24.3)
70 and above	493 (43.6)	161 (19.7)	80 (19.9)

Table 37: Distribution and Prevalence of various types of cataract (age and gender-wise) in study population according to clinical examination Gurgaon:

Cataract	Cortical n(%)	Nuclear n(%)	Posterior Subcapsular Cataract n(%)
Age			
40-49	23 (1.6)	32 (2.3)	33 (2.3)
50-59	75 (8.5)	103 (11.7)	51 (5.8)
60-69	175 (23.6)	248 (33.5)	157 (21.2)
70 +	193(36.1)	247 (46.2)	173 (32.5)
Prevalence (%)	466(13.0)	630(17.6)	414(11.6)
Gender			
Male	206 (12.8)	284 (17.7)	189 (11.8)
Female	260 (13.2)	346 (17.6)	225 (11.4)
Prevalence (%)	466(13.0)	630(17.6)	414(11.6)

Table 38: Distribution of study population according to duration of Sun Exposure (Melbourne visual impairment project model)4 in present, past and remote past

Quantiles of Total Exposure	Study participants	Mean*	95% CI
Present Exposure	3595	41.01	(39.49,42.53)
Past Exposure	2446	94.59	(92.25,96.94)
Remote past Exposure	608	25.32	(23.67,26.98)
Total Exposure	3595	116.96	(115.33,118.58)

Table 39: Distribution of study population according to usage of protective head gear in present, past and remote past

Participants with head gear protection	Present n=3,942	Past n=2,661*	Remote Past n=656**
Present	2660 (67.5)	2087 (78.4)	290 (44.2)
Absent	1282 (32.5)	574 (21.6)	366 (55.8)

Information not available for above parameter in remaining participants

Table 40: Distribution of study population into quantiles according to duration of Sun Exposure

Quantiles of Total Exposure	Number of participants (n=3595)	Mean (Min-Max)
1st quantile	719 (20.0%)	50.50 (7.3, 73.8)
2nd quantile	729 (20.2%)	88.4 (73.8, 101.2)
3rd quantile	714 (19.9%)	114.2 (101.2, 127.5)
4th quantile	715 (19.9%)	143.1 (127.5, 160.4)
5th quantile	718 (20.0%)	189.3 (160.4, 314.1)

Table 41: Association of Cataract with various risk factors (Unadjusted odds ratio)

Cataract	Total	Present	Unadjusted OR (95% CI)	P value
Age	**(n=3551)**	**(n=1080)**		
40-49 years	1422	64 (4.5)	1	
50-59 years	875	150 (17.1)	4.4 (3.23, 5.96)	<0.001
60-69 years	726	381 (52.5)	23.4 (17.53, 31.32)	<0.001
70 + years	528	485 (91.9)	239.3(160.41, 357.08)	<0.001
Gender	**(n=3551)**	**(n=1,080)**		
Male	1595	470 (29.5)	1	
Female	1956	610 (31.2)	1.1 (0.94, 1.25)	0.268
Education	**(n=3551)**	**(n=1080)**		
Illiterate	1733	714 (41.2)	1	
Can read & write	531	137 (25.8)	0.5 (0.40, 0.62)	<0.001
Intermediate	1186	211 (17.8)	0.3 (0.26, 0.37)	<0.001
Graduation	101	18 (17.8)	0.3 (0.18, 0.52)	<0.001
Occupation	**(n=3551)**	**(n=1080)**		
House work	1699	424 (25.0)	1	
Unemployed	791	479 (72.3)	7.8 (6.39, 9.59)	<0.001
Unskilled	398	134(16.9)	0.6 (0.49, 0.76)	<0.001
Skilled	663	43 (10.8)	0.4 (0.26, 0.51)	<0.001
Land area	**(n=3551)**	**(n=1080)**		
No Land	2046	641 (31.3)	1	
1 to 5 acres	1216	340 (28.0)	0.8 (0.7, 1.0)	0.043
>5 acres	289	99 (34.3)	1.1 (0.8, 1.5)	0.317
Cumulative sun exposure (Outdoor)	**(n=3551)**	**(n=1080)**		
Less than Mean	1841	280 (15.2)	1	
More than Mean	1710	800 (46.8)	4.9 (4.18,5.74)	<0.001
Quantiles of total Exposure	**(n=3551)**	**(n=1080)**		
1st quantile	714	77 (10.8)	1	
2nd quantile	720	115 (16.0)	1.6 (1.15,2.14)	0.004
3rd quantile	706	168 (23.8)	2.6 (1.93,3.46)	<0.001
4th quantile	708	267 (37.7)	5.0 (3.78,6.63)	<0.001
5th quantile	703	453 (64.4)	15.0 (11.30,19.88)	<0.001
Exposure during peak UV hours	**(n=3551)**	**(n=1080)**		
Less than Mean	1827	316 (29.3)	1	
More than Mean	1724	764 (70.7)	3.8 (3.26, 4.44)	<0.001
Smoking (pack years)	**(n=3551)**	**(n=1080)**		
No Smoker	1587	385 (24.3)	1	
>0 to ≤1 pack years	262	74 (28.2)	1.2 (0.9, 1.6)	0.167
1 to <5 pack years	562	141 (25.1)	1.0 (0.8, 1.3)	0.694
≥5 pack years	1,110	480 (42.1)	2.2 (1.92, 2.68)	<0.001
Bad fuel used for cooking (years)	**(n=3551)**	**(n=1080)**		
Nil Bad Fuel Exposure	1,267	363 (28.6)	1	
1 to 25 year	156	6 (3.8)	0.1 (0.04, 0.2)	<0.001
26 to 50 year	1,540	267 (17.3)	0.5 (0.4, 0.6)	<0.001
>50 years	588	444 (75.5)	7.6 (6.13, 9.6)	<0.001

Table 42: Association of Cataract with various risk factors (adjusted ratio)

Cataract	Total	Present	Adjusted OR (95% CI)	P value
Age	**(n=3570)**	**(n=817)**	-	
40-49 years	1423	242 (17.0)	-	-
50-59 years	876	205 (23.4)	-	-
60-69 years	740	209 (28.2)	-	-
70 + years	531	161 (30.3)	-	-
Education	**(n=3551)**	**(n=1080)**		
Illiterate	1733	714 (41.2)	1	
Can read & write	531	137 (25.8)	0.7 (0.6, 1.0)	0.088
Intermediate	1186	211 (17.8)	0.4 (0.3, 0.6)	<0.001
Graduation	101	18 (17.8)	0.5 (0.3, 1.1)	0.106
Occupation	**(n=3551)**	**(n=1080)**		
House work	1699	424 (25.0)	1	
Unemployed	791	479 (72.3)	5.1 (3.7, 7.1)	<0.001
Unskilled	398	134(16.9)	0.8 (0.5, 1.1)	0.154
Skilled	663	43 (10.8)	0.7 (0.5, 1.1)	0.118
Cumulative sun exposure (Outdoor)	**(n=3551)**	**(n=1080)**		
Less than Mean	1841	280 (15.2)	1	
More than Mean	1710	800 (46.8)	1.1 (0.7, 1.7)	0.518
Quantiles of total exposure	**(n=3551)**	**(n=1080)**		
1st quantile	714	77 (10.8)	1	
2nd quantile	720	115 (16.0)	1.2(0.9, 1.8)	0.241
3rd quantile	706	168 (23.8)	1.5 (1.1, 2.3)	0.039
4th quantile	708	267 (37.7)	1.7 (1.2, 3.4)	0.041
5th quantile	703	453 (64.4)	2.9 (2.4, 7.1)	<0.001
Exposure during peak UV hours	**(n=3551)**	**(n=1080)**		
Less than Mean	1827	316 (29.3)	1	
More than Mean	1724	764 (70.7)	1.1 (0.8, 1.4)	0.378
Smoking (pack years)	**(n=3551)**	**(n=1080)**		
No Smoker	1587	385 (24.3)	1	
>0 to ≤1 pack years	262	74 (28.2)	1.2 (0.8, 1.7)	0.213
1.01 to <5 pack years	562	141 (25.1)	1.0 (0.8, 1.3)	0.998
≥5 pack years	1,140	480 (42.1)	1.6 (1.3, 2.1)	<0.001
Bad fuel used for cooking (years)	**(n=3551)**	**(n=1080)**		
Nil Bad Fuel Exposure	1,267	363 (28.6)		
1 to 25 years	156	6 (3.8)	0.3 (0.1, 0.7)	0.006
26 to 50 years	1,540	267 (17.3)	0.7 (0.5, 1.0)	0.055
>50 years	588	444 (75.5)	3.8 (2.6, 5.4)	<0.001

Table 43: Association of Dry eye with various risk factors (Unadjusted odds ratio)

Dry eye	Total	Present	Unadjusted OR (95% CI)	P value
Age	**(n=3570)**	**(n=817)**		
40-49 years	1423	242 (17.0)	1	
50-59 years	876	205 (23.4)	1.5 (1.2,1.8)	<0.001
60-69 years	740	209 (28.2)	1.9 (1.6,2.4)	<0.001
70 + years	531	161 (30.3)	2.1 (1.7,2.7)	<0.001
Gender	**(n=3570)**	**(n=817)**		
Male	1608	357 (22.2)	1	
Female	1962	460 (23.5)	1.1 (0.9,1.3)	0.379
Education	**(n=3570)**	**(n=817)**		
Illiterate	1752	444 (25.3)	1	
Can read & write	527	121 (23.0)	0.9 (0.7,1.1)	0.267
Intermediate	1189	236 (19.9)	0.7 (0.6,0.9)	0.001
Graduation	102	16 (15.7)	0.5 (0.3,1.0)	0.030
Occupation	**(n=3570)**	**(n=817)**		
House work	1699	376 (22.1)	1	
Unemployed	672	202 (30.1)	1.5 (1.2,1.8)	<0.001
Unskilled	801	163 (20.4)	0.9 (0.7,1.1)	0.312
Skilled	398	76 (19.1)	0.8 (0.6,1.1)	0.185
Land Area	**(n=3570)**	**(n=817)**		
No Land	2062	501 (24.3)	1	
1 to 5 acres	1218	248 (20.4)	0.8 (0.7,1.1)	0.010
>5 acres	290	68 (23.4)	0.9 (0.7,1.3)	0.752
Cumulative sun exposure (Outdoor)	**(n=3570)**	**(n=817)**		
Less than Mean	1852	373 (20.1)	1	
More than Mean	1718	444 (25.8)	1.4 (1.2,1.6)	<0.001
Quantile of total exposure	**(n=3570)**	**(n=817)**		
1st quantile	715	146 (20.4)	1	
2nd quantile	726	146 (20.1)	1.0 (0.8,1.3)	0.884
3rd quantile	709	154 (21.7)	1.1 (0.8,1.4)	0.547
4th quantile	710	165 (23.2)	1.2 (0.9,1.5)	0.198
5th quantile	710	206 (29.01)	1.6 (1.3,2.0)	<0.001
Exposure during peak UV hours	**(n=3570)**	**(n=817)**		
Less than Mean	1829	363 (19.9)	1	
More than Mean	1741	454 (26.1)	1.4 (1.2,1.7)	<0.001
Smoking (Pack Years)	**(n=3570)**	**(n=817)**		
No Smoker	1588	334 (21.0)	1	
>0 to ≤1 pack years	263	57 (21.7)	1.0 (0.8,1.4)	0.814
1.01 to <5 pack years	574	131 (22.8)	1.1 (0.9,1.4)	0.371
≥ 5 pack years	1145	295 (25.8)	1.3 (1.0,1.5)	0.004
Bad fuel used for cooking (years)	**(n=3570)**	**(n=817)**		
Nil bad fuel exposure	1277	264 (20.7)	1	
1 to 25 years	156	30 (19.2)	0.9 (0.5,1.4)	0.674
26 to 50 years	1541	338 (21.9)	1.1 (0.9,1.3)	0.417
>50 years	596	185 (31.0)	1.7 (1.4,2.2)	<0.001

Table 44: Association of Dry eye with various risk factors (adjusted odds ratio)

Dry eye	Total	Present	Adjusted OR (95% CI)	P value
Age	**(n=3570)**	**(n=817)**		
40-49 years	1423	242 (17.0)	-	-
50-59 years	876	205 (23.4)	-	-
60-69 years	740	209 (28.2)	-	-
70 + years	531	161 (30.3)	-	-
Gender	**(n=3570)**	**(n=817)**		
Male	1608	357 (22.2)	1	
Female	1962	460 (23.5)	1.9 (0.6, 1.3)	0.505
Education	**(n=3570)**	**(n=817)**		
Illiterate	1752	444 (25.3)	1	
Can read & write	527	121 (23.0)	1.0 (0.8, 1.2)	0.899
Intermediate	1189	236 (19.9)	0.8 (0.6, 1.0)	0.083
Graduation	102	16 (15.7)	0.6 (0.3, 1.1)	0.109
Occupation	**(n=3570)**	**(n=817)**		
House work	1699	376 (22.1)	1	
Unemployed	672	202 (30.1)	1.4 (1.1, 1.8)	0.009
Unskilled	801	163 (20.4)	0.9 (0.7, 1.4)	0.958
Skilled	398	76 (19.1)	1.0 (0.7, 1.5)	0.841
Cumulative sun exposure (Outdoor)	**(n=3570)**	**(n=817)**		
Less than Mean	1852	373 (20.1)	1	
More than Mean	1718	444 (25.8)	1.2 (0.9, 1.8)	0.236
Quantile of total exposure	**(n=3570)**	**(n=817)**		
1st quantile	715	146 (20.4)	1	
2nd quantile	726	146 (20.1)	0.8 (0.7, 1.2)	0.250
3rd quantile	709	154 (21.7)	0.8 (0.6, 1.1)	0.086
4th quantile	710	165 (23.2)	0.6 (0.4, 0.9)	0.034
5th quantile	710	206 (29.01)	0.7 (0.4, 1.1)	0.119
Exposure during peak UV hours	**(n=3570)**	**(n=817)**		
Less than Mean	1829	363 (19.9)	1	
More than Mean	1741	454 (26.1)	1.3 (1.02, 1.7)	0.033
Smoking (Pack Years)	**(n=3570)**	**(n=817)**		
No Smoker	1588	334 (21.0)	1	
>0 to ≤1 pack years	263	57 (21.7)	1.0 (0.7, 1.4)	0.877
1 to <5 pack years	574	131 (22.8)	1.1 (0.9, 1.5)	0.245
≥ 5 pack years	1145	295 (25.8)	1.2 (1.0, 1.6)	0.030
Fuel used for cooking	**(n=3570)**	**(n=817)**		
Nil Bad Fuel Exposure	1277	264 (20.7)	1	
1 to 25 years	156	30 (19.2)	1.3 (0.8, 2.3)	0.215
26 to 50 years	1541	338 (21.9)	1.4 (1.0, 1.9)	0.020
>50 years	596	185 (31.0)	1.7 (1.2, 2.3)	<0.001

Table 45: Association of Pterygium with various risk factors (Unadjusted odds ratio)

Pterygium	Total	Present	Unadjusted OR (95% CI)	P value
Age	**(n=3595)**	**(n=403)**		
40-49 years	1427	127 (8.9)	1	
50-59 years	881	98 (11.1)	1.3 (1.0, 1.7)	0.081
60-69 years	746	98 (13.1)	1.5 (1.2, 2.1)	0.002
70 + years	541	80 (14.8)	1.8 (1.3, 2.4)	<0.001
Gender	**(n=3595)**	**(n=403)**		
Male	1614	201 (12.5)	1	
Female	1981	202 (10.2)	0.8 (0.6, 1.0)	0.033
Education	**(n=3595)**	**(n=403)**		
Illiterate	1769	219 (12.4)	1	
Can read & write	532	67 (12.6)	1.0 (0.8, 1.4)	0.896
Intermediate	1192	107 (9.0)	0.7 (0.5, 0.9)	0.004
Graduation	102	10 (9.8)	0.8 (0.4, 1.5)	0.441
Occupation	**(n=3595)**	**(n=403)**		
House work	1712	167 (9.8)	1	
Unemployed	683	92 (13.5)	1.4 (1.1, 1.9)	0.008
Unskilled	801	103 (12.9)	1.4 (1.1, 1.8)	0.020
Skilled and professional	399	41 (10.3)	1.1 (0.7, 1.5)	0.753
Land area	**(n=3595)**	**(n=403)**		
No Land	2076	224 (10.8)	1	
1 to 5 acres	1228	140 (11.4)	1.1 (0.8,1.3)	0.588
>5 acres	291	39 (13.4)	1.3 (0.9,1.8)	0.185
Cumulative sun exposure (Outdoor)	**(n=3595)**	**(n=403)**		
Less than Mean	1861	162 (8.7)	1	
More than Mean	1734	241 (13.9)	1.7 (1.4, 2.1)	<0.001
Quantile of Total Exposure	**(n=3595)**	**(n=403)**		
1st quantile	719	51 (7.1)	1	
2nd quantile	729	66 (9.1)	1.3 (0.9, 1.9)	0.172
3rd quantile	714	75 (10.5)	1.5 (1.1, 2.2)	0.023
4th quantile	715	85 (11.9)	1.8 (1.2, 2.5)	0.002
5th quantile	718	126 (17.6)	2.8 (2.0, 3.9)	<0.001
Exposure during peak UV hours	**(n=3595)**	**(n=403)**		
Less than Mean	1843	164 (8.9)	1	
More than Mean	1752	239 (13.6)	1.6 (1.3,1.9)	<0.001
Smoking (Pack Years)	**(n=3595)**	**(n=403)**		
No Smoker	1601	158 (9.9)	1	
>0 to ≤1 pack years	266	23 (8.7)	0.8 (0.5, 1.4)	0.533
1 to <5 pack years	574	64 (11.1)	1.1 (0.8, 1.5)	0.385
≥ 5 pack years	1154	158 (13.7)	1.4 (1.1, 1.8)	0.002
Bad fuel used for cooking (years)	**(n=3587)**	**(n=402)**		
Nil bad fuel exposure	1281	158 (12.3)	1	
1 to 25 years	156	11 (7.1)	0.5 (0.3, 1.0)	0.057
26 to 50 years	1551	145 (9.3)	0.7 (0.6, 0.9)	0.011
>50 years	607	89 (14.7)	1.2 (0.9, 1.6)	0.162

Table 46: Association of pterygium with various risk factors (adjusted odds ratio)

Pterygium	Total	Present	Adjusted OR (95% CI)	P value
Age	**(n=3595)**	**(n=403)**		
40-49 years	1427	127 (8.9)	-	-
50-59 years	881	98 (11.1)	-	-
60-69 years	746	98 (13.1)	-	-
>70 years	541	80 (14.8)	-	-
Gender	**(n=3595)**	**(n=403)**		
Male	1614	201 (12.5)	1	
Female	1981	202 (10.2)	0.7 (0.4, 1.2)	0.209
Education	**(n=3595)**	**(n=403)**		
Illiterate	1769	219 (12.4)	1	
Can read & write	532	67 (12.6)	1.0 (0.7, 1.4)	0.889
Intermediate	1192	107 (9.0)	0.7 (0.5, 0.9)	0.009
Graduation	102	10 (9.8)	0.9 (0.4, 1.7)	0.606
Occupation	**(n=3595)**	**(n=403)**		
House work	1712	167 (9.8)	1	
Unemployed	683	92 (13.5)	1.0 (0.7, 1.4)	0.891
Unskilled	801	103 (12.9)	1.3 (0.9, 1.9)	0.169
Skilled and professional	399	41 (10.3)	1.3 (0.8, 2.0)	0.359
Cumulative sun exposure (Outdoor)	**(n=3595)**	**(n=403)**		
Less than Mean	1861	162 (8.7)	1	
More than Mean	1734	241 (13.9)	0.9 (0.6, 1.5)	0.764
Quantile of total exposure	**(n=3595)**	**(n=403)**		
1st quantile	719	51 (7.1)	1	
2nd quantile	729	66 (9.1)	1.3 (0.9, 1.9)	0.213
3rd quantile	714	75 (10.5)	1.6 (1.1, 2.5)	0.051
4th quantile	715	85 (11.9)	1.9 (1.0, 3.7)	0.068
5th quantile	718	126 (17.6)	3.0 (1.4, 5.5)	0.003
Exposure during peak UV hours	**(n=3595)**	**(n=403)**		
Less than Mean	1843	164 (8.9)	1	
More than Mean	1752	239 (13.6)	0.9 (0.7, 1.3)	0.713
Smoking (Pack Years)	**(n=3595)**	**(n=403)**		
No Smoker	1601	158 (9.9)	1	
>0 to ≤1 pack years	266	23 (8.7)	0.8 (0.5, 1.3)	0.364
1 to <5 pack years	574	64 (11.1)	0.9 (0.7, 1.4)	0.865
≥ 5 pack years	1154	158 (13.7)	1.0 (0.8, 1.4)	0.745
Bad fuel used for cooking (years)	**(n=3587)**	**(n=402)**		
Nil bad fuel exposure	1281	158 (12.3)	1	
1 to 25 years	156	11 (7.1)	1.1 (0.5, 2.3)	0.817
26 to 50 years	1551	145 (9.3)	1.0 (0.7, 1.5)	0.954
>50 years	607	89 (14.7)	1.2 (0.04, 1.8)	0.453

Table 47: Association of ocular diseases with bad fuel usage among female participants

Cataract	Total	Present	Adjusted OR (95% CI)	P value
Fuel used for cooking	**(n=1946)**	**(n=608)**		
1 to 25 years	140	6 (4.3)	1	
26 to 50 years	1320	226 (17.1)	4.6 (2.0, 10.6)	<0.001
>50 years	486	376 (77.4)	76.3 (32.7, 177.7)	<0.001
Dry eye	**Total**	**Present**		
Fuel used for cooking	**(n=1952)**	**(n=457)**		
1 to 25 years	140	29 (20.7)	1	
26 to 50 years	1317	279 (21.2)	1.0 (0.7, 1.6)	0.897
>50 years	495	149 (30.1)	1.6 (1.0, 2.6)	0.030
Pterygium	**Total**	**Present**		
Fuel used for cooking	**(n=1970)**	**(n=202)**		
1 to 25 years	140	11 (7.9)	1	
26 to 50 years	1326	122 (9.2)	1.1 (0.6, 2.3)	0.599
>50 years	504	69 (13.7)	1.8 (0.9, 3.6)	0.068

Table 48: Prevalence of ARMD in study participants by gender and age[18]

	Total n(%)	Present n(%)	P value
Age (Years)			
40-50	1427	13 (0.9)	
50-60	881	38 (4.3)	
60-70	746	96 (12.9)	<0.001
70-80	541	134 (24.8)	
Gender			
Male	1614	125 (7.8)	
Female	1981	156 (7.9)	0.885
Total	3595	281 (7.8)	

Table 49: Prevalence of Diabetic retinopathy19 by age and gender in study participants

	Total n(%)	Present n(%)	P value
Age (years)			
40-50	1427	33 (2.3)	
50-60	881	41 (4.7)	
60-70	746	31 (4.2)	0.010
70-80	541	24 (4.4)	
Gender			
Male	1614	66 (4.1)	
Female	1981	63 (3.2)	0.145
Total	3595	129 (3.6)	

Table 50: Distribution of Conjunctival Ultra-Violet Auto-Fluorescence (UVAF)[26] mm^2

	R nasal (n=1148)	R temporal (n=1147)	L nasal (n=1149)	L temporal (n=1149)	R (total) (n=1147)	L (total) (n=1149)	Nasal (total) (n=1146)	Temporal (total) (n=1145)	Individual total (n=1145)
Median	4.8	4.2	9.3	4.8	4.4	9.9	10.1	9.4	19.7
Mean	6.2	5.9	12.1	6.2	6.5	12.7	13.4	12.4	24.8
Range	0.0-46.4	0.0-50.7	0.0-75.3	0.0-55.1	0.0-55.1	0.0-78.3	0.0-84.6	0.0-83.3	0.0-142.4
IQR*	1.0-9.3	0.0-8.7	4.3-17.2	0.0-9.4	0.0-9.5	3.6-18.7	4.1-17.7	3.2-17.5	9.4-34.3
Skewness	1.6	1.9	1.7	1.9	1.9	1.6	1.5	1.8	1.6
Kurtosis	6.8	8.8	7.6	9.4	8.1	6.2	6.6	7.3	6.6

Table 50.1: Age and Gender distribution Conjunctival Ultra-Violet Auto-Fluorescence (UVAF) in the study population

Category	First quartile		Second quartile		Third quartile		Fourth quartile		P (for trend)
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
Gender									
Male	123	23.7	126	24.3	125	24.1	144	27.8	P <0.204
Gender	161	25.7	161	25.7	165	26.3	140	22.3	
Age group (years)									
40-49	106	22.3	123	25.9	125	26.3	121	25.5	P <0.537
50-59	87	28.7	70	23.1	79	26.1	67	22.1	
60-69	57	23.1	62	25.1	63	25.5	65	26.3	
70+	34	28.3	32	26.7	23	19.2	31	25.8	

Table 51: Environmental and ocular data in NCR:

Environmental Data	NCR
UVA	1.54 to 19.4 w/m^2
UVB	0.03 to 0.53 w/m^2
SPM	397±95.4 µg/m^3
RSPM	144.9±26.5 µg/ m^3
Ocular diseases in population aged 40 years and above	**Prevalence (NCR) (3595/ 18015)***
Cataract	31.5%
Dry eye	22.7%
Pterygium	11.2%
VKC in children aged 5 to 15 years	**Prevalence (NCR) N= 3695****
VKC	0.35%

Total number of people examined above age of 40 years out of total number of people enumerated in all the clusters of that region.

*** Total number of people examined below age of 16 years out of total number of people enumerated in all the clusters of that region.*

Annexure – 2: Lists of tables of study done at RIO Guwahati

Table 1: Details of Village clusters included

S. No.	Village	Total Population	40+ population	Risk Assessment (%)	Clinical Examination (%)
1	AKADI	753	171	130 (76.0)	116 (67.8)
2	MAGARBERA	421	168	144 (85.7)	125 (74.4)
3	PACHIM NAOKOTA	413	127	109 (85.8)	102 (80.3)
4	PIALIKHATA	450	131	111 (84.7)	101 (77.1)
5	JATIA BHANGRA	471	135	111 (82.2)	95 (70.4)
6	KARIKUCHI	408	142	120 (84.5)	101 (71.1)
7	RAJPAT	432	132	119 (90.2)	114 (86.4)
8	DARI	541	139	124 (89.2)	115 (82.7)
9	BARI SARVARIKATI	485	110	95 (86.4)	91 (82.7)
10	KULHATI	566	162	129 (79.6)	123 (75.9)
11	MAJORKURI	478	141	123 (87.2)	112 (79.4)
12	DAKACHANH	606	122	104 (85.2)	98 (80.3)
13	NIZ KAORBAHA	486	127	110 (86.6)	100 (78.7)
14	BANGALTOLA	490	118	105 (89)	98 (83.1)
15	DAKHSHIN RANGAPANI	622	119	108 (90.8)	97 (81.5)
16	SATHISALA PAM	558	118	103 (87.3)	95 (80.5)
17	BARBAKARA F.V	411	115	101 (87.8)	74 (64.3)
18	CHIRA KHUNDI	427	116	102 (87.9)	99 (85.3)
19	DEOCHUNGA	443	122	94 (77)	71 (58.2)
20	GOG	446	130	115 (88.5)	107 (82.3)
21	RAIPARA	382	114	99 (86.8)	75 (65.8)
22	JARI GAON	517	130	113 (86.9)	95 (73.1)
23	DHAMI GAON	382	117	104 (88.9)	100 (85.5)
24	SARABORI	501	136	117 (86)	113 (83.1)
25	BAR KURIHA	451	115	106 (92.2)	100 (87)
26	RANCHA	431	123	106 (86.2)	102 (82.9)
27	BADLA PATHAR	376	129	115 (89.1)	101 (78.3)
28	PARLI PART	397	146	128 (87.7)	122 (83.6)
29	JATI BHANGRA	413	115	100 (87)	83 (72.2)
30	BARUA GAON	508	115	103 (89.6)	94 (81.7)
31	AMRANGA	401	132	117 (88.6)	113 (85.6)
32	BARUA PATHAR	406	123	107 (87)	99 (80.5)
	Total	**15,072**	**4,140**	**3572 (86.3)**	**3231 (78)**

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Age and Gender Distribution of Study Population

Age Distribution

Age group	Count (%)
0-4 years	1330 (8.8)
5-15 years	3244 (21.5)
16-39 years	6358 (42.2)
40-49 years	1947 (12.9)
50-59 years	1051 (7)
60-69 years	710 (4.7)
>70 years	432 (2.9)

Gender Distribution

Female: 7426 49%
Male: 7646 51%

■ Male ■ Female

Table 2: Demographic profile of population enumerated and eligible for the the study (all ages and population aged more than 40 years) in the 32 village clusters of Guwahati

	Total Enumerated (all ages) n=15,072	Eligible Population (40+ years) n=4140
Age	**15072**	**4140**
0-4 years	1,330 (8.8)	-
5-15 years	3,244 (21.5)	-
16-39 years	6,358 (42.2)	-
40-49 years	1,947 (12.9)	1,947 (100.0)
50-59 years	1,051 (7.0)	1,051 100.0)
60-69 years	710 (4.7)	710 (100.0)
≥70 years	432 (2.9)	432 (100.0)
Gender	**15072**	**4140**
Male	7646 (50.7)	2176 (28.5)
Female	7426 (49.3)	1964 (26.4)
Education	**13524**	**4117**
Illiterate	2246 (16.6)	1596 (71.1)
Can read & write	3836 (25.5)	986 (25.7)
Intermediate	6822 (45.3)	1377 (20.2)
Graduation	620 (4.1)	158 (25.5)
Others*	1508 (10.0)	3 (0.2)
99	40 (0.3)	20 (50.0)
Marital Status	**11526**	**4136**
Married	7000 (60.7)	3296 (47.1)
Unmarried	3721 (32.3)	82 (2.2)
Others (Divorced, separated, widow/widower, Not applicable)	4351 (28.9)	762 (17.5)
Occupation (15072)		**4130**
House work	4262 (28.3)	1722 (40.4)
Unskilled	2847 (18.9)	1283 (45.1)
Skilled and professionals	1779 (11.8)	671 (37.7)
Unemployed	750 (5.0)	454 (60.5)
Others**	5434 (36.1)	10 (0.2)
Religion(15053)	**15053**	**4137**
Hindu	9168 (60.9)	2731 (29.8)
Muslim	5794 (38.5)	1385 (23.9)
Sikh	18 (0.1)	5 (27.8)
Christian	73 (0.5)	16 (21.9)
Cultivable land (15041)	**15041**	**4130**
No land	4138 (27.5)	1005 (24.3)
1-5 acres	10875 (72.3)	3116 (28.7)
>5 acres	28 (0.2)	9 (32.1)
Family Income (15020)	**15020**	**4127**
<5000	3321 (22.1)	830 (25.0)
5000 to 9999	6608 (44.0)	1749 (26.5)
10000 to 14999	1615 (10.8)	470 (29.1)
15000 to 19999	1373 (9.1)	427 (31.1)
20000 to 24999	764 (50.1)	224 (29.3)
25000 to 29999	450 (3.0)	146 (32.4)
30000 and above	889 (5.9)	281 (31.6)

*Others for educational information as they are children less than 7 years.

** Others-Students and children less than 7 years therefore not applicable for occupational status.

Table 3: Demographic Characteristics of the enumerated and examined sample population (population aged more than 40 years)

	Examined Population
Age	**3572 (86.3%)**
40-49 years	1619 (83.2)
50-59 years	901 (85.7)
60-69 years	649 (91.4)
≥70 years	403 (93.3)
Gender	**3572 (86.3)**
Male	1728 (79.4)
Female	1844 (93.9)
Education	**3572 (86.3)**
Illiterate	1430 (89.6)
Can read & write	874 (88.6)
Intermediate	1142 (82.9)
Graduation	111 (70.3)
Others	0 (0.0)
99	15 (75.0)
Marital Status	**3572 (86.3)**
Married	2813 (85.3)
Unmarried	65 (79.3)
Others	694 (91.1)
Occupation	**3572 (86.3)**
House work	1622 (94.2)
Unskilled	1053 (82.1)
Skilled	467 (69.6)
Unemployed	423 (93.2)
Others	7 (70.0)
Religion	**3572 (86.3)**
Hindu	2355 (86.2)
Muslim	1200 (86.6)
Sikh	4 (80.0)
Christian	10 (62.5)
Cultivable land	**3562 (86.3)**
No Land	870 (86.6)
1 to 5 acres	2684 (86.1)
>5 acres	8 (88.9)
Family Income	**3560 (86.3)**
< 4999	729 (87.8)
5000 to 9999	1520 (86.9)
10000 to 14999	418 (88.9)
15000 to 19999	364 (85.2)
20000 to 24999	178 (79.5)
25000 to 29999	125 (85.6)
30000 and above	226 (80.4)

Age and Gender Distribution of 40+ population
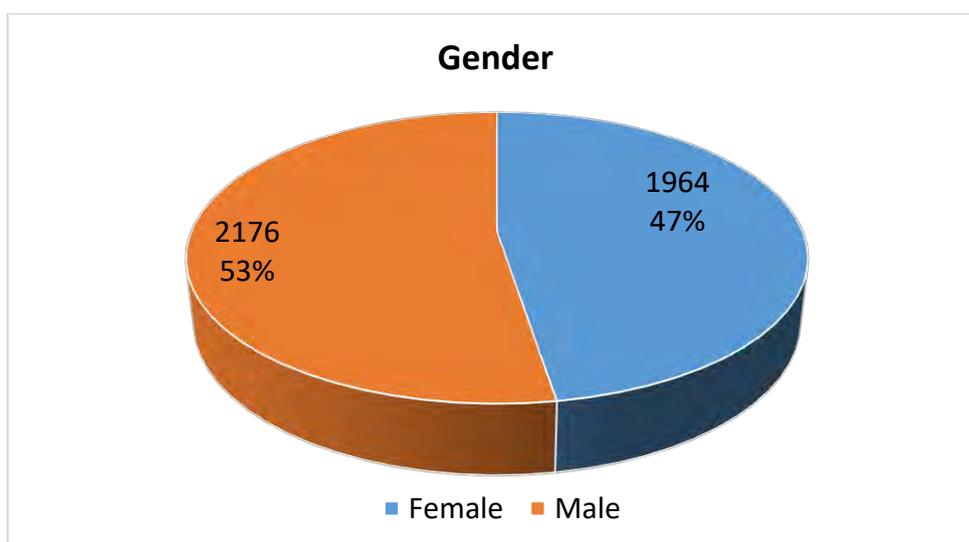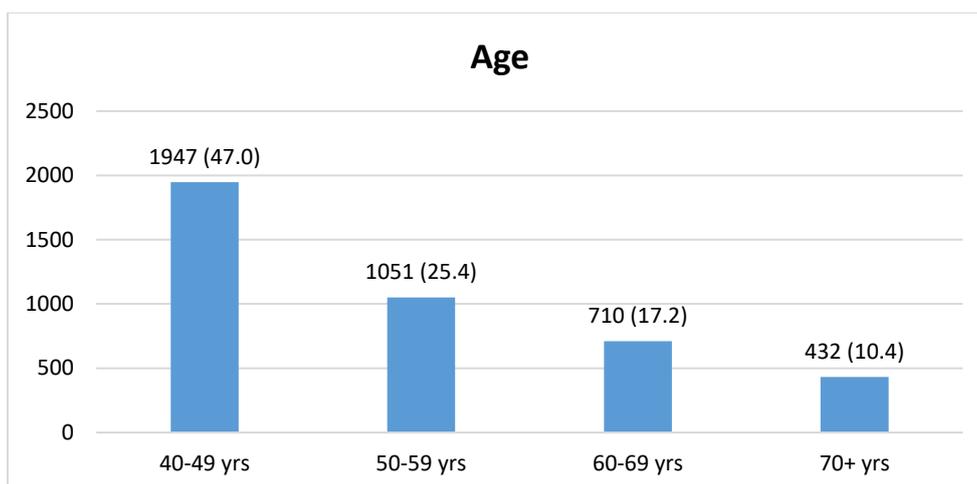
Age

Bar chart showing age distribution: 40-49 yrs: 1947 (47.0); 50-59 yrs: 1051 (25.4); 60-69 yrs: 710 (17.2); 70+ yrs: 432 (10.4)

Gender

Pie chart: Female 1964 (47%); Male 2176 (53%)

Table 4: Distribution of study participants according to type of activities done in present, past and remote past

Type of work	Present n=3572	Past n=3314*	Remote Past n=1460**
Agricultural work	1,519(42.6%)	2,244(67.7%)	990 (67.7%)
Outdoor Non Agricultural Work	3,418(95.7%)	3,268 (98.3%)	1,442 (98.7%)
Indoor work	3,479 (97.5%)	3,212 (97.0%)	1,436 (98.3%)

Table 5: Mean total duration of sun exposure in present, past and remote past reported by the study participants

Number of People (n)	Mean duration of sun exposure (Thousand Hours)	95% CI
Present (n=3567)	27.11	26.4-27.8
Past (n=3310)	30.69	29.8-31.6
Remote Past (n=1454)	8.61	8.1-9.1
Total (n=3567)	59.16	58.5-59.9

Table 6: Prevalence of smokers in present or past in study participants

History of Smoking	n (%)
Smokers	841 (23.6)
Non smokers	2723 (76.4)
Total	3564*

Information not available for above parameter in remaining participants

Table 7: Type of tobacco products used at present in the study participants

Type of smoked tobacco product	n (%)
Cigarette	205 (29.6)
Bidi	443 (64)
Hukka	6 (0.9)
Others (Specify)	38 (5.5)

Table 8: Distribution of study participants according to pack years of smoking

Pack Years of Smoking	n (%)
Non Smoker	2731 (76.4)
>0 to ≤1 pack	189 (5.3)
>0 to <5 pack	375 (10.5)
≥5 pack	239 (6.7)
Total	3,534

Table 9: Distribution of study participants according to duration of years of cooking food/ spending time in the kitchen

Number of years	n (%)
0.5-9	20 (0.6)
10-19	32 (1.0)
20-30	527 (16.1)
> 30	2687 (82.3)
Total	3266 (100)

Table 10: Distribution of study participants according to type of cooking fuel

Type of cooking fuel	Present n=3572	Past n=346	Remote Past n=4
Bad Fuel	3229 (90.4)	342 (9.6)	3 (0.1)
Good Fuel	338 (9.5)	4 (0.1)	1 (0.03)

Table 11: Distribution of study participants for total OSDI score according to gender

OSDI	Score<35(Normal) n (%)	Score>35 (Dry Eye) n (%)
Age		
40-49 years	1457 (90.5)	153 (9.5)
50-59 years	764 (85.4)	131 (14.6)
60-69 years	511 (79.0)	136 (21.0)
70+ years	250 (62.5)	150 (37.5)
Gender		
Male	1538 (89.5)	180 (10.5)
Female	1444 (78.7)	390 (21.3)
Total	2982 (83.9)	570 (16.1)

Table 12: Prevalence of dry eye using OSDI score in study participants

OSDI	n (%)
Score<35 (Normal)	2,982(83.9)
Score>35 (Dry Eye)	570(16.1)
Total	3,552(100.0)

Table 13: Demographic Characteristics of the enumerated sample population (population aged more than 40 years) undergoing clinical examination

	Study Population (40+ years)	Examined Population
Age	**4140**	**3231 (78.0%)**
40-49 years	1,947 (47.0)	1454 (45.0)
50-59 years	1,051 (25.4)	802 (24.8)
60-69 years	710 (17.2)	603 (18.7)
≥70 years	432 (10.4)	372 (11.5)
Gender	**4140**	**3231**
Male	2176 (52.6)	1491 (46.1)
Female	1964 (47.4)	1740 (53.8)
Education	**4140**	**3231**
Illiterate	1596 (28.6)	1306 (81.8)
Can read & write	986 (23.8)	779 (79.0)
Intermediate	1377 (33.3)	1036 (75.2)
Graduation	158 (3.8)	101 (63.9)
Others	3 (0.1)	0 (0.0)
99	20 (0.5)	9 (45.0)
Marital Status	**4140**	**3231**
Married	3296 (79.7)	2516 (76.3)
Unmarried	82 (2.0)	54 (65.9)
Others	762 (18.4)	661 (86.7)
Occupation	**4140**	**3231**
House work	1722 (41.7)	1528 (88.7)
Unskilled	1283 (31.0)	915 (31.1)
Skilled	671 (16.2)	396 (16.2)
Unemployed	454 (11.0)	386 (11.0)
Others	10 (0.2)	6 (60.0)
Religion	**4140**	**3231**

Hindu	2731 (66.0)	2115 (77.4)
Muslim	1385 (33.5)	1101 (79.5)
Sikh	5 (0.1)	4 (80.0)
Christian	16 (0.4)	8 (50.0)
Cultivable land	**4140**	**3231**
No Land	1005 (24.3)	782 (77.8)
1 to 5 acres	3116 (75.5)	2432 (78.0)
>5 acres	9 (0.2)	7 (77.8)
Family Income	**4140**	**3231**
< 4999	830 (20.1)	657 (79.2)
5000 to 9999	1749 (42.4)	1383 (79.1)
10000 to 14999	470 (11.4)	372 (79.1)
15000 to 19999	427 (10.4)	332 (77.8)
20000 to 24999	224 (5.4)	164 (73.2)
25000 to 29999	146 (3.5)	114 (78.1)
30000 and above	281 (6.8)	197 (70.1)

Table 14: Prevalence of study participants by place of examination

Place of Examination	n (%)
Base hospital	5 (0.2)
Central field site	3189 (98.7)
Home Examination	35 (1.08)
Total	3229 (100)

Table 15: Prevalance of study participants by history of Systemic diseases and treatment

Systemic Diseases	Present n (%)	Absent n (%)	On treatment n (%)
Diabetes (n=3231)	125 (3.9)	3103 (96.1)	82 (2.5)
Hypertension (n=3231)	511 (15.9)	2717 (84.1)	315 (9.8)
Heart disease (n=3231)	20 (0.6)	3204 (99.2)	14 (0.4)

Table 16: Prevalence of random capillary blood glucose levels in study population

Blood glucose levels	n (%)
<140 mg/ dl	2650 (84)
≥ 140 mg/dl	506 (16)
Total	3156*

Information not available for above parameter in remaining participants

Table 17: Distribution of Blood Pressure in study population

Blood Pressure	n (%)
≥140/90 mmHg	975 (30.3)
< 140/90 mmHg	2239 (69.7)
Total	3214*

Table 18: Distribution of study sample according to Body Mass Index (BMI)

BMI*	n (%)
Under Weight (<18.5 kg / m^2)	786 (24.7)
Normal (18.5-24.9 kg/m^2)	1896 (59.7)
Over Weight (25 - 29.9 kg/m^2)	398 (12.5)
Obese ($\geq$ 30 kg/m^2)	97 (3.1)
Total	3177*

Table 19: Prevalence of visual impairment based on PVA in better eye among study participants

Visual impairment	n (%)
Blind (<3/60)	232 (7.2)
Severe Visual Impairment (<6/60-3/60)	51 (1.6)
Moderate Visual Impairment (6/18-6/60)	427 (13.3)
Mild Visual Impairment ($\leq$6/12-6/18)	231 (7.2)
Normal (6/6-6/9)	2277 (70.8)
Total	3218* (100)

Table 20: Prevalence of blindness according to WHO and NPCB criteria by age and gender in the study population (based on presenting visual acuity (PVA) in better eye)[19]

	WHO Binocular (n=232)*	NPCB (binocular) (n=282)
Age		
40-49	18(1.2)	24(1.7)
50-59	39(4.9)	46(5.7)
60-69	68(11.3)	81(13.5)
>70	106(29.5)	131(36.4)
Gender		
Male	97(6.5)	114(7.7)
Female	134(7.8)	168(9.7)

Table 21: Categorisation of study population according to history of wearing glasses

History of use of glasses	n (%)
Wearing glasses	57(1.6)
Not wearing glasses	3,172 (98.4)
Total	3,229 (100.0)

Table 22: Distribution of myopia according to age in study population for distance vision

Age n=2896*	No Myopia n (%)	Myopia n (%)
40-49 (1423)	1332 (93.6)	91 (6.4)
50-59 (742)	634 (85.6)	107 (14.4)
60-69 (507)	336 (66.3)	171 (33.7)
>70 (224)	125 (55.8)	99 (44.2)
Total	2428 (83.8)	468 (16.2)

Information not available for above parameter in remaining participants

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Table 23: Distribution of hypermetropia according to age and gender in study population for distance vision

Age n=2896*	No Hypermetropia n (%)	Hypermetropia n (%)
40-49 (1423)	1325 (93.1)	98 (6.9)
50-59 (742)	664 (89.6)	77 (10.4)
60-69 (507)	466 (91.9)	41 (8.1)
>70 (224)	216 (96.4)	8 (3.6)
Gender		
Male (1361)	1286 94.5)	75 (5.5)
Female (1534)	1385 (90.3)	149 (9.7)
Total	**2672 (92.3)**	**224 (7.7)**

Information not available for above parameter in remaining participants

Table 24: Distribution of severity of myopia (spherical equivalent) in study population

Severity of myopia (Dioptre Sphere)	Total number of people n(%)
Mild (-0.5 to -3)	443 (94.7)
Moderate (-3.5to -5)	17 (3.6)
Severe (-5.5 to -8)	7 (1.5)
Very Severe (-≥8)	1 (0.2)
Total	468 (100.0)

Table 25: Distribution of severity of hypermetropia (spherical equivalent) in study population

Severity of Hypermetropia (Dioptre Sphere)	n (%)
Mild (+0.5 to+3)	218 (97.2)
Moderate (+3.5 to +5)	1 (0.5)
Severe(≥+5)	5 (2.3)
Total	224 (100.0)

Table 26: Association of severity of myopia with age, education, gender and occupation

Categories	Mild (%) (-0.5 to -<3) diopters n=443	Moderate (%) (>-3 to <-5) diopters n=17	Severe (%) (> -5 to<-8) Diopters n=7	Very Severe (%) (-≥8) diopters n=2
Age in years				
40-49 (n=70)	87 (95.6)	1 (1.1)	2 (2.2)	1 (1.1)
50-59 (n=62)	102 (95.3)	4 (3.7)	1 (0.9)	0 (0.0)
60-69 (n=107)	161 (94.2)	8 (4.7)	2 (1.2)	0 (0.0)
≥70(n=112)	93 (93.9)	4 (4.0)	2 (2.0)	1 (0.0)
			Pearson chi^2 = 7.1670	Pr = 0.620
Education				
Illiterate (n=201)	227 (95.8)	7 (3.0)	2 (0.8)	1 (0.4)
Can read & write (n=59)	107 (93.0)	5 (4.4)	3(2.6)	0 (0.0)
Intermediate (n=87)	98 (93.3)	5 (4.8)	2 (1.9)	0 (0.0)
Graduation (n=4)	9 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)
Not known	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)
			Pearson chi^2= 4.2292	Pr = 0.979

Gender				
Male (n=163)	217 (93.5)	8 (3.5)	6 (2.6)	1 (0.4)
Female (n=188)	226 (95.8)	9 (3.8)	1 (0.4)	0 (0.0)
Pearson chi^2= 4.7793 Pr = 0.189				
Occupation				
House work (n=149)	206 (96.3)	7 (3.3)	1 (0.5)	0 (0.0)
Unskilled (n=69)	105 (94.6)	1 (0.9)	4 (3.6)	1 (0.9)
Skilled (n=21)	43 (95.6)	2 (4.4)	0 (0.0)	0 (0.0)
Unemployed (n=112)	88 (90.7)	7 (7.2)	2 (2.1)	0 (0.0)
Pearson chi^2= 15.0517 Pr = 0.239				

Table 27: Association of severity of hypermetropia for distance vision according to age, education, gender and occupation according to subjective acceptance

Categories(n=224)	Mild (%) (+0.5 to <+3) diopters n=218	Moderate (%) (>+3to+ <5) diopters n=1	Severe (%) (>+5) diopters n=1
Age in years			
40-49 (n=98)	97 (99.0)	1 (1.0)	0 (0)
50-59 (n=77)	76 (98.7)	0 (0)	0 (0)
60-69 (n=41)	38 (92.7)	0 (0)	3 (7.3)
≤70(n=8)	7 (87.5)	0 (0)	1 (12.5)
Education			
Illiterate (n=78)	76 (97.4)	0 (0.0)	2 (2.6)
Can read & write (n=51)	49 (96.0)	0 (0.0)	2 (4.0)
Intermediate (n=87)	85 (97.6)	1 (1.2)	1 (1.2)
Graduation (n=8)	8 (100.0)	0 (0.0)	0 (0.0)
Not known	0 (0.0)	0 (0.0)	0 (0.0)
Gender			
Male (n=75)	72 (96.0)	0 (0.0)	2 (2.6)
Female (n=149)	146 (98.0)	1 (0.7)	2 (1.3)
Occupation			
House work (n=133)	130 (97.7)	1 (0.8)	2 (1.5)
Unskilled (n=45)	44 (97.8)	0 (0.0)	1 (2.2)
Skilled (n=31)	30 (96.8)	0 (0.0)	1 (3.2)
Unemployed (n=14)	13 (92.9)	0 (0.0)	1 (7.1)
Others (n=1)	1 (100.0)	0 (0.0)	0 (0.0)

Table 28: Distribution of study population according to use of myopic glasses

History of wearing spectacles	n (%)
Using Glasses	13 (2.8)
Not using Glasses	455 (97.2)
Total	468 (100.0)

Table 29: Distribution of study participants according to Schirmers and TBUT:

	Schirmers n (%)	Breakup Time n (%)
Abnormal	282 (8.8)	976 (30.5)
Normal	2921 (91.2)	2227 (69.5)
Total	3203*(100.0)	3203*(100.0)

Table 30: Detailed distribution of study participants according to abnormalities in anterior adenexa on basic Eye Examination

Anterior adenexa abnormalities	n (%)
Squint	26 (0.8)
Nystagmus	4 (0.1)
Anterior staphyloma	1 (0.03)
Phthisis/Disorganized globe	6 (0.2)
Corneal opacity	22 (0.7)
Adherent Leucoma	1 (0.03)
Corneal Ulcer	2 (0.1)
Others	118 (3.7)

Table 31: Prevalence of various ocular surface disorders in study participants (n=3229)

Disorder of ocular surface	n (%)
Pterygium	293 (9.1)
Pingecula	753 (23.3)

Table 32: Prevalence of cataract in study participants

Disease	n (%)
Cortical Cataract	243 (8.5)
PSC	54 (2.0)
Nuclear Cataract	619 (20.6)

Table 33: Prevalence of various ocular diseases according to gender in study population

	Cataract (n=828)	Dry Eye (n=185)	Pterygium (n=293)
Male	370 (24.9)	86 (5.8)	164 (11.0)
Female	458 (26.7)	99 (5.7)	129 (7.4)

Table 34: Prevalence of various ocular diseases according to age in study population

Age in Years (n)	Cataract n(%)	Dry Eye n(%)	Pterygium n(%)
40-49 (1454)	70 (4.8)	68 (4.7)	115 (7.9)
50-59 (802)	161 (20.1	40 (5.0)	77 (9.6)
60 -69 (603)	306 (50.7)	42 (7.0)	64 (10.6)
70 and above(372)	291 (79.5)	35 (9.7)	37 (10.0)

Table 35: Distribution and prevalence of Cataract in study population according to age and gender

Demographic characteristics	Cataract (n, % in age group)		Cataract Prevalence % (95% C.I.)	P Value
	Absent n=2380	Present n=828		
Age (years)				
40-49 (1453)	1383 (57.6)	70 (8.4)	4.82 (3.715, 5.920)	
50-59 (800)	639 (26.7)	161 (19.4)	20.12 (17.341, 22.909)	
60-69 (603)	297 (12.4)	306 (37.0)	50.75 (46.745, 54.748)	<0.001
≥70 (366)	75 (3.1)	291 (35.1)	79.51 (75.353, 83.663)	
Total (3222)	2394(100.0)	828 (100.0)		
Gender				
Male (1488)	1118 (46.7)	370 (44.7)	24.87 (22.667, 27.064)	
Female (1734)	1276 (53.3)	458 (55.3)	26.41(24.3,3.60) 28.490)	0.316
Total (3222)	2394 (100.0)	828 (100.0)		

Table 36: Prevalence of various types of cataract (age and gender-wise) in study population according to clinical classification

	Cortical n(%)	Nuclear n(%)	Posterior Subcapsular Cataract n(%)
Age			
40-49	27 (1.9)	43 (3.0)	10 (0.7)
50-59	47 (5.9)	119 (14.9)	13 (1.6)
60-69	116 (19.3)	249 (41.3)	25 (4.1)
70 +	100 (24.5)	212 (58.1)	15 (4.1)
Prevalence (%)	290 (9.1)	623 (19.4)	63 (2.0)
Gender			
Male	125 (8.4)	276 (18.6)	28 (1.9)
Female	165 (9.5)	347 (20.0)	35 (2.0)
Prevalence (%)	290 (9.1)	623 (19.4)	63 2.0)

Table 37: Distribution of study population into quantiles according to duration of Sun Exposure in Guwahati:

Quantiles of Total Exposure	Number of participants (n=3567)	Mean (Min-Max)
1st quantile	716 (20.1%)	46.3 (7.3, 55.5)
2nd quantile	711(19.9%)	61.2 (55.5, 66.8)
3rd quantile	714(20.0%)	72.9 (66.8, 80.2)
4th quantile	713(20.0%)	88.4 (80.2, 98.0)
5th quantile	713(20.0%)	120.5 (98.1, 223.8)

Table 38: Association of Cataract with various risk factors (Unadjusted odds ratio):

Cataract	Total	Present	Unadjusted OR (95% CI)	P value
Age	**(n=3222)**	**(n=828)**		
40-49 years	1453	70 (4.8)	1	
50-59 years	800	161 (20.1)	5.0 (3.70, 6.69)	<0.001
60-69 years	603	306 (50.7)	20.3 (15.26, 27.16)	<0.001
70 + years	366	291 (79.5)	76.7 (54.05, 108.72)	<0.001
Gender	**(n=3222)**	**(n=828)**		
Male	1488	370 (24.9)	1	
Female	1734	458 (26.7)	1.1 (0.93, 1.27)	0.316
Education	**(n=3222)**	**(n=828)**		
Illiterate	1299	465 (35.8)	1	
Can read & write	778	183 (23.5)	0.6 (0.45, 0.67)	<0.001
Intermediate	1035	169 (16.3)	0.4 (0.28, 0.43)	<0.001
Graduation	101	10 (9.9)	0.2 (0.10, 0.38)	<0.001
Not known	9	1 (11.1)	0.2 (0.03, 1.80)	0.159
Occupation	**(n=3222)**	**(n=828)**		
House work	1525	358 (23.5)	1	
Unskilled	914	152 (16.6)	0.7 (0.53, 0.80)	0.001
Skilled	396	41 (10.3)	0.4 (0.27, 0.53)	<0.001
Unemployed	381	276 (72.4)	8.6 (6.65, 11.05)	<0.001
Others	6	1 (16.7)	0.7 (0.08, 5.60)	0.697
Land area	**(n=3212)**	**(n=825)**		
No Land	780	206 (26.4)	1	
1 to 5 acres	2425	615 (25.4)	0.94 (0.78, 1.13)	0.559
>5 acres	7	4 (57.1)	3.7 (0.82, 16.74)	0.087
Cumulative sun exposure (Outdoor)	**(n=3220)**	**(n=827)**		
Less than Mean	1838	230 (12.5)	1	
More than Mean	1382	597 (43.2)	5.3 (4.47, 6.33)	<0.001
Quantiles of total exposure	**(n=3220)**	**(N=827)**		
1st quantile	639	51 (8.0)	1	
2nd quantile	647	66 (10.2)	1.3 (0.89, 1.92)	0.167
3rd quantile	640	136 (21.3)	3.1 (2.20, 4.38)	<0.001
4th quantile	645	224 (34.7)	6.1 (4.41, 8.52)	<0.001
5th quantile	649	350 (53.9)	13.4 (9.75, 18.68)	<0.001
Peak Hour Exposure	**(n=3126**	**(n=825)**		
Less than Mean	1810	280 (15.5)	1	
More than Mean	1406	545 (38.8)	3.4 (2.93, 4.09)	<0.001
Smoking (pack years)	**(n=3222)**	**(n=828)**		
No Smoker	2499	601 (24.1)	1	
>0 to ≤1 pack years	168	32 (19.1)	0.7 (0.50, 1.10)	0.141
1 to <5 pack years	325	95 (29.2)	1.3 (1.0, 1.68)	0.042
≥5 pack years	201	89 (44.3)	2.5 (1.87, 3.36)	<0.001
Others	29	11 (37.9)	1.9 (0.91, 4.11)	0.088
Fuel used for cooking	**(n=3222)**	**(n=828)**		
No bad fuel exposure	277	73 (26.3)	1	
1 to 25 years	79	3 (3.8)	0.1 (0.03, 0.36)	<0.001
26 to 50 years	2205	320 (14.5)	0.4 (0.35, 0.63)	<0.001
>50 years	661	432 (65.4)	5.2 (3.86, 7.19)	<0.001

Table 39: Association of Cataract with various risk factors (adjusted odds ratio):

Cataract	Total	Present	Ad OR (95% CI)	P value
Age	**(n=3222)**	**(n=828)**		
40-49 years	1453	70 (4.8)		
50-59 years	800	161 (20.1)		
60-69 years	603	306 (50.8)		
70 + years	366	291 (79.5)		
Gender	**(n=3222)**	**(n=828)**		
Male	1488	370 (24.9)	1	
Female	1734	458 (26.4)	0.7 (0.49, 1.06)	0.100
Education	**(n=3222)**	**(n=828)**		
Illiterate	1299	465 (35.8)	1	
Can read & write	778	183 (23.5)	0.7 (0.57, 0.93)	0.011
Intermediate	1035	169 (16.3)	0.6 (0.47, 0.78)	<0.001
Graduation	101	10 (9.9)	0.5 (0.22, 1.04)	0.063
Not known	9	1 (11.1)	0.3 (0.02, 2.69)	0.257
Occupation	**(n=3222)**	**(n=828)**		
House work	1525	358 (23.5)	1	
Unskilled	914	152 (16.6)	0.4 (0.27, 0.59)	<0.001
Skilled	396	41 (10.4)	0.5 (0.29, 0.75)	0.002
Unemployed	381	276 (72.4)	2.4 (1.71, 3.36)	<0.001
Others	6	1 (16.7)	0.4 (0.04, 3.87)	0.419
Cumulative sun exposure (Outdoor)	**(n=3220)**	**(n=827)**		
Less than Mean	1838	230 (12.5)	1	
More than Mean	1382	597 (43.2)	1.1 (0.60, 1.87)	0.834
Quantiles of total exposure	**(n=3220)**	**N=827**		
1st quantile	639	51 (8.0)	1	
2nd quantile	647	66 (10.2)	1.0 (0.70, 1.54)	0.858
3rd quantile	640	136 (21.3)	1.9 (1.32, 2.81)	0.001
4th quantile	645	224 (34.7)	2.3 (1.20, 4.58)	0.013
5th quantile	649	350 (53.9)	2.7 (1.38, 5.44)	0.004
Peak Hour Exposure	**(n=3216)**	**(n=825)**		
Less than Mean	1810	280 (15.5)	1	
More than Mean	1406	545 (38.8)	1.3 (1.03, 1.64)	<0.001
Smoking (pack years)	**(n=3222)**	**(n=828)**		
No Smoker	2499	601 (24.1)	1	
>0 to ≤1 pack years	168	32 (19.1)	1.1 (1.69, 1.85)	0.628
1 to <5 pack years	325	95 (29.2)	1.3 (0.90, 1.84)	0.168
≥5 pack years	201	89 (44.3)	1.5 (1.01, 2.28)	0.042
Others	29	11 (37.9)	2.2 (0.90, 5.48)	0.083
Fuel used for cooking	**(n=3222)**	**(n=828)**		
No bad fuel exposure	277	73 (26.4)	1	
1 to 25 years	79	3 (3.8)	0.2 (0.06, 0.68)	0.010
26 to 50 years	2205	320 (14.5)	0.6 (0.40, 0.82)	0.002
>50 years	661	432 (65.4)	2.2 (1.52, 3.22)	<0.001

Table 40: Association of Dry eye with various risk factors (Unadjusted odds ratio):

Dry eye	Total	Present	Unad OR (95% CI)	P value
Age	**(n=3216)**	**(n=185)**		
40-49 years	1452	68 (4.7)	1	
50-59 years	800	40 (5.0)	1.07 (0.72, 1.60)	0.736
60-69 years	602	42 (7.0)	1.53 (1.03, 2.27)	0.037
70 + years	362	35 (9.7)	2.18 (1.42, 3.33)	<0.001
Gender	**(n=3216)**	**(n=185)**		
Male	1482	86 (5.8)	1	
Female	1734	99 (5.7)	0.98 (0.73, 1.32)	0.910
Education	**(n=3216)**	**(n=185)**		
Illiterate	1298	85 (6.6)	1	
Can read & write	776	45 (5.8)	0.88 (0.61, 1.27)	0.496
Intermediate	1033	51 (4.9)	0.74 (0.52, 1.06)	0.100
Graduation	100	4 (4.0)	0.59 (0.21, 1.66)	0.320
Not known	9	0 (0.0)		
Occupation	**(n=3216)**	**(n=185)**		
House work	1526	90 (5.9)	1	
Unskilled	914	44 (4.8)	0.81 (0.56, 1.17)	0.256
Skilled	393	16 (4.1)	0.68 (0.39, 1.17)	0.160
Unemployed	377	35 (9.3)	1.63 (1.09, 2.46)	0.018
Others	6	0 (0.0)	-	-
Land Area	**(n=3206)**	**(n=183)**		
0-1 acres	781	42 (5.4)	1	
1.5-5 acres	2418	141 (5.8)	1.09 (0.76, 1.55)	0.635
>5 acres	7	0 (0.0)	-	-
Cumulative sun exposure (Outdoor)	**(n=3214)**	**(n=184)**		
Less than Mean	1835	80 (4.4)	1	
More than Mean	1379	104 (7.5)	1.79 (1.33, 2.42)	<0.001
Quantiles of total exposure	**(n=3214)**	**(n=184)**		
1st quantile	636	26 (4.1)	1	
2nd quantile	647	26 (4.0)	0.98 (0.56, 1.71)	0.950
3rd quantile	640	33 (5.2)	1.28 (0.75, 2.16)	0.365
4th quantile	644	38 (5.9)	1.47 (0.88, 2.45)	0.139
5th quantile	647	61 (9.4)	2.44 (1.52, 3.92)	<0.001
Peak Hour Exposure	**(n=3210)**	**(n=184)**		
Less than Mean	1809	82 (4.5)	1	
More than Mean	1401	102 (7.3)	1.65 (1.22, 2.23)	0.001
Smoking	**(n=3216)**	**(n=185)**		
No Smoker	2495	141 (5.7)	1	
>0 to ≤1 pack years	168	8 (4.7)	0.83 (0.40, 1.73)	0.628
1 to <5 pack years	324	17 (5.2)	0.92 (0.55, 1.55)	0.766
≥5 pack years	200	16 (8.0)	1.41 (0.84, 2.48)	0.175
Others	29	3 (10.3)	1.92 (0.57, 6.44)	0.287
Fuel used for cooking	**(n=3216)**	**(n=185)**		
No bad fuel exposure	277	16 (5.8)	1	
1 to 25 years	79	5 (6.3)	1.10 (0.39, 3.11)	0.854
26 to 50 years	2203	109 (5.0)	0.85 (0.49, 1.46)	0.553
>50 years	657	55 (8.4)	1.49 (0.84, 2.65)	0.174

Table 41: Association of Dry eye with various risk factors (adjusted odds ratio):

Dry eye	Total	Present	Adj OR (95% CI)	P value
Age	**(n=3216)**	**(n=185)**	-	-
40-49 years	1452	68 (4.7)	-	-
50-59 years	800	40 (5.0)	-	-
60-69 years	602	42 (7.0)	-	-
70 + years	362	35 (9.7)	-	-
Gender	**(n=3216)**	**(n=185)**		
Male	1482	86 (5.8)	1	
Female	1734	99 (5.7)	0.61 (0.34, 1.09)	0.096
Education	**(n=3216)**	**(n=185)**		
Illiterate	1298	85 (6.6)	1	
Can read & write	776	45 (5.8)	0.94 (0.63, 1.40)	0.756
Intermediate	1033	51 (4.9)	0.88 (0.58, 1.32)	0.528
Graduation	100	4 (4.0)	0.79 (0.26, 2.42	0.678
Not known	9	0 (0.0)	-	-
Occupation	**(n=3216)**	**(n=185)**		
House work	1526	90 (5.9)	1	
Unskilled	914	44 (4.8)	0.48 (0.27, 0.88)	0.018
Skilled	393	16 (4.1)	0.54 (0.26, 1.13)	0.102
Unemployed	377	35 (9.3)	0.93 (0.54, 1.60)	0.781
Others	6	0 (0.0)	-	-
Cumulative sun exposure (Outdoor)	**(n=3214)**	**(n=184)**		
Less than Mean	1835	80 (4.4)	1	
More than Mean	1379	104 (7.5)	0.95 (0.32, 2.80)	0.925
Quantiles of total exposure	**(n=3214)**	**(n=184)**		
1st quantile	636	26 (4.1)	1	
2nd quantile	647	26 (4.0)	0.95 (0.54, 1.67)	0.859
3rd quantile	640	33 (5.2)	1.10 (0.62, 1.96)	0.741
4th quantile	644	38 (5.9)	1.27 (0.38, 4.28)	0.698
5th quantile	647	61 (9.4)	1.96 (0.58, 6.67)	0.282
Peak Hour Exposure	**(n=3210)**	**(n=184)**		
Less than Mean	1809	82 (4.5)	1	
More than Mean	1401	102 (7.3)	1.28 (0.81, 1.77)	0.371
Smoking (pack years)	**(n=3216)**	**(n=185)**		
No Smoker	2495	141 (5.7)	1	
>0 to ≤1 pack years	168	8 (4.7)	0.83 (0.40, 1.73)	0.628
1 to <5 pack years	324	17 (5.2)	0.92 (0.55, 1.55)	0.766
≥5 pack years	200	16 (8.0)	1.45 (0.84, 2.48)	0.175
Others	29	3 (10.3)	1.92 (0.57, 6.44)	0.287
Fuel used for cooking	**(n=3216)**	**(n=185)**		
No bad fuel exposure	277	16 (5.8)	1	
1 to 25 years	79	5 (6.3)	1.64 (0.54, 5.01)	0.381
26 to 50 years	2203	109 (5.0)	1.03 (0.56, 1.90)	0.914
>50 years	657	55 (8.4)	1.02 (0.53, 1.93)	0.964

Table 42: Association of Pterygium with various risk factors (Unadjusted odds ratio):

Pterygium	Total	Present	Unadj OR (95% CI)	P value
Age	**(n=3229)**	**(n=293)**		
40-49 years	1454	115 (7.9)	1	
50-59 years	801	77 (9.6)	1.24 (0.91, 1.68)	0.166
60-69 years	603	64 (10.6)	1.38 (1.00, 1.91)	0.048
70 + years	371	37 (10.0)	1.29 (0.87, 0.90)	0.200
Gender	**(n=3229)**	**(n=293)**		
Male	1491	164 (11.0)	1	
Female	1738	129 (7.4)	0.65 (0.51, 0.83)	<0.001
Education	**(n=3229)**	**(n=293)**		
Illiterate	1305	133 (10.2)	1	
Can read & write	778	62 (8.0)	0.76 (0.56, 1.05)	0.093
Intermediate	1036	91 (8.8)	0.85 (0.64, 1.12)	0.250
Graduation	101	6 (5.9)	0.56 (0.24, 1.29)	0.928
Not known	9	1 (11.1)	1.10 (0.14, 8.88)	0.928
Occupation	**(n=3229)**	**(n=293)**		
House work	1526	116 (7.6)	1	
Unskilled	915	110 (12.0)	1.66 (1.26, 2.19)	<0.001
Skilled and professional	396	30 (7.6)	1.00 (0.66, 1.51)	0.986
Unemployed	386	37 (9.6)	1.29 (0.87, 1.90)	0.200
Others	6	0 (0.0)	-	-
Land area	**(n=3219)**	**(n=292)**		
No land	782	62 (7.9)	1	
1 to 5 acres	2430	230 (9.5)	1.21 (0.91, 1.63)	0.194
>5 acres	7	0 (0.0)	-	-
Cumulative sun exposure (Outdoor)	**(n=3227)**	**(n=293)**		
Less than Mean	1838	151 (8.2)	1	
More than Mean	1389	142 (10.2)	1.27 (1.0, 1.6)	0.050
Quantiles of total exposure	**(n=3227)**	**(n=184)**		
1st quantile	639	43 (6.7)	1	
2nd quantile	647	60 (9.3)	1.42 (0.94, 2.13)	0.094
3rd quantile	640	58 (9.1)	1.38 (0.92, 2.08)	0.123
4th quantile	646	56 (8.7)	1.32 (0.87, 1.99)	0.193
5th quantile	655	76 (11.6)	1.82 (1.23, 2.69)	0.003
Peak Hour Exposure	**(n=3223)**	**(n=292)**		
Less than Mean	1812	146 (8.1)	1	
More than Mean	1411	146 (10.4)	1.3 (1.04,1.68)	0.025
Smoking	**(n=3229)**	**(n=293)**		
No Smoker	2506	212 (8.5)	1	
>0 to ≤1 pack years	168	16 (9.5)	1.13 (0.66, 1.94)	0.633
1 to <5 pack years	325	47 (14.5)	1.82 (1.30, 2.56)	<0.001
≥5 pack years	201	15 (7.5)	0.87 (0.50, 1.50)	0.624
Others	29	3 (10.3)	1.24 (0.37, 4.15)	0.718
Fuel used for cooking	**(n=3229)**	**(n=293)**		
Zero bad fuel exposure	278	24 (8.6)	1	
1 to 25 years	79	3 (3.8)	0.42 (0.12, 1.43)	0.163
26 to 50 years	2206	190 (8.6)	1.00 (0.64, 1.56)	0.991
>50 years	666	76 (11.4)	1.36 (0.84, 2.21)	0.208

Table 43: Association of pterygium with various risk factors adjusted odds ratio:

Pterygium	Total	Present	Adj OR (95% CI)	P value
Age	**(n=3229)**	**(n=293)**		
40-49 years	1454	115 (7.9)	-	-
50-59 years	801	77 (9.6)	-	-
60-69 years	603	64 (10.6)	-	-
70 + years	371	37 (10.0)	-	-
Gender	**(n=3229)**	**(n=293)**		
Male	1491	164 (11.0)	1	
Female	1738	129 (7.4)	0.55 (0.34, 0.91)	0.019
Education	**(n=3229)**	**(n=293)**		
Illiterate	1305	133 (10.2)	1	
Can read & write	778	62 (8.0)	0.66 (0.48, 0.93)	0.017
Intermediate	1036	91 (8.8)	0.77 (0.56, 1.06)	0.111
Graduation	101	6 (5.9)	0.55 (0.22, 1.38)	0.204
Not known	9	1 (11.1)	1.76 (0.20, 15.17)	0.607
Occupation	**(n=3229)**	**(n=293)**		
House work	1526	116 (7.6)	1	
Unskilled	915	110 (12.0)	1.08 (0.66, 1.77)	0.749
Skilled and professional	396	30 (7.6)	0.83 (0.46, 1.50)	0.532
Unemployed	386	37 (9.6)	0.80 (0.49, 1.31)	0.381
Others	6	0 (0.0)	-	-
Cumulative sun exposure (Outdoor)	**(n=3227)**	**(n=293)**		
Less than Mean	1838	151 (8.2)	1	
More than Mean	1389	142 (10.2)	1.36 (0.66, 2.84)	0.407
Quantile of Total Exposure	**(n=3227)**	**(n=184)**		
1st quantile	639	43 (6.7)	1	
2nd quantile	647	60 (9.3)	1.34 (0.88, 2.04)	0.169
3rd quantile	640	58 (9.1)	1.15 (0.73, 1.81)	0.553
4th quantile	646	56 (8.7)	0.80 (0.34, 1.88)	0.603
5th quantile	655	76 (11.6)	1.09 (0.45, 2.61)	0.849
Peak Hour Exposure	**(n=3223)**	**(n=292)**		
Less than Mean	1812	146 (8.1)	1	
More than Mean	1411	146 (10.4)	1.00 (0.74, 1.37)	0.972
Smoking	**(n=3229)**	**(n=293)**		
No Smoker	2506	212 (8.5)	1	
>0 to ≤1 pack years	168	16 (9.5)	0.87 (0.49, 1.52)	0.632
1 to <5 pack years	325	47 (14.5)	1.30 (1.88, 1.91)	0.172
≥5 pack years	201	15 (7.5)	0.57 (0.31, 1.01)	0.056
Others	29	3 (10.3)	1.02 (0.30, 2.70)	0.963
Fuel used for cooking	**(n=3229)**	**(n=293)**		
Zero bad fuel exposure	278	24 (8.6)	1	
1 to 25 years	79	3 (3.8)	0.73 (0.21, 2.57)	0.623
26 to 50 years	2206	190 (8.6)	1.20 (0.75, 1.94)	0.450
>50 years	666	76 (11.4)	1.56 (0.92, 2.66)	0.100

Table 44: Prevalence of ARMD in study participants by gender and age

	Total n(%)	Present n(%)	P value
Age (Years)			
40-50	1444 (99.3)	10 (0.7)	
50-60	784 (97.9)	17 (2.1)	
60-70	572 (94.9)	31 (5.1)	0.039
70-80	351 (94.6)	20 (5.4)	
Total	3,151 (97.6)	78 (2.4)	
Gender			
Male	1,446 (97.0)	45(3.0)	
Female	1,705 (98.1)	33(1.9)	<0.001
Total	3,151 (97.6)	78(2.4)	

Table 45: Prevalence of diabetic retinopathy by age and gender in study participants

	Total n(%)	Present n(%)	P value
Age (Years)			
40-50	1444 (99.3)	10 (0.7)	
50-60	784 (97.9)	17 (2.1)	
60-70	572 (94.9)	31 (5.1)	0.039
70-80	351 (94.6)	20 (5.4)	
Total	3,151 (97.6)	78 (2.4)	
Gender			
Male	1,446 (97.0)	45(3.0)	
Female	1,705 (98.1)	33(1.9)	<0.001
Total	3,151 (97.6)	78(2.4)	

Table 46: Environmental and ocular data in Guwahati :

Environmental Data	Guwahati
UVA	1.8 to 11.9 w/m^2
UVB	0.04 to 0.3 w/m^2
SPM	178 ±42.2 µg/ m^3
RSPM	114.2 ±26.5 µg/ m^3
Ocular diseases in population aged 40 years and above	**Prevalence (Guwahati) (3231/ 15072)***
Cataract	25.7%
Dry eye	5.8%
Pterygium	9.1%
VKC in children aged 5 to 15 years	**Prevalence (Guwahati) N=3244****
VKC	0.18%

* Total number of people examined above age of 40 years out of total number of people enumerated in all the clusters of that region.

** Total number of people examined below age of 16 years out of total number of people enumerated in all the clusters of that region.

Annexure – III : Lists of tables of study done at IIPH, Hyderabad (Prakasam)

Table 1: Details of Village clusters included

S. No.	Village	Total Population	40+ population	Risk Assessment	Clinical Examination (%)
1	KASYA PURAM	224	113	100 (88.5)	96 (85.0)
2	NANDIPADU	281	107	100 (93.5)	92 (86.0)
3	KONANKI	280	100	89 (89.0)	82 (82.0)
4	GOLLAVIDIPI	362	104	96 (92.3)	87 (83.7)
5	MARKAPUR WARD-10	334	106	83 (78.3)	80 (75.5)
6	CHILAKAPADU	304	102	88 (86.3)	80 (78.4)
7	VEERANNA PALEM	232	101	91 (90.1)	81 (80.2)
8	INAMANAMELLUR	315	106	89 (84.0)	86 (81.1)
9	CHIRALA W-12	322	101	89 (88.1)	78 (77.2)
10	KARAVADI	337	110	102 (92.7)	97 (88.2)
11	GOGULA DINNE	349	104	94 (90.4)	90 (86.5)
12	AMMAVARI PALEM	335	106	96 (90.6)	91 (85.8)
13	KOTCHERALA	260	100	92 (92.0)	79 (79.0)
14	KONIDENA	344	100	96 (96.0)	85 (85.0)
15	SALAKALAVEEDU	260	99	91 (91.9)	84 (84.8)
16	KOTHAPETA	307	102	93 (91.2)	89 (87.3)
17	PEDAVARIMADUGU	311	111	98 (88.3)	94 (84.7)
18	B.K. PADU	312	108	91 (84.3)	82 (75.9)
19	KUNDURRU	282	104	100 (96.2)	89 (85.6)
20	NUTHALA PADU	305	107	98 (91.6)	94 (87.9)
21	CHEVURU	294	102	95 (93.1)	91 (89.2)
22	TROVAGUNTA	296	100	98 (98.0)	91 (91.0)
23	BHIMAVARAM	247	102	91 (89.2)	82 (80.4)
24	RAMANAYA PALEM	166	102	91 (89.2)	85 (83.3)
25	ILLAPAVULURU	270	100	94 (94.0)	87 (87.0)
26	ONGOLE	365	101	93 (92.1)	88 (87.1)
27	SIDDAVARAM	348	102	93 (91.2)	90 (88.2
28	KANDUKURU WARD-20	316	106	87 (82.1)	78 (73.6)
29	KANDUKURU W NO-21	321	103	87 (84.5)	82 (79.6)
30	MAGANBOTLAPALEM	341	100	83 (83.0)	78 (78.0)
31	VAGUMADUGU	391	104	78 (75.0)	73 (70.2)
32	CHIRALA WARD NO-15	318	105	87 (82.9)	84 (80.0)
33	MARKAPUR W-4	250	105	89 (84.8)	82 (78.1)
34	SINGARAYAKONDA	334	105	90 (85.7)	82 (78.1)
	Total	**10313**	**3528**	**3132 (88.8)**	**2909(82.5)**

Age and Gender Distribution of Study Population
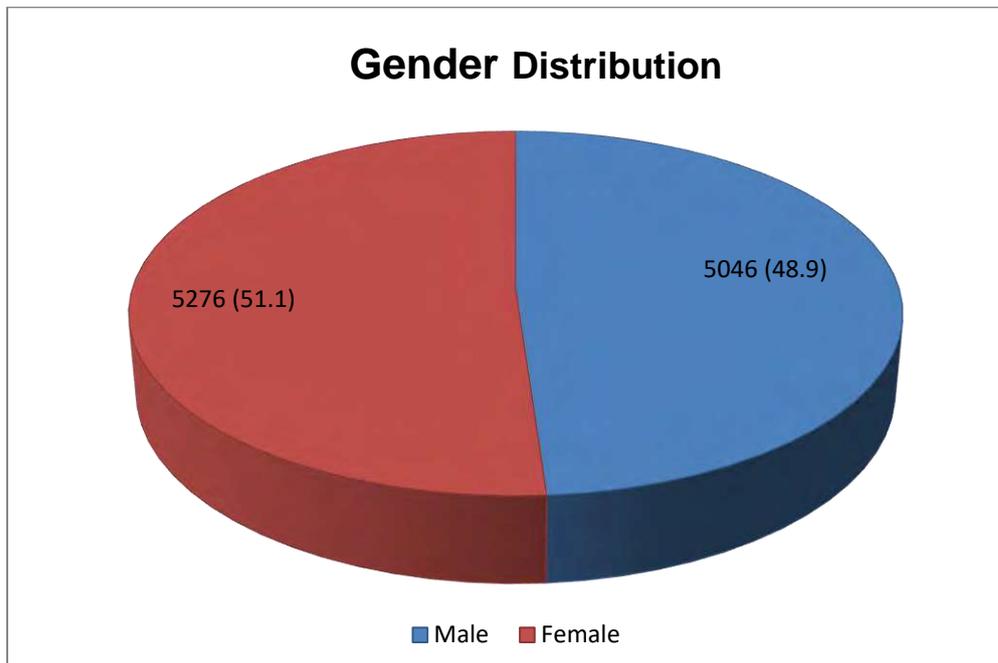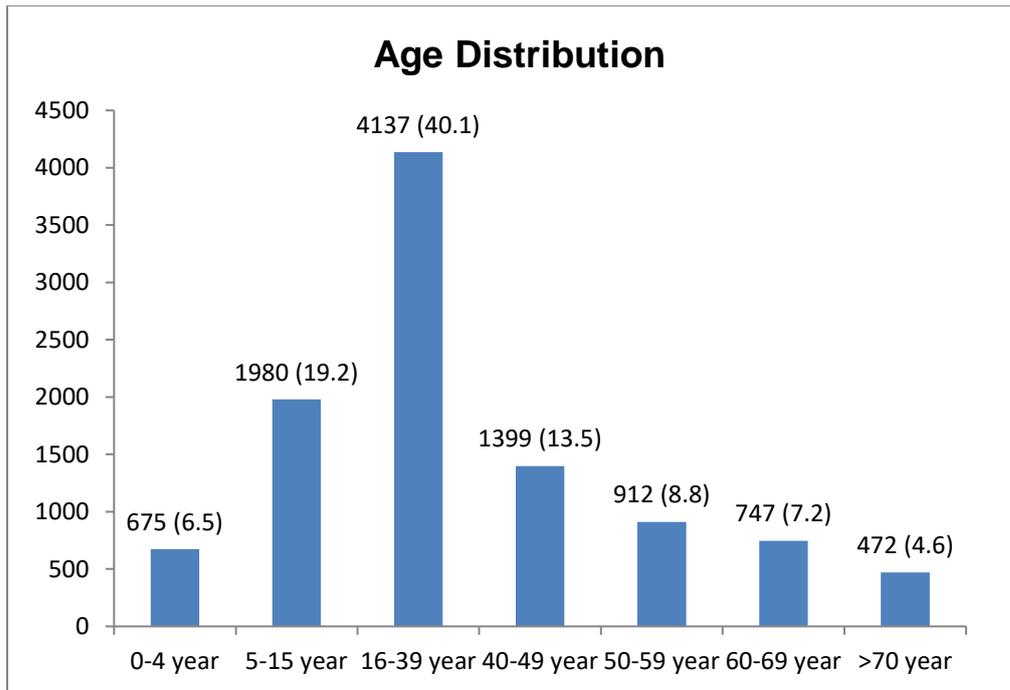
Age Distribution

Bar chart values:
- 0-4 year: 675 (6.5)
- 5-15 year: 1980 (19.2)
- 16-39 year: 4137 (40.1)
- 40-49 year: 1399 (13.5)
- 50-59 year: 912 (8.8)
- 60-69 year: 747 (7.2)
- >70 year: 472 (4.6)

Gender Distribution

Pie chart values:
- Male: 5046 (48.9)
- Female: 5276 (51.1)

Table 2: Demographic profile of population enumerated and eligible for the the study (all ages and population aged more than 40 years) in the 34village clusters of Guwahati

	Total Enumerated (all ages) n=10,313	Eligible Population (40+ years) n=3,528
Age	**10,313**	**3,528 (34.2)**
0-4 years	675 (6.5)	-
5-15 years	1980 (19.2)	-
16-39 years	4130 (40.1)	-
40-49 years	1398 (13.6)	1398 (100.0)
50-59 years	912 (8.8)	912 (100.0)
60-69 years	746 (7.2)	746 (100.0)
≥70 years	472 (4.6)	472 (100.0)
Gender	**10,313**	**3,528 (34.2)**
Male	5041 (48.9)	1705 (33.8)
Female	5272 (51.1)	1823 (34.5)
Education	**10,313**	**3,528 (34.2)**
Illiterate	3631 (35.2)	2274 (62.6)
Can read & write	2355 (22.8)	594 (25.2)
Intermediate	3063 (29.7)	560(18.3)
Graduation	586 (5.7)	98 (16.7)
Others	678 (6.6)	2 (0.3)
Marital Status	**10,313**	**3,528 (34.2)**
Married	5531 (53.6)	2668 (48.2)
Unmarried	909 (8.8)	24 (2.6)
Others	3,802 (37.5)	836 (22.0)
99	1 (0.01)	
Occupation	**10,313**	**3,528 (34.2)**
House work	1307 (12.7)	558 (42.7)
Unskilled	4159 (40.3)	2024 (48.7)
Skilled and professionals	1166 (11.3)	440 (37.7)
Unemployed	655 (6.4)	501 (76.5)
Others	3026 (29.3)	5 (0.2)
Religion	**10,313**	**3,528 (34.2)**
Hindu	5897 (57.2)	2073 (35.1))
Muslim	1246 (12.1)	397 (31.9)
Christian	3170 (30.7)	1058 (33.4)
Cultivable land	**10,313**	**3,528 (34.2)**
No Land	6790 (65.8)	2194 (32.3)
1 to 5 acres	3217 (31.2)	1209 (37.6)
>5 acres	306 (3.0)	125 (40.8)
Family Income	**10,313**	**3,528 (34.2)**
< 4999	2740 (26.6)	1158 (42.3)
5000 to 9999	4782 (46.4)	1464 (30.6)
10000 to 14999	1438 (13.9)	461 (32.1)
15000 to 19999	701 (6.8)	220 (31.4)
20000 to 24999	295 (2.9)	107 (36.3)
25000 to 29999	189 (1.8)	58 (30.7)
30000 and above	168 (1.6)	60 (35.7)

*Others for educational information as they are children less than 7 years.

** Others-Students and children less than 7 years therefore not applicable for occupational status.

99 Not Knowm

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Table 3: Demographic Characteristics of the enumerated and examined sample population (population aged more than 40 years)

	Study Population (40+ years)	Examined Population
Age	**3,528**	**3132 (88.8)**
40-49 years	1398 (39.6)	1229 (87.9)
50-59 years	912 (25.9)	808 (88.6)
60-69 years	746 (21.2)	668 (89.5)
≥70 years	472 (13.4)	427 (90.5)
Gender	**3,528**	**3132 (88.8)**
Male	1705 (48.3)	1440 (84.5)
Female	1823 (51.7)	1692 (92.8)
Education	**3,528**	**3132 (88.8)**
Illiterate	2274 (64.5)	2064 (90.8)
Can read & write	594 (16.8)	523 (88.0)
Intermediate	560(15.9)	466 (83.2)
Graduation	98 (2.8)	78 (79.6)
Others	2 (0.1)	1 (50.0)
Marital Status	**3,528**	**3132 (88.8)**
Married	2668 (75.6)	2355 (88.8)
Unmarried	24 (0.7)	19 (79.2)
Others	836 (23.7)	758 (90.7)
Occupation	**3,528**	**3132 (88.8)**
House work	558 (15.8)	501 (89.8)
Unskilled	2024 (57.4)	1808 (89.3)
Skilled	440(12.5)	357 (81.1)
Unemployed	501(14.2)	463 (92.4)
Others	5 (0.1)	3 (60.0)
Religion	**3,528**	**3132 (88.8)**
Hindu	2073(58.8)	1828 (88.2)
Muslim	397(11.3)	339 (85.4)
Christian	1058(30.0)	965 (91.2)
Cultivable land	**3,528**	**3132 (88.8)**
No Land	2194 (62.2)	1911 (87.1)
1 to 5 acres	1209 (34.3)	1110 (91.8)
>5 acres	125 (3.5)	111 (88.8)
Family Income	**3,528**	**3132 (88.8)**
<5000	1158 (32.8)	1031 (89.0)
5000 to 9999	1464 (41.5)	1307 (89.3)
10000 to 14999	461 (13.1)	412 (89.4)
15000 to 19999	220 (6.2)	195 (88.6)
20000 to 24999	107 (3.0)	88 (82.2)
25000 to 29999	58 (1.6)	49 (84.5)
30000 and above	60(1.7)	50 (83.3)

Age and Gender Distribution of 40+ population
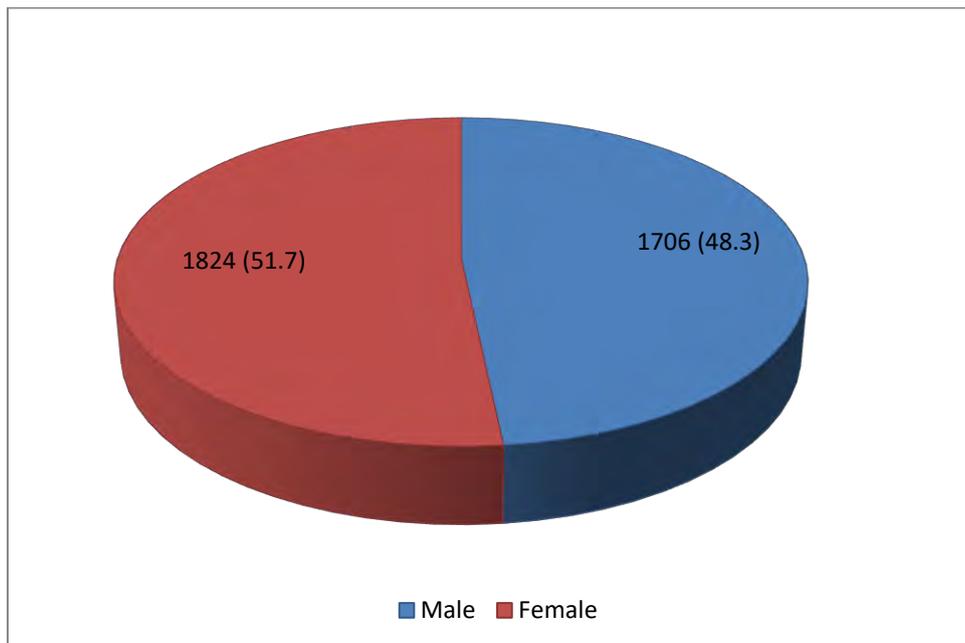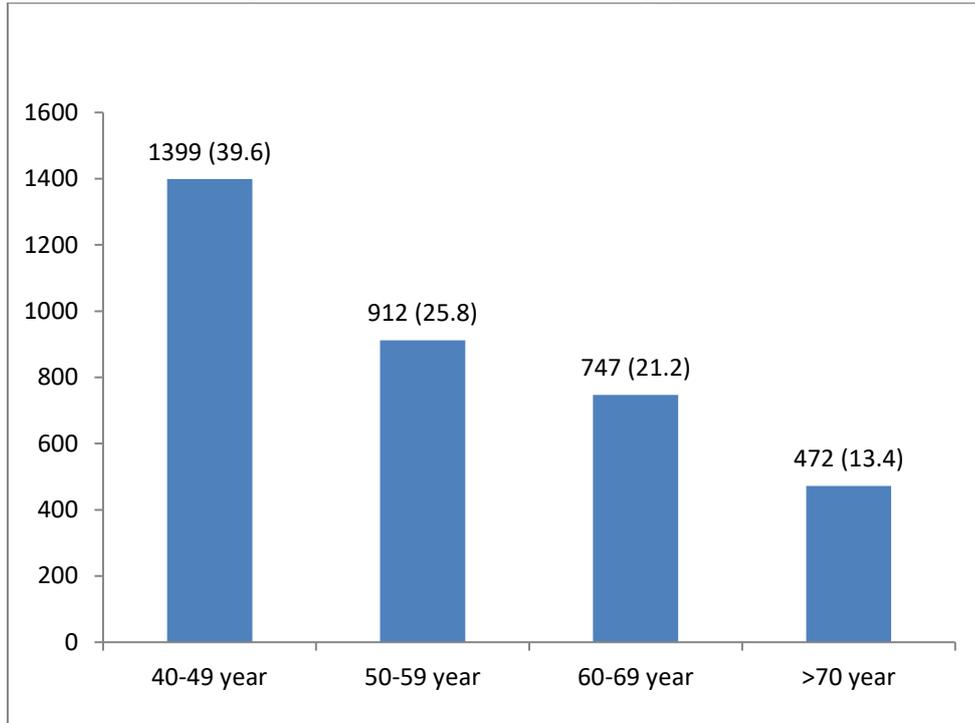
Bar chart showing age distribution:
- 40-49 year: 1399 (39.6)
- 50-59 year: 912 (25.8)
- 60-69 year: 747 (21.2)
- >70 year: 472 (13.4)

Pie chart:
- Male: 1706 (48.3)
- Female: 1824 (51.7)

Table 4: **Distribution of study participants according to type of activities done in present, past and remote past**

Type of work	Present n=3,132	Past n=3,137*	Remote Past n=127**
Agricultural work	1512(48.3%)	799 (70.3%)	87 (68.5%)
Outdoor Non Agricultural Work	1231(39.3%)	728 (64.1%)	63 (49.6%)
Indoor work	1784 (57.0%)	453 (39.9%)	59 (46.5%)

Information not available for above parameter in remaining participants

Table 5: **Mean total duration of sun exposure in present, past and remote past reported by the study participants**

Number of People (n)	Mean duration of sun exposure (Thousand Hours)	95% CI
Present (n=3129)	48.25	46.60-49.89
Past (n=1136)	76.83	74.05-79.61
Remote Past (n=127)	39.79	31.98-47.59
Total (n=3129)	77.75	76.13-79.34

Table 6: **Prevalence of smokers in present or past in study participants**

History of Smoking	n (%)
Smokers	936 (29.9)
Non smokers	2196 (70.1)
Total	3,132*

Table 7: **Type of tobacco products used at present in the study participants**

Type of smoked tobacco product	Present (%) N= 3,132*
Cigarette	278 (29.7)
Bidi	303 (32.4)
Hukka	1 (0.1)
Others (Specify)	335 (35.8)

Information not available for above parameter in remaining participants

Table 8: **Distribution of study participants according to pack years of smoking**

Pack Years of Smoking	n (%)
Non Smoker	2195 (78.3)
>0 to ≤1	64 (2.2)
>1 to <5	211 (7.5)
≥5	334 (11.9)
Total	2,804*

Table 9: Distribution of study participants according to duration of years of cooking food/ spending time in the kitchen

Number of years	n (%)
0.5-9	40 (2.3)
10-19	37 (2.1)
20-30	294 (16.7)
> 30	1389 (78.9)
Total	1760 (100)

Table 10: Distribution of study participants according to type of cooking fuel

Type of cooking fuel	Present n= 2121*	Past n= 1809**	Remote Past n= 143***
Bad Fuel	1346 (43.0)	1780 (56.8)	143 (4.6)
Good Fuel	775 (24.7)	29 (0.9)	-

Information not available for above parameter in remaining participants

Table 11: Distribution of study participants for total OSDI score according to age and gender

	Score<35(Normal)	Score>35 (Dry Eye)
OSDI		
Age		
40-49 years	1135 (92.4)	94 (7.7)
50-59 years	698 (86.5)	109 (13.5)
60-69 years	528 (79.0)	140 (21.0)
70+ years	310 (72.6)	117 (27.4)
Male	1273 (88.4)	167 (11.6)
Female	1398 (82.7)	293 (17.3)

Table 12: Prevalence of dry eye using OSDI score in study participants

OSDI	n (%)
Score<35 (Normal)	2671(85.3)
Score>35 (Dry Eye)	460(14.7)
Total	3,131(100.0)

Table 13: Demographic Characteristics of the enumerated sample population (population aged more than 40 years) undergoing clinical examination

	Study Population (40+ years)	Examined Population
Age	**3528**	**2909 (82.5)**
40-49 years	1398 (39.6)	1117 (79.9)
50-59 years	912 (25.9)	755 (82.8)
60-69 years	746 (21.2)	632 (84.7)
>70 years	472 (13.4)	405 (85.8)
Gender	**3528**	**2909 (82.5)**
Male	1705 (48.3)	1321 (77.5)
Female	1823 (51.7)	1588 (87.1)
Education	**3528**	**2909 (82.5)**
Illiterate	2274 (64.5)	1925 (84.7)
Can read & write	594 (16.8)	487 (82.0)
Intermediate	560 (15.9)	431 (77.0)
Graduation	98 (2.8)	65 (66.3)
Others	2 (0.1)	1 (50.0)
Marital Status	**3528**	**2909 (82.5)**
Married	2668 (75.6)	2184 (81.9)
Unmarried	24 (0.7)	14 (58.3)
Others	836 (23.7)	711 (85.1)
Occupation	**3528**	**2909 (82.5)**
House work	558 (15.8)	471 (84.4)
Unskilled	2024 (57.4)	1676 (82.8)
Skilled	440 (12.5)	320 (72.7)
Unemployed	501 (14.2)	439 (87.6)
Others	5 (0.1)	3 (60.0)
Religion	**3528**	**2909 (82.5)**
Hindu	2073 (58.8)	1697 (81.9)
Muslim	397 (11.3)	311 (78.3)
Christian	1058 (30.0)	901 (85.2)
Cultivable land	**3528**	**2909 (82.5)**
No Land	2194 (62.2)	1761 (80.3)
1 to 5 acres	1209 (34.3)	1046 (86.5)
>5 acres	125 (3.5)	102 (81.6)
Family Income	**3528**	**2909 (82.5)**
1000 to 4999	1158 (32.8)	969 (83.7)
5000 to 9999	1464 (41.5)	1214 (82.9)
10000 to 14999	461 (13.1)	371 (80.5)
15000 to 19999	220 (6.2)	182 (82.7)
20000 to 24999	107 (3.0)	83 (77.6)
25000 to 29999	58 (1.6)	41 (70.7)
30000 and above	60 (1.7)	49 (81.7)

Table 14: Distribution of study participants by place of examination

Place of Examination	n (%)
Central field site	2757 (94.7)
Home Examination	151 (5.2)
Base hospital	1(0.03)
Total	2,909 (100)

Table 15: Prevalence of study participants by history of Systemic diseases and treatment

Systemic Diseases	Present n (%)	Absent n (%)	On treatment n (%)
Diabetes (n=2905)	338 (11.6)	2567 (88.2)	325 (11.2)
Hypertension (n=2904)	439 (15.1)	2465 (84.7)	414 (14.2)
Heart disease (n=2902)	70 (2.4)	2832 (97.4)	60 (2.1)

Table 16: Prevalence of random capillary blood glucose levels in study population

Blood glucose levels	n (%)
<140 mg / dl	2093 (73.6)
≥ 140 mg / dl	749 (26.4)
Total	2842*

Table 17: Prevalence of Blood Pressure in study population

Blood Pressure	n (%)
≥140/90 mmHg	1029 (36.2)
< 140/90 mmHg	1817 (63.8)
Total	2,846*

Table 18: Distribution of study sample according to Body Mass Index (BMI)

BMI*	n (%)
Under Weight (<18.5 kg / m^2)	372 (13.2)
Normal (18.5-24.9 kg/m^2)	1368 (48.7)
Over Weight (25 - 29.9 kg/m^2)	719 (25.6)
Obese (≥ 30 kg/m^2)	349 (12.4)
Total	2,808*

Information not available for above parameter in remaining participants

Table 19: Prevalence of visual impairment based on PVA in better eye among study participants

Visual impairment	n (%)
Blind (<3/60)	29 (1.0)
Severe Visual Impairment (<6/60-3/60)	27 (0.9)
Moderate Visual Impairment (6/18-6/60)	379 (13.4)
Mild Visual Impairment (≤6/12-6/18)	406 (14.3)
Normal (6/6-6/9)	1997 (70.4)
Total	2838* (100)

Information not available for above parameter in remaining participants

Table 20: Prevalence of blindness according to WHO and NPCB criteria by age and gender in the study population

	WHO binocular (n=29)*	NPCB (binocular) (n=60)*
Age		
40-49	1(0.1)	3(0.3)
50-59	3(0.4)	8(1.1)
60-69	13(2.1)	23(3.6)
>70	12(3.0)	26(6.4)
Gender		
Male	15(1.1)	26(2.0)
Female	14(0.9)	34(2.1)

Others for educational information as they are children less than 7 years.

*** Others-Students and children less than 7 years therefore not applicable for occupational status.*

99 Not Knowm

Table 21: Categorisation of study population according to history of wearing glasses

History of use of glasses	n (%)
Wearing glasses	424(14.6)
Not wearing glasses	2485 (85.4)
Total	2,909 (100.0)

Table 22: Distribution of myopia according to age in study population for distance vision

Age n=2,692*	No Myopia n (%)	Myopia n (%)
40-49 (1085)	994 (91.6)	91 (8.4)
50-59 (722)	590 (81.7)	132 (18.3)
60-69 (576)	414 (71.9)	162(28.1)
>70 (309)	222 (71.8)	87(28.2)
Gender		
Male	1022 (82.4)	219 (17.6)
Female	1198 (82.6)	253 (17.4)
Education		
Illiterate	1395 (79.5)	359 (20.5)
Can read & write	405 (86.2)	65 (13.8)
Intermediate	363 (89.2)	44 (10.8)
Graduation	57 (93.4)	4 (6.6)
Occupation		
House work	352 (83.0)	72 (17.0)
Unskilled	1358 (83.9)	260 (16.1)
Skilled	266 (85.5)	45 (14.5)
Unemployed	241 (71.7)	95 (28.3)
Total	2220 (82.5)	472 (17.5)

Table 23: Distribution of hypermetropia according to age in study population for distance vision

Age n=2,692*	No Hypermetropia n (%)	Hypermetropia n (%)
40-49 (1085)	1030 (94.9)	55 (5.1)
50-59 (722)	657 (91.0)	65 (9.0)
60-69 (576)	547 (95.0)	29 (5.1)
>70 (309)	298 (96.4)	11 (3.6)

Gender		
Male (1241)	1189 (95.8)	52 (4.2)
Female (1451)	1343 (92.6)	108 (7.4)
Total	2532(94.1)	160 (5.9)

Information not available for above parameter in remaining participants

Table 24: Distribution of severity of myopia (spherical equivalent) in study population

Severity of myopia (Dioptre Sphere)	Total number of people n(%)
Mild (-0.5 to -3)	425(90.0)
Moderate (-3.5to -5)	35(7.4)
Severe (-5.5 to -8)	12(2.5)
Total	472 (100.0)

Table 25: Distribution of severity of hypermetropia (spherical equivalent) in study population

Severity of Hypermetropia (Dioptre Sphere)	n (%)
Mild (+1 to +3)	148(92.5)
Moderate (+3.5 to +5)	2(1.3)
Severe($\geq$+5)	1(0.6)
Very severe (>8)	9 (5.6)
Total	160

Table 26: Association of severity of myopia with age, education, gender and occupation

Categories	Mild (%) (-0.5 to -<3) diopters n=425	Moderate (%) (>-3 to <-5) diopters n=35	Severe (%) (> -5 to<-8) diopters n=12
Age in years			
40-49 (n=91)	82(90.1)	6(6.6)	3(3.3)
50-59 (n=132)	116(87.9)	14(10.6)	2(1.5)
60-69 (n=162)	147(90.7)	10(6.2)	5(3.1)
$\geq$70(n=87)	80(92.0)	5(5.8)	2(2.3)
		Pearson chi^2 = 3.6321 Pr = 0.726	
Education			
Illiterate (n=359)	323(90.0)	25(7)	11(3.1)
Can read & write (n=65)	59(90.8)	6(9.2)	0(0.0)
Intermediate (n=44)	39(88.7)	4(9.1)	1(2.3)
Graduation (n=4)	4(100)	0(0.0)	0(0.0)
		Pearson chi^2= 3.0597 Pr = 0.801	
Gender			
Male (n=219)	195(89)	17(7.8)	7(3.2)
Female (n=253)	230(90.9)	18(7.1)	5(2.0)
		Pearson chi^2= 0.7993Pr = 0.671	
Occupation			
House work (n=72)	62(86.1)	8(11.1)	2(2.8)
Unskilled (n=260)	234(90.0)	20(7.7)	6(2.3)
Skilled (n=45)	43(95.6)	1(2.2)	1(2.2)
Unemployed (n=95)	86(90.5)	6(6.3)	3(3.2)
		Pearson chi^2= 3.6543Pr = 0.723	

Table 27: Association of severity of hypermetropia for distance vision according to age, education, gender and occupation according to subjective acceptance

Categories(n=160)	Mild (%) (+0.5 to <+3) Diopters n=148	Moderate (%) (>+3to+ <5) diopters n=2	Severe (%) (>+5) diopters n=1	Very Severe(%) (-≥8) diopters n=9
Age in years				
40-49 (n=55)	54(98.2)	0(0.0)	1(1.8)	0(0.0)
50-59 (n=65)	63(96.9)	1(1.5)	0(0.0)	1(1.5)
60-69 (n=29)	26(89.7)	1(3.5)	0(0.0)	2(6.9)
≤70(n=11)	5(45.5)	0(0.0)	0(0.0)	6(54.5)
			Pearson chi^2=	58.7927Pr< 0.001
Education				
Illiterate (n=91)	82(90.1)	0(0.0)	1(1.1)	8(8.8)
Can read & write (n=35)	34(97.1)	1(2.9)	0(0.0)	0(0.0)
Intermediate (n=29)	27(93.1)	1(3.5)	0(0.0)	1(3.5)
Graduation (n=5)	5(100)	0(0.0)	0(0.0)	0(0.0)
			Pearson chi^2=	8.0880Pr = 0.525
Gender				
Male (n=52)	49(94.2)	1(1.9)	1(1.9)	1(1.9)
Female (n=108)	99(91.7)	1(0.9)	0(0.0)	8(7.4)
			Pearson chi^2=	4.2579Pr = 0.235
Occupation				
House work (n=43)	42(97.7)	0(0.0)	0(0.0)	1(2.3)
Unskilled (n=72)	69(95.8)	0(0.0)	1(1.4)	2(2.8)
Skilled (n=24)	21(87.5)	2(8.3)	0(0.0)	1(4.2)
Unemployed (n=21)	16(76.2)	0(0.0)	0(0.0)	5(23.8)
			Pearson chi^2=	27.7411Pr = 0.001

Table 28: Distribution of study population according to use of myopic glasses

History of wearing spectacles	n (%)
Using Glasses	50(10.6)
Not using Glasses	422(89.4)
Total	472 (100.0)

Table 29: Catogarisation of study participants according to Schirmers and TBUT:

	Schirmers n (%)	Breakup Time n (%)	Dryeye (%)
Normal	2620 (96.4)	2279 (83.7)	2709 (98.5)
Abnormal	97 (3.6)	444 (16.3)	41 (1.5)
Total	2717*(100.0)	2723*(100.0)	2750

Information not available for Schirmers in 192 participants and for TBUT in 186 participants

Table 30: Detailed distribution of study participants according to abnormalities in anterior adenexa on basic Eye Examination

Anterior adenexa abnormalities	n (%)
Squint	19 (0.7)
Nystagmus	0 (0.0)
Anterior staphyloma	2 (0.07)
Phthisis/Disorganized globe	11 (0.4)
Corneal opacity	35 (1.2)
Adherent Leucoma	2 (0.07)
Corneal Ulcer	1 (0.03)
Others	5 (0.2)

Table 31: Distribution of various ocular surface disorders in study participants (n=3231)

Disorder of ocular surface	n (%)
Pterygium	584 (20.1)
Pingecula	361 (12.4)

Table 32: Catergorisation of study participants according to prevalence of cataract: Prakasam

Demographic characteristics	Cataract (n, % in age group)	Cataract Prevalence % (95% C.I.)	P Value
	Present n=1221		
Age (years)			
40-49 (1117)	110 (9.0)	9.85 (8.098, 11.598)	
50-59 (753)	270 (22.1)	35.86 (32.423, 39.290)	
60-69 (632)	459 (37.6)	72.63 (69.141, 76.112)	<0.001
≥70 (404)	382 (31.3)	94.55 (92.332, 96.777)	
Gender			
Male (1319)	539 (44.1)	40.86 (38.208, 43.521)	
Female (1587)	682(55.9)	42.97 (40.536, 45.412)	0.251
Total	1221 (100.0)		

Table 33: Prevalence of various ocular diseases according to gender in study population

	Cataract (n=1221)	Dry Eye (n=41)	Pterygium (n=584)
Male	539 (40.9)	19 (1.5)	225 (17.0)
Female	682 (42.1)	22 (1.4)	359 (22.6)

Table 34: Prevalence of various ocular diseases according to age in study population

Age in Years	Cataract (n=1221)	Dry Eye (n=41)	Pterygium (n=584)
40-49	110 (9.8)	9 (0.8)	200 (17.9)
50-59	270 (35.9)	8 (1.1)	159 (21.1)
60 -69	459 (72.6)	11 (1.7)	149 (23.5)
70 and above	382 (94.5)	13 (13.2)	76 (18.8)

Table 35: Distribution and prevalence of Cataract in study population according to age and gender

Demographic characteristics	Cataract (n, % in age group)	Cataract Prevalence % (95% C.I.)	P Value
	Present n=1221		
Age (years)			
40-49 (1117)	110 (9.0)	5.18 (4.034, 6.338)	
50-59 (753)	270 (22.11)	18.66 (16.077, 21.238)	<0.001
60-69 (632)	459 (37.6)	53.84 (50.243,57.429)	
≥70 (404)	382 (31.3)	91.47 (89.099, 93.832)	
Gender			
Male (1319)	539 (44.14)	30.71 (28.453, 32.961)	
Female (1587)	682 (55.9)	32.19 (30.125, 34.248)	0.105
Total	1221(100.0)		

Table 36: Prevalence of various types of cataract (age and gender-wise) in study population according to clinical classification

	Cortical n(%) (n=1763)	Nuclear n(%) (n=2509)	Posterior Subcapsular Cataract n(%) (n=1770)
Age (years)			
40-49	2(0.2)	79 (7.1)	11 (0.9)
50-59	15 (2.0)	191 (25.4)	12 (1.6)
60-69	21 (3.3)	314 (49.7)	13 (2.1)
70 +	7 (1.7)	238 (58.9)	3 (0.7)
Prevalence (%)	45(1.5)	822(28.3)	39 (1.3)
Gender			
Male	20 (1.5)	390 (29.6)	17 (1.3)
Female	25 (1.6)	432(27.2)	22 (1.4)
Prevalence (%)	45(1.5)	822 (28.3)	33 1.3)

Table 37: Distribution of study population into quantiles according to duration of Sun Exposure in Prakasam

Quantiles of Total Exposure	Number of participants (n=3129)	Mean (Min-Max)
1st quantile	626 (20.0%)	21.7 (7.3, 60.9)
2nd quantile	679 (21.7%)	85.8 (61.4, 100.0)
3rd quantile	601 (19.2%)	110.1 (100.0, 119.2)
4th quantile	605 (19.3%)	133.4 (119.2, 148.6)
5th quantile	618 (19.7%)	174.1 (149.1, 252.2)

Table 38: Association of Cataract with various risk factors (Unadjusted odds ratio):

Cataract	Total	Present	Unadj OR (95% CI)	P value
Age	**(n=2906)**	**(n=1221)**		
40-49 years	1117	110 (9.8)	1	
50-59 years	753	270 (35.9)	5.1 (4.0, 6.55)	<0.001
60-69 years	632	459 (72.6)	24.3 (18.7, 31.6)	<0.001
70 + years	404	382 (94.5)	158.9 (99.08, 255.0)	<0.001
Gender	**(n=2906)**	**(n=1221)**		
Male	1319	539 (40.9)	1	
Female	1587	682 (42.1)	1.09 (0.94, 1.26)	0.251
Education	**(n=2906)**	**(n=1221)**		
Illiterate	1923	930 (48.4)	1	
Can read & write	487	178 (36.5)	0.61 (0.50, 0.75)	<0.001
Intermediate	430	109 (25.3)	0.36 (0.28, 0.45)	<0.001
Graduation	65	4 (6.1)	0.07 (0.02, 0.19)	<0.001
Other	1	0 (0.0)	-	
Occupation	**(n=2906)**	**(n=1221)**		
House work	471	231 (49.0)	1	
Unskilled	1674	558 (33.3)	0.45 (0.37, 0.56)	<0.001
Skilled	320	81 (25.3)	0.35 (0.25, 0.48)	<0.001
Unemployed	438	349 (79.7)	4.07 (3.03, 5.47)	<0.001
Other	3	2 (66.7)	2.07 (0.18, 23.07)	0.552
Land area	**(n=2906)**	**(n=1221)**		
No Land	1761	754 (42.8)	1	
1-5 acres	1043	434 (41.6)	0.95 (0.81, 1.11)	0.532
>5 acres	102	33 (32.3)	0.63 (0.41, 0.97)	0.039
Cumulative sun exposure (Outdoor)	**(n=2904)**	**(n=1220)**		
Less than Mean	1283	355 (27.7)	1	
More than Mean	1621	865 (53.4)	2.99 (2.55, 3.49)	<0.001
Quantile of total exposure	**(n=2904)**	**(n=1220)**		
1st quantile	569	189 (33.2)	1	
2nd quantile	615	138 (22.4)	0.58 (0.44, 0.75)	<0.001
3rd quantile	563	151 (26.8)	0.73 (0.57, 0.95)	0.019
4th quantile	567	282 (49.7)	1.98 (1.56, 2.52)	<0.001
5th quantile	590	460 (77.9)	7.11 (5.47, 9.23)	<0.001
Peak Hour Exposure	**(n=2904)**	**(n=1220)**		
Less than Mean	1363	416 (30.5)	1	
More than Mean	1541	804 (52.2)	2.48 (2.13, 2.89)	<0.001
Smoking (pack years)	**(n=2906)**	**(n=1221)**		
No Smoker	2039	818 (40.1)	1	
>0 to ≤1 pack years	60	22 (36.7)	0.86 (0.50, 1.47)	0.591
1 to <5 pack years	190	70 (36.8)	0.87 (0.64, 1.18)	0.378
≥5 pack years	305	125 (40.9)	1.03 (0.81, 1.32)	0.774
Not applicable	312	186 (59.6)	2.20 (1.72, 2.80)	<0.001
Fuel used for cooking	**(n=2906)**	**(n=1221)**		
Zero bad fuel exposure	1264	517 (40.9)	1	
1 to 25 years	120	13 (10.8)	0.17 (0.09, 0.31)	<0.001
25 to 50 years	1163	378 (32.5)	0.69 (0.58, 0.82)	<0.001
>50 years	359	313 (87.2)	9.83 (7.07, 13.6)	<0.001

Table 39: Association of Cataract with various risk factors (adjusted odds ratio):

Cataract	Total	Present	Ad OR (95% CI)	P value
Age	**(n=2906)**	**(n=1221)**		
40-49 years	1117	110 (9.8)	-	
50-59 years	753	270 (35.9)	-	-
60-69 years	632	459 (72.6)	-	-
70 + years	404	382 (94.5)	-	-
Gender	**(n=2906)**	**(n=1221)**		
Male	1319	539 (40.9)	1	
Female	1587	682 (42.1)	0.66 (0.40, 1.09)	0.106
Education	**(n=2906)**	**(n=1221)**		
Illiterate	1923	930 (48.4)	1	
Can read & write	487	178 (36.5)	0.63 (0.49, 0.81)	<0.001
Intermediate	430	109 (25.3)	0.43 (0.32, 0.58)	<0.001
Graduation	65	4 (6.1)	0.06 (0.02, 0.22)	<0.001
Other	1	0 (0.0)	-	
Occupation	**(n=2906)**	**(n=1221)**		
House work	471	231 (49.0)	1	
Unskilled	1674	558 (33.3)	0.33 (0.25, 0.43)	<0.001
Skilled	320	81 (25.3)	0.47 (0.32, 0.68)	<0.001
Unemployed	438	349 (79.7)	2.15 (1.51, 3.08)	<0.001
Other	3	2 (66.7)	8.28 (0.21, 324.84)	0.259
Cumulative sun exposure (Outdoor)	**(n=2904)**	**(n=1220)**		
Less than Mean	1283	355 (27.7)	1	
More than Mean	1621	865 (53.4)	0.98 (0., 2.04)	0.946
Quantile of total exposure	**(n=2904)**	**(n=1220)**		
1st quantile	569	189 (33.2)	1	
2nd quantile	615	138 (22.4)	0.75 (0.55, 1.02)	0.072
3rd quantile	563	151 (26.8)	1.09 (0.64, 1.87)	0.727
4th quantile	567	282 (49.7)	2.69 (1.44, 5.02)	0.002
5th quantile	590	460 (77.9)	6.17 (3.23, 11.81)	<0.001
Smoking (pack years)	**n=2906)**	**(n=1221)**		
No Smoker	2039	818 (40.1)	1	
>0 to ≤1 pack years	60	22 (36.7)	0.9 (0.48, 1.84)	0.883
1 to <5 pack years	190	70 (36.8)	1.2 (0.77, 1.70)	0.484
≥5 pack years	305	125 (40.9)	1.3 (0.93, 1.82)	0.116
Not applicable	312	186 (59.6)	1.6 (1.19, 2.24)	0.002
Fuel used for cooking	**(n=2906)**	**(n=1221)**		
Zero bad fuel exposure	1264	517 (40.9)	1	
1 to 25 years	120	13 (10.8)	0.4 (0.17, 0.76)	0.008
25 to 50 years	1163	378 (32.5)	1.3 (0.81, 2.04)	0.285
>50 years	359	313 (87.2)	6.2 (3.59, 10.73)	<0.001

Table 40: Association of Dry eye with various risk factors (Unadjusted odds ratio):

Dry eye	Total	Present	Unadj OR (95% CI)	P value
Age	**(n=2750)**	**(n=41)**		
40-49 years	1093	9 (0.8))	1	
50-59 years	728	8 (1.1)	1.34 (0.51, 3.48)	0.551
60-69 years	595	11 (1.9)	2.27 (0.93, 5.51)	0.070
70 + years	334	13 (3.9)	4.88 (2.07, 11.52)	<0.001
Gender	**(n=2750)**	**(n=41)**		
Male	1259	19 (1.5)	1	
Female	1491	22 (1.5)	0.98 (0.53, 1.81)	0.942
Education	**(n=2750)**	**(n=41)**		
Illiterate	1807	26 (1.4)	1	
Can read & write	473	9 (1.9)	1.33 (0.62, 2.85)	0.466
Intermediate	408	6 (1.5)	1.02 (0.42, 2.50)	0.961
Graduation	61	0 (0.0)	1	-
Others	1	0 (0.0)	1	-
Occupation	**(n=2750)**	**(n=41)**		
House work	440	18 (4.1)	1	
Unskilled	1643	14 (0.9)	0.20 (0.10, 0.41)	<0.001
Skilled	311	3 (1.0)	0.23 (0.07, 0.78)	0.019
Unemployed	353	6 (1.7)	0.41 (0.16, 1.03)	0.058
Others	3	0 (0.0)	1	
Land Area	**(n=2750)**	**(n=41)**		
No Land	1660	31 (1.9)	1	
1-5 acres	997	10 (1.0)	0.53 (0.26, 1.09)	0.085
>5 acres	93	0 (0.0)	1	-
Cumulative sun exposure (Outdoor)	**(n=2749)**	**(n=41)**		
Less than Mean	1207	19 (1.6)	1	
More than Mean	1542	22 (1.4)	0.90 (0.49, 1.68)	0.752
Quantile of total exposure	**(n=2749)**	**(n=41)**		
1st quantile	525	14 (2.7)	1	
2nd quantile	586	4 (0.7)	0.25 (0.08, 0.77)	0.015
3rd quantile	549	2 (0.4)	0.13 (0.03, 0.59)	0.008
4th quantile	541	7 (1.3)	0.48 (0.19, 1.20)	0.114
5th quantile	548	14 (2.6)	0.96 (0.45, 2.03)	0.908
Peak Hour Exposure	**(n=2749)**	**(n=41)**		
Less than Mean	1284	19 (1.5)	1	
More than Mean	1465	22 (1.5)	1.02 (0.55, 1.88)	0.962
Smoking	**(n=2750)**	**(n=41)**		
No Smoker	1931	29 (1.5)	1	
>0 to ≤1 pack years	57	0 (0.0)	1	
1 to <5 pack years	182	2 (1.1)	0.73 (0.17, 3.08)	0.667
≥ 5 pack years	291	5 (1.7)	1.15 (0.44, 2.99)	0.779
Others	289	5 (1.7)	1.15 (0.44, 3.01)	0.768
Fuel used for cooking	**(n=2750)**	**(n=41)**		
Zero bad fuel exposure	1205	19 (1.6)	1	
1 to 25 years	117	2 (1.7)	1.09 (0.25, 4.72)	0.913
25 to 50 years	1119	14 (1.3)	0.79 (0.39, 1.58)	0.508
>50 years	309	6 (1.9)	1.24 (0.49, 3.12)	0.654

Table 41: Association of Dry eye with various risk factors (adjusted odds ratio):

Dry eye	Total	Present	Adj OR (95% CI)	P value
Age	**(n=2750)**	**(n=41)**		
40-49 years	1093	9 (0.8))		
50-59 years	728	8 (1.1)		
60-69 years	595	11 (1.9)		
70 + years	334	13 (3.9)		
Gender	**(n=2750)**	**(n=41)**		
Male	1259	19 (1.5)	1	
Female	1491	22 (1.5)	0.59 (0.10, 3.45)	0.562
Education	**(n=2750)**	**(n=41)**		
Illiterate	1807	26 (1.4)	1	
Can read & write	473	9 (1.9)	1.08 (0.48, 2.43)	0.856
Intermediate	408	6 (1.5)	0.88 (0.32, 2.38)	0.795
Graduation	61	0 (0.0)	1	-
Others	1	0 (0.0)	1	-
Occupation	**(n=2750)**	**(n=41)**		
House work	440	18 (4.1)	1	
Unskilled	1643	14 (0.9)	0.21 (0.09, 0.48)	<0.001
Skilled	311	3 (1.0)	0.19 (0.05, 0.74)	0.017
Unemployed	353	6 (1.7)	0.29 (0.10, 0.82)	0.019
Others	3	0 (0.0)	1	-
Cumulative sun exposure (Outdoor)	**(n=2749)**	**(n=41)**		
Less than Mean	1207	19 (1.6)	1	
More than Mean	1542	22 (1.4)	0.21 (0.09, 0.48)	<0.001
Quantile of total exposure	**(n=2749)**	**(n=41)**		
1st quantile	525	14 (2.7)	1	
2nd quantile	586	4 (0.7)	0.37 (0.11, 1.24)	0.108
3rd quantile	549	2 (0.4)	0.51 (0.06, 4.44)	0.540
4th quantile	541	7 (1.3)	2.30 (1.10, 51.42)	0.599
5th quantile	548	14 (2.6)	4.23 (0.19, 96.60)	0.366
Peak Hour Exposure	**(n=2749)**	**(n=41)**		
Less than Mean	1284	19 (1.5)	1	
More than Mean	1465	22 (1.5)	1.26 (0.27, 5.80)	0.770
Smoking	**(n=2750)**	**(n=41)**		
No Smoker	1931	29 (1.5)	1	
>0 to ≤1 pack years	57	0 (0.0)	1	
1 to <5 pack years	182	2 (1.1)	0.77 (0.16, 3.73)	0.750
≥ 5 pack years	291	5 (1.7)	1.14 (0.36, 3.56)	0.826
Others	289	5 (1.7)	0.87 (0.29, 2.65)	0.808
Fuel used for cooking	**(n=2750)**	**(n=41)**		
Zero bad fuel exposure	1205	19 (1.6)	1	
1 to 25 years	117	2 (1.7)	0.56 (0.07, 4.88)	0.603
26 to 50 years	1119	14 (1.3)	0.82 (0.16, 4.28)	0.811
>50 years	309	6 (1.9)	0.89 (0.15, 5.12)	0.892

Table 42: Association of Pterygium with various risk factors (Unadjusted odds ratio):

Pterygium	Total	Present	Unadj OR (95% CI)	P value
Age	**(n=2909)**	**(n=584)**		
40-49 years	1117	200 (17.9)	1	
50-59 years	755	159 (21.1)	1.22 (0.97, 1.54)	0.089
60-69 years	632	149 (23.5)	1.41 (1.11, 1.80)	0.004
70 + years	405	76 (18.8)	1.06 (0.79, 1.42)	0.700
Gender	**(n=2909)**	**(n=584)**		
Male	1321	225 (17.0)	1	
Female	1588	359 (22.6)	1.42 (1.18, 1.71)	<0.001
Education	**(n=2909)**	**(n=584)**		
Illiterate	1925	461 (23.9)	1	
Can read & write	487	82 (16.8)	0.64 (0.50, 0.83)	0.001
Intermediate	431	37 (8.6)	0.30 (0.21, 0.42)	<0.001
Graduation	65	3 (4.6)	0.15 (0.05, 0.49)	0.002
Others	1	1 (100.0)	1	-
Occupation	**(n=2909)**	**(n=584)**		
House work	471	63 (13.4)	1	
Unskilled	1676	411 (24.5)	2.10 (1.58, 2.81)	<0.001
Skilled and professional	320	27 (8.4)	0.60 (0.37, 0.96)	0.033
Unemployed	439	83 (18.9)	1.51 (1.06, 2.16)	0.024
Others	3	0 (0.0)	1	-
Land area	**(n=2909)**	**(n=584)**		
No Land	1761	302 (17.2)	1	
1-5 acres	1046	252 (24.1)	1.53 (1.27, 1.85)	<0.001
>5 acres	102	30 (29.4)	2.01 (1.29, 3.14)	0.002
Cumulative sun exposure (Outdoor)	**(n=2907)**	**(n=583)**		
Less than Mean	1284	195 (15.2)	1	
More than Mean	16223	388 (23.9)	1.75 (1.45, 2.12)	<0.001
Quantile of total exposure	**(n=2907)**	**(n=583)**		
1st quantile	570	56 (9.8)	1	
2nd quantile	615	116 (18.9)	2.13 (1.52, 3.00)	<0.001
3rd quantile	563	123 (21.9)	2.57 (1.83, 3.61)	<0.001
4th quantile	568	136 (23.9)	2.89 (2.06, 4.05)	<0.001
5th quantile	591	152 (25.7)	3.18 (2.28, 4.43)	<0.001
Peak Hour Exposure	**(n=2907)**	**(n=583)**		
Less than Mean	1365	204 (15.0)	1	
More than Mean	1542	379 (24.6)	1.85 (1.54, 2.24)	<0.001
Smoking	**(n=2909)**	**(n=584)**		
No Smoker	2040	442 (21.7)	1	
>0 to ≤1 pack years	60	14 (23.3)	1.10 (0.59, 2.01)	0.758
1 to <5 pack years	191	33 (17.3)	0.75 (0.51, 1.11)	0.158
≥5 pack years	305	31 (10.2)	0.40 (0.27, 0.60)	<0.001
Not Applicable	313	64 (20.4)	0.92 (0.69, 1.24)	0.625
Fuel used for cooking	**(n=2897)**	**(n=584)**		
Zero bad fuel exposure	1266	223 (17.6)	1	
1 to 25 years	120	11 (9.2)	0.47 (0.25, 0.89)	0.021
25 to 50 years	1164	280 (24.1	1.48 (1.22, 1.80)	<0.001
>50 years	359	70 (19.5)	1.13 (0.84, 1.53)	0.413

Table 43: Association of pterygium with various risk factors (adjusted odds ratio):

Pterygium	Total	Present	Adj OR (95% CI)	P value
Age	**(n=2909)**	**(n=584)**		
40-49 years	1117	200 (17.9)		
50-59 years	755	159 (21.1)		
60-69 years	632	149 (23.5)		
70 + years	405	76 (18.8)		
Gender	(n=2909)	(n=584)		
Male	1321	225 (17.0)	1	
Female	1588	359 (22.6)	1.50 (0.85, 2.65)	0.157
Education	**(n=2909)**	**(n=584)**		
Illiterate	1925	461 (23.9)	1	
Can read & write	487	82 (16.8)	0.87 (0.66, 1.15)	0.340
Intermediate	431	37 (8.6)	0.48 (0.33, 0.71)	<0.001
Graduation	65	3 (4.6)	0.32 (0.10, 1.06)	0.063
Others	1	1 (100.0)	1	-
Occupation	**(n=2909)**	**(n=584)**		
House work	471	63 (13.4)	1	
Unskilled	1676	411 (24.5)	1.72 (1.25, 2.37)	0.001
Skilled and professional	320	27 (8.4)	1.00 (0.60, 1.66)	0.996
Unemployed	439	83 (18.9)	1.35 (0.92, 1.99)	0.124
Others	3	0 (0.0)	1	-
Cumulative sun exposure (Outdoor)	**(n=2907)**	**(n=583)**		
Less than Mean	1284	195 (15.2)	1	
More than Mean	16223	388 (23.9)	0.82 (0.48, 1.40)	0.473
Quantile of total exposure	**(n=2907)**	**(n=583)**		
1st quantile	570	56 (9.8)	1	
2nd quantile	615	116 (18.9)	1.54 (1.06, 2.24)	0.024
3rd quantile	563	123 (21.9)	1.85 (1.03, 3.33)	0.041
4th quantile	568	136 (23.9)	2.31 (1.18, 4.55)	0.015
5th quantile	591	152 (25.7)	2.73 (1.37, 5.45)	0.004
Peak Hour Exposure	**(n=2907)**	**(n=583)**		
Less than Mean	1365	204 (15.0)	1	
More than Mean	1542	379 (24.6)	1.13 (0.84, 1.52)	0.426
Smoking	**(n=2909)**	**(n=584)**		
No Smoker	2040	442 (21.7)	1	
>0 to ≤1 pack years	60	14 (23.3)	1.26 (0.65, 2.41)	0.485
1 to <5 pack years	191	33 (17.3)	0.80 (0.51, 1.24)	0.326
≥5 pack years	305	31 (10.2)	0.51 (0.33, 0.78)	0.002
Others	313	64 (20.4)	0.81 (0.58, 1.14)	0.241
Fuel used for cooking	**(n=2897)**	**(n=584)**		
Zero bad fuel exposure	1266	223 (17.6)	1	
1 to 25 years	120	11 (9.2)	0.62 (0.27, 1.43)	0.262
25 to 50 years	1164	280 (24.1	0.90 (0.52, 1.55)	0.706
>50 years	359	70 (19.5)	0.58 (0.32, 1.04)	0.067

Table 44: Prevalence of ARMD in study participants by gender and age

	Total n(%)	Present n(%)	P value
Age (Years)			
40-50	1117	1 (0.1)	
50-60	755	0 (0.0)	
60-70	632	1 (0.2)	0.412
70-80	405	2 (0.5)	
Total	2909	4 (0.1)	
Gender			
Male	1321	1 (0.1)	0.172
Female	1588	3 (0.2)	
Total	2909	4(0.1)	

Table 45: Prevalence of diabetic retinopathy by age and gender in study participants

	Total n(%)	Present n (%)	P value
Age (years)			
40-50	1117	98 (8.8)	
50-60	755	104 (13.8)	
60-70	632	85 (13.4)	0.003
70-80	405	51 (12.6)	
Total	2909	338 (11.6)	
Gender			
Male	1321	173 (13.1)	
Female	1588	165 (10.4)	0.075
Total	2909	338 (11.6)	

Table 46: Environmental and ocular data in Prakasam:

Environmental Data	Prakasam
UVA	6.6 to 12.8 w/m^2
UVB	0.19 to 0.42 w/m^2
SPM	-
RSPM	-
Ocular diseases in population aged 40 years and above	Prevalence (Guwahati) (2909/ 10313)*
Cataract	42%
Dry eye	1.5%
Pterygium	20.1%
VKC in children aged 5 to 15 years	-
VKC	-

Total number of people examined above age of 40 years out of total number of people enumerated in all the clusters of that region.

Participant Information Sheet

Title of project: - Multi-centric Collaborative Study on the impact of Environment Changes and Ultra Violet Radiation(UVR) exposure on ocular health in India

Dr. Rajendra Prasad Centre For Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi is conducting a study related to Ultra Violet Radiation and eye diseases. Environment Changes and Ultra Violet Radiation has been the overriding physical environmental concern for the past decade as it significantly affects the ocular health. The potential effects on ocular health of long-term climatic change include allergic diseases, diseases of the conjunctiva, cornea, lens and retina. The main concern of the study is UV related ocular damage. Cataract is the most common cause of blindness in India. In this study we would like to know the correlation of UV Radiation and prevalence of eye disease like cataract, dry eye, Pterygium and spring catarrh (VKC). This will help us in preventing the most serious problem of eyes in the community.

To get the above information, we will seek participation from children in the age group of 5 to 15 for V.K.C. and people above 40 years of age for cataract, dry eye and pterygium in the population. A questionnaire will be administered to you. We shall examine your eyes thoroughly at Dr. R. P. Centre of Ophthalmic Sciences, AIIMS in accordance to the normal standard of care. Investigations on the eye will include dilating your pupil by instilling some eye drops. This will lead to harmless blurring of vision for 1-2 days. It will subside by itself. Photographs of the lens of your eyes will be taken by special cameras. All of the above examinations and tests shall be completed in one visit of approximately 3 hours.

All the information that you provide and your investigation results shall be kept confidential. There is no risk involved to you in this study.
You are free to participate or withdraw from this research study at any time. You will be provided free treatment for your eye problem. Your decision to participate or withdraw will not affect your treatment in anyway.

In case of any further information or clarification at any time, you are requested to contact the following:

Prof. Radhika Tandon, Professor   26593145

Dr. Praveen Vashist, Associate Professor   9868398410, 26593143

Version 2.0

Participant Informed Consent Form

Participant identification number for this trial: _____

Title of project: - **Multi-centric Collaborative Study on the impact of Environment Changes and Ultra Violet Radiation (UVR) exposure on ocular health in India.**

Name of Principal Investigator: **Prof. Radhika Tandon, Professor   Tel. No. (S) 26593145**

     The contents of the information sheet dated - - /- -/- - - - that was provided have been read carefully by me / explained in detail to me, in a language that I comprehend, and I have fully understood the contents. I confirm that I have had the opportunity to ask questions.
     The nature and purpose of the study and its potential risks / benefits and expected duration of the study, and other relevant details of the study have been explained to me in detail. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal right being affected.
     I understand that the information collected about me from my participation in this research and sections of any of my medical notes may be looked at by responsible individuals from AIIMS. I give permission for these individuals to have access to my records.

     I agree to take part in the above study.

                                                                Date:

(Signatures / Left Thumb Impression) _____   Place:

Name of the Participant: _____

Son / Daughter / Spouse of: _____

Complete postal address: _____

This is to certify that the above consent has been obtained in my presence.

----------------------------   Date:

Signatures of Investigator   Place:

1) Witness – 1   2) Witness – 2

Name: ------------------------------   Name: -------------------------------

Address: ------------------------------   Address: ------------------------------

रोगी सूचना प्रपत्र

परियोजना का शीर्षकः – भारत में नेत्र स्वास्थ्य पर वातावरण बदलाव तथा अल्ट्रावॉयलेट रेडिएशन (यू०वी०आर०) के प्रभाव का बहु केन्द्रीय सहयोगी अध्ययन ।

डॉ० राजेन्द्र प्रसाद नेत्र विज्ञान केन्द्र, अखिल भारतीय आयुर्विज्ञान संस्थान, नई दिल्ली द्वारा अल्ट्रावॉयलेट रेडिएशन तथा नेत्र रोगों से संबंधित एक अध्ययन संचालित किया गया है । पिछले दशको में अल्ट्रावॉयलेट रेडिएशन ने प्राकृतिक वातावरण को प्रभाकवत करने के साथ–साथ नेत्र स्वास्थ्य को भी महत्त्वपूर्ण रूप से प्रभावित किया है । जलवायु परिवर्तन के कारण आँख की ऊपरी सतह, कार्निया, लैंस तथा रेटिना पर दुष्भाव पड़ा है । इस अध्ययन का मुख्य उद्देश्य अल्ट्रावायलेट के कारण उत्पन्न नेत्र क्षति है ।भारत में मोतियाबिंद अंधता का एक मुख्य कारण है । इस अध्ययन के द्वारा हम यू०वी० रेडिएशन तथा विभिन्न नेत्र रोग जैसे मोतियाबिंद, शुष्क नेत्र, टेरीजियम तथा स्प्रिंग नजला (वी०के०सी०) के उपचार के सहसंबंध अति गंभीर समस्याओं को रोकने में सहायता प्राप्त होगी ।

उपर्युक्त जानकारी प्राप्त करने के लिए हमें वी०के०सी० के लिए 5 से 15 वर्ष की आयु वर्ग के बच्चो की तथा मोतियाबिंद, शुष्क नेत्र तथा टेरीजियम के लिए 40 वर्ष से अधिक आयु वर्ग के व्यक्तियों के नेत्रो की जाँच होगी । आपको एक प्रश्नावली दी जाएगी । सामान्यमानक के अनुसार डॉ० राजेन्द्र नेत्र विज्ञान, केन्द्र, अखिल भारतीय आयुर्विज्ञान संस्थान, नई दिल्ली में आपकी ऑखो का उपचार एवं संपूर्ण जांच की जाएगी । नेत्र परीक्षण के दौरान नेत्र डॉप्स की कुछ बूंदो द्वारा आपकी पुतली को विस्तारित किया जाएगा । इससे 1-2 दिनों तक आपको धुंधला दिखाई दे सकता है जो पूर्णतः हानिरहित है । यह स्वतः ही ठीक हो जाएगा । विशेष कैमरो द्वारा आप के नेत्रों के लैंसो की तस्वीरें ली जाएगी । उपर्युक्त सभी परीक्षण एवं जाँच एक बार में लगभग 3 घंटो में पूरी हो जाएंगे ।

आप के द्वारा दी गई सभी जानकारियाँ तथा सभी परीक्षणों के परिणाम गोपनीय रखा जाएगा । इस अध्ययन में शामिल होने से आपको किसी प्रकार की हानि नही होगी ।आप इस अध्ययन में सम्मिलित होने अथवा इसे बीच में छोड़ देने के लिए स्वतंत्र है । आपकी नेत्र संबंधी समस्याओं का निःशुल्क उपचार किया जाएगा । आपकी इस अध्ययन में सहभागिता अथवा अध्ययन छोड़ देने से आपके उपचार पर कोई प्रभाव नही पड़ेगा ।

आपसे अनुरोध है कि इससे अतिरिक्त किसी भी जानकारी अथवा स्पष्टीकरण के लिए आप किसी भी समय निम्न व्यक्तियों से संपर्क कर सकते है :–

आचार्या राधिका टडंन, आचार्या   26593145

डॉ० प्रवीण वशिष्ठ, सह आचार्य   9868398410, 26593143

रोगी सूचित स्वीकृति पत्र

इस ट्रायल के लिए रोगी की आईडीः . . . .

परियोजना का शीर्षकः – भारत में नेत्र स्वास्थ्य पर वातावरण बदलाव तथा अल्ट्रावॉयलेट रेडिएशन (यू०वी०आर०) के प्रभाव का बहु केन्द्रीय सहयोगी अध्ययन।

मुख्य अन्वेषक का नामः **आचार्या राधिका टंडन   26593145**

     इस सूचना पत्र की सामग्री दिनांक . . . . को प्रदान की गई थी, मैंने सावधानीपूर्वक पढ़लिया है। मुझे उस भाषा में विस्तार से समझा दिया गया है जो मुझे समझ में आती है और मैंने पूरी सामग्रीके अच्छी तरह समझ लिया है। मैं पुष्टि करता / करती हूँ कि मुझे प्रश्न पूछने का अवसर दिया गया है।

     अध्ययन का प्रकार और प्रयोजन तथा इसके संभावित जोखिम / लाभ और अध्ययन पूरा होने की अनुमानित आवधि तथा अध्ययन के अन्य संगत विवरण मुझे विस्तार से समझा दिये गए हैं। मुझे बताया गयाहै कि मेरी भागीदारी स्वेच्छानुसार है और मैं कोई कारण बताए बिना किसी भी समय वापस जाने के लिए पूरी तरह स्वतंत्र हूँ और इस पर मेरी चिकित्सा देखभाल या कानूनी आधिकारों पर कोई प्रभाव नही पड़ेगा।

     मुझे पता है कि इस अनुसंधान में मेरी भागीदारी के बारे में जमा की गई जानकारी और मेरे चिकित्सा नोट्स अखिल भारतीय आयुर्विज्ञान संस्थान (एम्स) के जिम्मेदार व्यक्तियों द्वारा देखी जाएगी, जो विनियामक प्राधिकरणों से हैं, जहां इस अनुसंधान में मेरे भाग लेने के संगत पाया जाए। मैं इन व्यक्तियों को अपने अभिलेख देखने की अनुमति देता/देती हूँ।

     मैं उपरोक्त अध्ययन में भाग लेने के लिए सहमत हूँ।

<div align="right">

दिनांकः . . . .

स्थान : . . . .

</div>

हस्ताक्षर/बांए अंगूठे का निशानः . . . .

सहभागी का नामः . . . .

पुत्र/पुत्री/जीवन साथीः . . . .

डाक का पूरा पताः . . . .

यह प्रमाणित किया जाता है कि उपरोक्त स्वीकृति मेरी उपस्थिति में प्राप्त की गई है।

अन्वेषक के हस्ताक्षर

<div align="right">

दिनांकः . . . .

स्थानः . . . .

</div>

गवाह – 1	गवाह – 2
गवाह का नाम	गवाह का नाम . . . .
डाक का पूरा पता	डाक का पूरा पता . . . .

Form I
Household Enumeration Form
(PLEASE ENCIRCLE AND WRITE THE GIVEN RESPONSE)

IDENTIFICATION DATA	RESPONSE CATEGORIES	FOR OFFICE USE ONLY
Study Location प्रोजेक्ट की जगह	**Delhi=1, Guwahati=2, Chennai=3** दिल्ली =1, गोवाहाटी =2, चेन्नई = 3	[ ]
Name of village ग्राम का नाम	_____	
Cluster Code समूह संख्या एवं कोड		[ ] [ ]
Household ID मकान का दिया गया नम्बर	Study House No. _____ मकान का दिया गया नम्बर _____	[ ] + [ ] [ ] + [ ] [ ] [ ] Location 1D (1) +Cluster 1D (2) +HH No (3)
Interviewer Name/ Code साक्षात्कार लेने वाले का नाम / कोड	[ ][ ]	[ ][ ]
Date of Enumeration गणना की तिथि	**(dd/mm/yyyy)** __ / __/____	[ ] [ ] − [ ] [ ] − [ ] [ ]
Name of respondent: उत्तरदाता का नाम		
Relation to Head of the House Hold (HOH) परिवार के मुखिया से सम्बन्ध	01. Self मुखिया 02. Spouse मुखिया की पत्नी /पति 03. Father पिता 04. Mother माता 05. Son बेटा 06. Daughter बेटी 07. Brother भाई 08. Sister बहन 09. Daughter-in-law बहु 10. Grand Son पोता/नाती 11. Grand Daughter पोती/ नतनी [____] 12. Servant नौकर 66. Other(Specify) अन्य (उल्लेख करे) _____	[ ] [ ]
Religion धर्म	1.Hindu, 2.Muslim, 3.Sikh, 4.Christian 66.Others(specify) [____] 1. हिन्दू, 2. मुस्लिम, 3.सिख, 4. ईसाई, 66.अन्य (उल्लेख करें) _____	[ ]
Caste जाति	1.SC/ST, 2.OBC, 3.General [____] 1. अ०सु०जा०/अ०सु०ज०जा०, 2. अन्य पिछड़ी जाति, 3. सामान्य,	[ ][ ]

Number of rooms in the house: excluding kitchen, toilets and bathrooms. मकान में कमरों की संख्या: रसोई, शौचालय व नहाने के कमरे को छोड़कर		Exact Number वास्तविक संख्या _____	[ ] [ ]
Landholdings (Cultivable) कृषि योग्य भूमि	00. No land holding 01. Less than / equal to one acre Give exact number of acres if more than one 00. कोई भूमि नहीं , 01. एक किले से कम / बराबर, यदि एक किले से अधिक हैं तो किलों की सही संख्या _____ [ ]	[ ] [ ]
Total family income per month by all sources कुल मिलाकर परिवार की मासिक आय	₹ _____ 99. Not known 99. नहीं पता	

Total Number of Household Members (Those staying continuously for the last 6 months or more) घर के सदस्यों की कुल संख्या (जो लगातार पिछले छः माह या अधिक से रह रहें है)	Actual No. of persons (including children of all ages) सदस्यों की वास्तविक संख्या (सभी उम्र के बच्चों को मिलाकर) _____ 00-04 years (00-04 वर्ष) _____ 05-15 years (05-15 वर्ष) _____ 16-39 years (16-39 वर्ष) _____ 40+ years (40+ वर्ष) _____	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

Details of all members in the household (Start with oldest living member)
मकान में रहने वाले सभी सदस्यों की जानकारी (सबसे बड़े जीवित सदस्य से शुरु करें)

S. No	Unique ID No	Name	Relation to HOH	Age	Gender	Marital Status	Education	Current Occupation	Type of resident	VKC RE	VKC LE
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

Relation	Age	Marital Status	Education	Occupation	Type of Resident
01. Self मुखिया 02. Spouse मुखिया की पत्नी /पति 03. Father पिता 04. Mother माता 05. Son बेटा 06. Daughter बेटी 07. Brother भाई 08. Sister बहन 09. Daughter-in-law बहु 10. Grand Son पोता/नाती 11. Grand Daughter पोती/ नतनी 12. Servant नौकर 66. Other(Specify) अन्य (उल्लेख करे) _____	Actual No. of years --------- 99. Not known **Gender** 1. Male 2. Female	1. Married 2. Unmarried 3. .Divorced 4. Separated 5. Widow/Widower 33. Not applicable 66. Others (Specify) _____	00. Illiterate, 50. Can read & write 1-12. Years of schooling 14. Diploma 15. Graduation 17. Post Graduation 20. Professional Education 33. Not applicable 66. Others (specify) _____ 99. Not known	01. House work 02. Cultivator 03. Agricultural laborer 04. Non Agricultural laborer 05. Skilled worker 06. Office Job (Class I) 07. Office Job(Class II/III) 08. Office Job(Class IV) 09. Business 10. Professional (Doctor, Engineer, Lawyer etc.) 11. Unemployed 12. Retired/ Not working because of old age 13. Not working because of handicap/ sickness 14. Student 33. Not applicable 66.Others (specify)_____	1. Usual resident 2. Resident for less than 6 months **CO/ VKC** 0. None 1. Vernal kerato conjunctivitis (VKC)

3

Status of Enumeration Data गणना की स्थिति	1.Completed interview (पूर्ण साक्षात्कार) 2.Incomplete interview (अपूर्ण साक्षात्कार) 3.Refused (मना कर दिया) 66.Others (Specify) अन्य (उल्लेख करें) _____	[ ]

Date of First Visit for Enumeration: _____

Date of Second Visit for Enumeration: _____

Date of Third Visit for Enumeration: _____

Signature of Enumerator   **Name of Enumerator**

4

UVR FORM II
INDIVIDUAL RISK ASSESSMENT QUESTIONNAIRE ≥40 YRS
PLEASE ENCIRCLE THE GIVEN RESPONSE

IDENTIFICATION DATA पहचान तथ्य	RESPONSE CATEGORIES उत्तरदाता श्रेणी
Study Location प्रोजेक्ट की जगह	☐ **Delhi=1, Guwahati=2, Chennai=3** दिल्ली =1, गोवाहाटी =2, चेन्नई = 3
Name of Village ग्राम का नाम	_____
Cluster Code समूह संख्या	☐☐
House No. मकान का दिया गया नम्बर	☐☐☐
Person No. व्यक्ति नम्बर	☐☐
Person Unique ID No. **(From Enumeration Form)** व्यक्ति को दिया गया नम्बर	☐ - ☐☐ - ☐☐☐ - ☐☐ Location ID (1) + Cluster ID (2) + HH No (3) + Person No (2)
Respondent Name उत्तरदाता का नाम	
Gender लिंग	Male=1; Female=2 पुरूष =1; स्त्री =2
Age उम्र	_____ (In completed years)
Interviewer Name and Code साक्षात्कारकर्ता का नाम एवं कोड	☐☐
Date of Interview साक्षात्कार की तिथि	**(dd/mm/yyyy)** _ _/ _ _/ _ _ _ _

SECTION A: OUTDOOR EXPOSURE

PRESENT ACTIVITY

1. What type of work are you mainly involved in throughout the day?

(Multiple responses possible)

आप की प्रत्येक दिन की दिनचर्या क्या है?   **(एक से अधिक उत्तर संभव)**

1. Agricultural work (खेती का कार्य)   ☐
2. Outdoor Non Agricultural Work (घर के बाहर अन्य कार्य)   ☐
3. Indoor work (घर के अन्दर का कार्य)   ☐

2. For how many years have you been doing this kind of work?

आप यह कार्य कितने वर्षों से कर रहे हैं?

_____ years (वर्ष)

3. How many hours do you usually spend outdoor after sunrise and before sunset? (9:00 AM to 5:00 PM) **Record in decimal form (eg: 1:30hr = 1.5hr)**

आप सूरज निकलने से सूरज डूबने तक प्रायः कितने घंटे घर से बाहर बिताते हैं ?

(सुबह 9:00 बजे से शाम 5:00 बजे तक)   0 = Nil (कुछ नहीं)

_____ hours (घंटे)

4. For how many hours are you usually outdoors in the middle of the day? (From 11:00 AM to 3:00 PM)

आमतौर पर आप दोपहर में कितने घंटे घर से बाहर बिताते है? (सुबह 11:00 बजे से दोपहर 3:00 बजे तक)

_____ hours (घंटे)

5. What type of head gear or eye gear do you normally wear when outside b/w 9 AM to 5 PM?

आमतौर पर आप जब धूप में जाते है तो सूबह 9:00 बजे से 5:00 बजे तक सिर व आँख ढकने के लिए क्या इस्तेमाल करते है ?   **Record in decimal form (eg: 1:30hr = 1.5hr)**

घंटे प्रति दिन

0. None (कुछ नही)   ....
1. Veil/ Dupatta/Saree pallu/ Ghunghat(बुरका / दूपट्टा / साड़ी पल्लू / घूँघट)   ....
2. Pagdi/saroopa/ mundas /towel(पगड़ी / सरूपा / मुंडास / तौलीया)   ....
3. Umbrella(छाता)   ....
4. Cap (टोपी)   ....
5. Sunglasses/prescription glasses (धूप का चश्मा / नम्बर वाला चश्मा)   ....
66. Others अन्य (उल्लेख करें) _____   ....

PAST ACTIVITY

6. Were you doing some other work in the past? **(Multiple responses possible)**

क्या आप इसके पहले दूसरा काम करते थे?   **(एक से अधिक उत्तर संभव)**

0 . Not applicable (लागू नही)
1. Agricultural work (खेती का कार्य)   ☐
2. Outdoor Non Agricultural Work (घर के बाहर अन्य कार्य)   ☐
3. Indoor work (घर के अन्दर का कार्य)   ☐

7. For how many years did you follow this routine?

आप ने यह कार्य कितने वर्षों तक किया था?

_____ years (वर्ष)

8. How many hours did you usually spend outdoor after sunrise and before sunset? (9.00am to 5.00PM) **Record in decimal form (eg: 1:30hr = 1.5hr)**

आप सूरज निकलने से सूरज डूबने तक प्रायः कितने घंटे घर से बाहर बिताते थे?

(सुबह 9:00 बजे से शाम 5:00 बजे तक)   0 = Nil (कुछ नही)

_____ hours (घंटे)

9. For how many hours were you usually outdoors in the middle of the day. (From 11:00 AM to 3:00 PM)

आमतौर पर आप दोपहर में कितने घंटे घर से बाहर बिताते थे? (सूबह 11:00 बजे से दोपहर 3:00 बजे तक)

_____ hours (घंटे)

10. What type of head gear or eye gear did you normally wear when outside b/w 9:00 AM to 5:00 PM ?

आमतौर पर आप जब धूप में जाते थे तो सूबह 9:00 बजे से शाम 5:00 बजे तक सिर व आँख ढकने के लिए क्या इस्तेमाल करते थे?   **Record in decimal form (eg: 1:30hr = 1.5hr)**

घंटे प्रति दिन

0. None (कुछ नही)   ....
1. Veil/ Dupatta/Saree pallu/ Ghunghat(बुरका / दूपट्टा / साड़ी पल्लू / घूँघट)   ....
2. Pagdi/saroopa/ mundas /towel(पगड़ी / सरूपा / मुंडास / तौलीया)   ....
3. Umbrella (छाता)   ....
4. Cap (टोपी)   ....
5. Sunglasses/prescription glasses (धूप का चश्मा / नम्बर वाला चश्मा)   ....
66. Others अन्य (उल्लेख करें) _____   ....

REMOTE PAST ACTIVITY

11. Were you doing some other work in the past? **(Multiple responses possible)**

क्या आप इसके पहले दूसरा काम करते थे?   **(एक से अधिक उत्तर संभव)**

0 . Not applicable (लागू नही)

1. Agricultural work (खेती का कार्य)

2. Outdoor Non Agricultural Work (घर के बाहर अन्य कार्य)

3. Indoor work (घर के अन्दर का कार्य)

12. For how many years did you follow this routine?

आप ने यह कार्य कितने वर्षों तक किया था ?

_____ years (वर्ष)

13. How many hours did you usually spend outdoor after sunrise and before sunset? (9.00AM to 5.00PM) **Record in decimal form (eg: 1:30hr = 1.5hr)**

आप सूरज निक्लने से सूरज डूबने तक प्रायः कितने घंटे घर से बाहर बिताते थे? (सुबह 9:00 बजे से शाम 5:00 बजे तक)   0 = Nil (कुछ नही)

_____ hours (घंटे)

14. For how many hours were you usually outdoors in the middle of the day. (From 11:00 AM to 3:00 PM)

आमतौर पर आप दोपहर में कितने घंटे घर से बाहर बिताते थे? (सूबह 11:00 बजे से दोपहर 3:00 बजे तक)

_____ hours (घंटे)

15. What type of head gear or eye gear did you normally wear when outside b/w 9AM to5PM?

आमतौर पर आप जब धूप में जाते थे तो सुबह 9:00 बजे से शाम 5:00 बजे तक सिर व आँख ढकने के लिए क्या इस्तेमाल करते थे?

घंटे प्रति दिन

0. None (कुछ नही) ....

1. Veil/ Dupatta/Saree pallu/ Ghunghat(बूरका / दूपट्टा / साड़ी पल्लू / घूँघट) ....

2. Pagdi/saroopa/ mundas /towel(पगड़ी / सरूपा / मुंडास / तौलीया) ....

3. Umbrella (छाता) ....

4. Cap (टोपी) ....

5. Sunglasses/prescription glasses (धूप का चश्मा / नम्बर वाला चश्मा) ....

66. Others अन्य (उल्लेख करें) _____ ....

SECTION B: INDOOR SMOKE EXPOSURE
KITCHEN (रसोईघर)

16. Do/Did you ever cook food/ spend time in the kitchen daily?

क्या प्रतिदिन आप खाना पकाने / रसोईघर में समय बिताते है/थे ?

Yes (हाँ) =1   No (नहीं) =2   **(If No, go to Q.No. 19)**

17. If yes, then how much time do you spend in the cooking place/kitchen every day?

यदि हाँ तो आप प्रतिदिन कितना समय खाना पकाने या रसोईघर में बिताते हैं/थे ?

Total Time (कुल) _____hours (घंटे)

18. For how many years have you been cooked food/spent time in the kitchen?

आप कितने वर्ष खाना बनाने /रसोई में समय बितायें है/थे ?

_____ years(वर्ष)

19. In your house what fuel is generally used? **(Multiple responses possible)**

सामान्यतः आपके घर में कौन सा ईंधन इस्तेमाल होता है /था?
(एक से अधिक उत्तर संभव है)

FUEL (ईंधन)

S.No. कोड	Type of fuel ईंधन के प्रकार	Number of years कितने साल से		
		Present	Past	Remote past
1.	Wood/Crop residues/Dung cakes (लकड़ी/ फसल का बचा हुआ हिस्सा /उपले)			
2.	Coal/coke/lignite/ Charcoal (कोयला / लकड़ी का कोयला)			
3.	Kerosene (किरोसिन)			
4.	Electricity (बिजली का हीटर)			
5.	LPG (एल०पी०जी०)			
6.	Bio Gas/Gobar Gas/Solar Cooker (वायोगैस/गोबरगैस)			

3

SECTION C: SMOKING HABITS

20. Have you ever smoked tobacco daily for more than three months?
क्या आप ने कभी लगातार तीन महीने से अधिक समय तक प्रतिदिन धूम्रपान किया है?

    Yes (हाँ) = 1   No (नही) = 2   **(If No then finish the form III)**

21. If yes, for how long have you been smoking/smoked tobacco?
यदि हाँ तो आपने कितने समय तक धूम्रपान किया है?
_____ months/ years(महीने / वर्ष)

22. What do you smoke? **(Multiple responses possible)**
धूम्रपान के लिए आप क्या इस्तेमाल करते है? (एक से अधिक उत्तर संभव)
   1. Cigarette (सिगरेट)   □
   2. Bidi (बीड़ी)   □
   3. Hukka (हुक्का)   □
   66. Others (Specify) (अन्य उल्लेख करें) _____

23. How many cigarettes/bidi/chillum do you smoke each day?
आप प्रतिदिन कितने सिगरेट/बीड़ी/हुक्का पीते है?

	Present	
	Years	Numbers
1. Cigarette (सिगरेट)		
2. Bidi (बीड़ी)		
3. Hukka (हुक्का)		
66. Others (Specify) (अन्य उल्लेख करें)		

If you do not smoke now or if the pattern of smoking was different in the past then
यदि आप वर्तमान में धूम्रपान नहीं करते या धूम्रपान के तरीके में कोई बदलाव आया है तो

24. What did you smoke? **(Multiple responses possible)**
पहले आप धूम्रपान के लिए क्या इस्तेमाल करते थे ? (एक से अधिक उत्तर संभव)
   1. Cigarette (सिगरेट)   □
   2. Bidi (बीड़ी)   □
   3. Hukka (हुक्का)   □
   66. Others (Specify) (अन्य उल्लेख करें) _____

25. How many cigarettes/bidi/chillum did you smoke each day?
धूम्रपान के लिए आप क्या इस्तेमाल करते थे ?

	Past	
	Years	Numbers
1. Cigarette (सिगरेट)		
2. Bidi (बीड़ी)		
3. Hukka (हुक्का)		
66. Others (Specify) (अन्य उल्लेख करे)		

4

<u>UVR FORM III</u>: Ocular Surface Disease Index (OSDI)

नेत्र ऊपरी रोग सूचक (ऑक्यूलर सरफेस डिजीज इन्डेक्स)

Ask your participant the following 12 questions, and circle the number in the box that best represents each answer.

उत्तरदाता से निम्नलिखित १२ सवाल पूछें, और सर्वोत्तम जवाब के अंक को गोला करे

Have you experienced any of the following during the last month :- क्या आपने पिछले महीने निम्न में से किन्हीं तक्लीफ का अनुभव किया है?	All of the time हर समय	Most of the time ज्यादा समय	Half of the time आधे समय	Some of the time कुछ समय	None of the time कभी नहीं
1. Eyes that are sensitive to light? आँखों का रोशनी से प्रभावित होना	4	3	2	1	0
2. Eyes that feel gritty? आँखों में किरकिरापन महसूस होना	4	3	2	1	0
3. Painful or sore eyes? आँखों में दर्द या जलन	4	3	2	1	0
4. Blurred vision (आँखों में धुँधलापन)	4	3	2	1	0
5. Poor vision (नजर कमजोर होना) ?	4	3	2	1	0
Subtotal score for answers 1 to 5: [____] **A**					

Have problems with your eyes limited you in performing any of the following during the last month (क्या पिछले महीने से आँखों की तकलीफ के कारण आप निम्न कार्यों को नहीं कर पा रहे हैं ?)	All of the time हर समय	Most of the time ज्यादा समय	Half of the time आधे समय	Some of the time कुछ समय	None of the time कभी नहीं	Not applicable लागू नहीं है
6. Reading (पढ़ना)	4	3	2	1	0	N/A
7. Driving at night? रात में गाड़ी चलाना	4	3	2	1	0	N/A
8. Working with a computer or bank machine (ATM)? कम्प्यूटर या एटीम पर काम करना	4	3	2	1	0	N/A
9. Watching TV? टी०वी० देखना	4	3	2	1	0	N/A
Subtotal score for answers 6 to 9: [____] **B**						

Have your eyes felt uncomfortable in any of the following situations during the last month?

क्या पिछले महीने से निम्न में से किसी परिस्थितियों में आपकी आँखों में तकलीफ हुई है?

	All of the time हर समय	Most of the time ज्यादा समय	Half of the time आधे समय	Some of the time कुछ समय	None of the time कभी नहीं	Not applicable लागू नहीं है
10. Windy conditions? तेज हवा के कारण	4	3	2	1	0	N/A
11. Places or areas with low humidity (very dry)? कम उमस वाली जगहों में (अत्यधिक शुष्क)	4	3	2	1	0	N/A
12. Areas that are air conditioned? वातानुकूलित (एयर कंडीशंड) जगहों में	4	3	2	1	0	N/A

Subtotal score for answers 10 to 12: [____] **C**   **Total score (A+B+C) =** [____]   **Total no. of questions answered =** [____]

Status of Interview साक्षात्कार की स्थिति	1. Completed interview (पूर्ण साक्षात्कार) 2. Incomplete interview (अपूर्ण साक्षात्कार) 3. Refused (मना कर दिया) 66.Others (Specify) अन्य (उल्लेख करें) _____

Signature of Interviewer: Name of Interviewer:

SPECIAL OBSERVATIONS AND REMARKS

रोगी सूचना प्रपत्र

<u>परियोजना का शीर्षकः</u> – भारत में नेत्र स्वास्थ्य पर वातावरण बदलाव तथा अल्ट्रावॉयलेट रेडिएशन

<u>(यू०वी०आर०) के प्रभाव का बहु केन्द्रीय सहयोगी अध्ययन।</u>

डॉ० राजेन्द्र प्रसाद नेत्र विज्ञान केन्द्र, अखिल भारतीय आयुर्विज्ञान संस्थान, नई दिल्ली द्वारा अल्ट्रावॉयलेट रेडिएशन तथा नेत्र रोगों से संबंधित एक अध्ययन संचालित किया गया है। पिछले दशको में अल्ट्रावॉयलेट रेडिएशन ने प्राकृतिक वातावरण को प्रभाकवत करने के साथ–साथ नेत्र स्वास्थ्य को भी महत्त्वपूर्ण रूप से प्रभावित किया है। जलवायु परिवर्त्तन के कारण आँख की ऊपरी सतह, कार्निया, लैंस तथा रेटिना पर दुष्प्रभाव पड़ा है। इस अध्ययन का मुख्य उद्देश्य अल्ट्रावायलेट के कारण उत्पन्न नेत्र क्षति है।भारत में मोतियाबिंद अंधता का एक मुख्य कारण है। इस अध्ययन के द्वारा हम यू०वी० रेडिएशन तथा विभिन्न नेत्र रोग जैसे मोतियाबिंद, शुष्क नेत्र, टेरीजियम तथा स्प्रिंग नजला (वी०के०सी०) के उपचार के सहसंबंध अति गंभीर समस्याओं को रोकने में सहायता प्राप्त होगी।

उपर्युक्त जानकारी प्राप्त करने के लिए हमें वी०के०सी० के लिए 5 से 15 वर्ष की आयु वर्ग के बच्चो की तथा मोतियाबिंद, शुष्क नेत्र तथा टेरीजियम के लिए 40 वर्ष से अधिक आयु वर्ग के व्यक्तियों के नेत्रो की जाँच होगी। आपको एक प्रश्नावली दी जाएगी। सामान्यमानक के अनुसार डॉ० राजेन्द्र नेत्र विज्ञान, केन्द्र, अखिल भारतीय आयुर्विज्ञान संस्थान, नई दिल्ली में आपकी ऑखो का उपचार एवं संपूर्ण जांच की जाएगी। नेत्र परीक्षण के दौरान नेत्र डॉप्स की कुछ बूंदो द्वारा आपकी पुतली को विस्तारित किया जाएगा। इससे 1-2 ँ दे सकता है जो पूर्णतः हानिरहित है। यह स्वतः ही ठीक हो जाएगा। विशेष कैमरो द्वारा आप के नेत्रों के लैंसो की तस्वीरें ली जाएगी। उपर्युक्त सभी परीक्षण एवं जाँच एक बार में लगभग 3 घंटो में पूरी हो जाएंगे।

आप के द्वारा दी गई सभी जानकारियाँ तथा सभी परीक्षणों के परिणाम गोपनीय रखा जाएगा। इस अध्ययन में शामिल होने से आपको किसी प्रकार की हानि नही होगी।आप इस अध्ययन में सम्मिलित होने अथवा इसे बीच में छोड़ देने के लिए स्वतंत्र है। आपकी नेत्र संबंधी समस्याओं का निःशुल्क उपचार किया जाएगा। आपकी इस अध्ययन में सहभागिता अथवा अध्ययन छोड़ देने से आपके उपचार पर कोई प्रभाव नही पड़ेगा।

आपसे अनुरोध है कि इससे अतिरिक्त किसी भी जानकारी अथवा स्पष्टीकरण के लिए आप किसी भी समय निम्न व्यक्तियों से संपर्क कर सकते है :–

आचार्या राधिका टडंन, आचार्या   26593145

डॉ० प्रवीण वशिष्ठ, सह आचार्य   9868398410, 26593143

रोगी सूचित स्वीकृति पत्र

इस ट्रायल के लिए रोगी की आईडी: ....

परियोजना का शीर्षक: – भारत में नेत्र स्वास्थ्य पर वातावरण बदलाव तथा अल्ट्रावॉयलेट रेडिएशन (यू०वी०आर०)

के प्रभाव का बहु केन्द्रीय सहयोगी अध्ययन।

मुख्य अन्वेषक का नाम: **आचार्या राधिका टडंन   26593145**

इस सूचना पत्र की सामग्री दिनांक .... को प्रदान की गई थी, मैंने सावधानीपूर्वक पढ़लिया है। मुझे उस भाषा में विस्तार से समझा दिया गया है जो मुझे समझ में आती है और मैंने पूरी सामग्रीको अच्छी तरह समझ लिया है। मैं पुष्टि करता / करती हूँ कि मुझे प्रश्न पूछने का अवसर दिया गया है।

अध्ययन का प्रकार और प्रयोजन तथा इसके संभावित जोखिम / लाभ और अध्ययन पूरा होने की अनुमानित आवधि तथा अध्ययन के अन्य संगत विवरण मुझे विस्तार से समझा दिये गए हैं। मुझे बताया गयाहै कि मेरी भागीदारी स्वेच्छानुसार है और मैं कोई कारण बताए बिना किसी भी समय वापस जाने के लिए पूरी तरह स्वतंत्र हूँ और इस पर मेरी चिकित्सा देखभाल या कानूनी अधिकारों पर कोई प्रभाव नही पड़ेगा।

मुझे पता है कि इस अनुसंधान में मेरी भागीदारी के बारे में जमा की गई जानकारी और मेरे चिकित्सा नोट्स अखिल भारतीय आयुर्विज्ञान संस्थान (एम्स) के जिम्मेदार व्यक्तियों द्वारा देखी जाएगी, जो विनियामक प्राधिकरणों से हैं, जहां इस अनुसंधान में मेरे भाग लेने के संगत पाया जाए। मैं इन व्यक्तियों को अपने अभिलेख देखने की अनुमति देता हूँ।

मैं उपरोक्त अध्ययन में भाग लेने के लिए सहमत हूँ।

दिनांक: ....

स्थान : ....

हस्ताक्षर/बांए अंगूठे का निशान: ....

सहभागी का नाम: ....

पुत्र/पुत्री/जीवन साथी: ....

डाक का पूरा पता: ....

यह प्रमाणित किया जाता है कि उपरोक्त स्वीकृति मेरी उपस्थिति में प्राप्त की गई है।

अन्वेषक के हस्ताक्षर

दिनांक: ....

स्थानः ....

गवाह – 1   गवाह – 2

गवाह का नाम ....   गवाह का नाम ....

डाक का पूरा पता ....   डाक का पूरा पता ....

UVR FORM IV

INDIVIDUAL RISK ASSESSMENT QUESTIONNAIRE (5-15 YRS)

IDENTIFICATION DATA पहचान तथ्य	RESPONSE CATEGORIES उत्तरदाता श्रेणी
Study Location प्रोजेक्ट की जगह	☐ **Delhi=1, Guwahati=2, Chennai=3** दिल्ली =1, गोवाहाटी =2, चेन्नई = 3
Name of Village ग्राम का नाम	_____
Cluster Code समूह संख्या	☐☐
House No. मकान नम्बर	☐☐☐
Child No. बच्चे का नम्बर	☐☐
Child Unique ID No. **(From Enumeration Form)** बच्चे को दिया गया नम्बर	☐ - ☐☐ - ☐☐☐ - ☐☐ Location ID (1) + Cluster ID (2) + House No(3) + Person No (2)
Interviewer Code and Name साक्षात्कारकर्ता का कोड एवं नाम	☐☐ _____
Respondent Name उत्तरदाता का नाम	_____
Relationship to the child बच्चे से संबंध	☐ Mother=1 Father=2 माता =1 पिता =2 66. Others(specify) अन्य (उल्लेख करे)_____
Date of Interview **(dd-mm-yyyy)** साक्षात्कार की तिथि	☐☐ ☐☐ ☐☐☐☐
Name of child बच्चे का नाम	_____
Gender of the child	☐ Male=1 Female=2 पुरूष = 1 स्त्री = 2
Age of child (In completed years) बच्चे का उम्र (निकटतम वर्ष में)	☐☐

Informant: Mother/Father (Please Encircle the right response)
सूचना दाता : माता/पिता (कृपया सही उत्तर पर गोला लगाये)

S. No.	DATA	RESPONSE CATEGORIES
1.	Is there a family history of allergy or asthma (breathing problem)? क्या आप के परिवार में कभी किसी को एलर्जी या अस्थमा (सांस की) समस्या रही है ?	1= Yes 2 = No 99 = Not known 1= हाँ 2 = नहीं 99 = पता नही
2.	Are there any pets in the family? क्या परिवार में कोई पालतू पशु है ?	1=Yes 2=No 1= हाँ 2= नहीं
3.	Does anybody smoke in your family? क्या आप के परिवार में कोइ धूम्रपान करता है ? **(If No, than go to Question No.05)**	1=Yes 2=No 1= हाँ 2= नहीं
4.	If yes, then what is the relation to head of the house hold? यदि हाँ, तो उसका परिवार के मुखिया से क्या सम्बन्ध है ? 01. Self मुखिया 02. Spouse मुखिया की पत्नी /पति 03. Father पिता 04. Mother माता 05. Son बेटा 06. Daughter बेटी 07. Brother भाई 08. Sister बहन 09. Daughter-in-law बहु 10. Grand Son पोता/नाती 11. Grand Daughter पोती/ नतनी 12. Servant नौकर 66. Other(Specify) अन्य (उल्लेख करे) _____	Name of the smoker धूम्रपान करने वाले का नाम _____
5.	How many hours does the child usually spend outdoor after sunrise and before sunset? (9AM to 5PM) 0 = Nil आप का बच्चा अपने सारे कार्यो के लिए सूरज निकलने से सूरज डूबने तक प्रायः कितने घंटे घर से बाहर बिताता है ?	_____ घंटे
6.	For how many hours is the child usually outdoors in the middle of the day (From 11 AM to 3 PM) 0= Nil आमतौर पर आप का बच्चा दोपहर में कितने घंटे घर से बाहर बिताता है? (सूबह 11बजे से 3 बजे तक)	_____ घंटे
7.	What type of head/eye gear does the child normally wear when outdoors? आप का बच्चा घर से बाहर निकलते समय सिर व आँख को ढ़कने के लिए क्या इस्तेमाल करता है ?	Hrs. Per day (घंटे प्रति दिन) 0. None (कुछ नहीं) : ………….. 1. Cap/Hat(टोपी) ………….. 2. Umbrella/Japi (छाता) ………….. 3. Towel/Gamcha (तौलीया) ..……….. 4. Sunglasses/prescription glasses ……….. (धूप का चशमा / नम्बर वाला चश्मा) 66. Others(specify) (अन्य उल्लेख करें) _____ ……………..

UVR FORM V

CLINICAL EXAMINATION FORM ≥40 YRS

SECTION A: IDENTIFICATION DATA

IDENTIFICATION DATA	RESPONSE
Study Location	☐ **Delhi=1, Guwahati=2, Chennai=3**
Name of village	_____
Cluster Code	☐☐
House No.	☐☐☐
Person Number	☐☐
Person Unique ID No.	☐ - ☐☐ - ☐☐☐ - ☐☐ Location ID (1) + Cluster ID (2) + House No(3) + Person No (2)
Respondent Name	_____
Respondent Age **(in completed years)**	☐☐
Gender	☐ **Male = 1 ; Female = 2**
Optometrist Code/Name	☐☐ _____
Ophthalmologist Code/Name	☐☐ _____
Place of Examination	☐ **1. Base hospital** **2. Central field site** **3. Home Examination**
Date of Examination **(dd/mm/yyyy)**	☐☐ - ☐☐ - ☐☐☐☐
Photograph taken	☐ **Yes=1, No=2**

SECTION B: BLOOD PRESSURE, BLOOD SUGAR AND ANTHROPOMETRY

BLOOD PRESSURE (in mm Hg)

	First measurement	Second measurement
Systolic blood pressure		
Diastolic blood pressure		

If blood pressure not available please state reason why (circle one):
   1. Patient refused
   2. Machine gives error message
   66. Other (specify): _____		

WEIGHT

State value in Kg up to one decimal point	

If weight measurement not possible, please state reason why (circle one):
   1. Participant refuses
   2. Participant is chair/bed bound
   3. Participant is too unsteady on feet
   66. Other (specify): _____	

STANDING HEIGHT

State value in cm up to one decimal point	

If standing height measurement not possible, please state reason why (circle one):
   1. Participant refuses
   2. Participant is chair/bed bound
   3. Participant is too unsteady on feet
   4. Participant has a bent spine
   66. Other (specify): _____	

MID UPPER ARM CIRCUMFERENCE

State value (in cm) up to one decimal point	
If circumference not taken, state the reason:	

BLOOD SUGAR

State value in mg/dl up to one decimal point	
If blood sugar not taken, state the reason:	

HISTORY OF SYSTEMIC DISEASE (YES-1; NO=2)

	Yes/ No	Duration (yrs)	Medical Treatment (Yes/ No)
1. DM			
2. HYPERTENSION			
3. HEART DISEASE			
4. ANY OTHER (Specify)			

SECTION C1: VISUAL ACUITY

Wearing Glass (Yes=1, No=2)					
Vision		**Right Eye**		**Left Eye**	
		Acuity	**Total 'E's read**	**Acuity**	**Total 'E's read**
Unaided	Distance				
	Near				
Presenting (With usual glasses)	Distance				
	Near				
If vision not recorded, state the reason: RE_____ LE_____					

SECTION C2: SUBJECTIVE ACCEPTANCE

Subjective Acceptance (Done/ Not Done)						
If Not Done, Give reason: Corneal disease, Lenticular opacity, Patient Not Cooperative, Machine Error, Home Visit						
Acceptance		Sphere	Cylinder	Axis	Acuity	Total Es read
Right Eye	Distance					
	Near	Add D sph				
Left Eye	Distance					
	Near	Add DSph				

SECTION C3 : AUTOREFRACTION

Autorefraction (Done/ Not Done)					
If Not Done, Give reason: Corneal disease, Lenticular opacity, Patient Not Cooperative, Machine Error, Home Visit					
		Sphere		Cylinder	Axis
Right Eye	+/_		+/_		
Left Eye	+/_		+/_		

SECTION D: DRY EYE TESTS

PARAMETER	RIGHT EYE	LEFT EYE
SCHIRMER'S TEST (mm)		
BREAK UP TIME (sec)		
If dry eye tests not done please state reason why (circle one): 1. Patient refused 66. Other (specify): _____		

SECTION E: INTRAOCULAR PRESSURE

	RE	LE
Measured (**1= Yes; 2= No**)		
IOP in mm Hg		
Measured with:	1. NCT 2.Perkin's Applanation	
If not measured, Give reasons		

SECTION F1: BASIC EYE EXAMINATION
(Mark: 1= Present; 2=Not present; 9=Undetermined)

	RE	LE
1.Squint (a=LDS; b=LCS; c=RDS; d=RCS)		
2.Nystagmus		
3. Anterior staphyloma		
4. Phthisis/ Disorganized/Absent Globe/Microphthalmos/Anophthalmos		
5. Corneal Opacity (specify cause)		
6. Adherent leucoma		
7. Corneal Ulcer(Infective/shield ulcer)		
66.Others (Specify)		

If undetermined give reasons LE_____
                                   RE_____

SECTION F2:BIOMICROSCOPY EXAMINATION
(Mark: 1= Present; 2=Not present; 9=Undetermined)
☐ **Not Done, please explain:** _____

1.Pterygium		
a. Location	Nasal /temporal	Nasal /temporal
b. Size(mm)		
c. Extent beyond corneal limbus		
d. Grade		
2. Pingecula		
3. Corneal Staining		
a. Location (Superior =1, Inferior=2, Nasal =3, Temporal=4, Central=5, Total/Diffuse=6)		
4. Other Pathology		
specify:		

If undetermined give reasons   LE_____
                                     RE_____

SECTION G: PUPIL DILATION

1. Were mydriatic drops instilled (Yes=1; No=2)   **RE** _____ **LE** _____

    If no, specify reason **RE** _____**LE**_____

2. Was dilation = 6 mm (Yes=1; No=2) **RE** _____ **LE**_____

SECTION H1: LENS STATUS (MULTIPLE RESPONSES ALLOWED)
(Present=1; Not present=2; Not seen=3; Undetermined=9)

	RE	LE
1. Normal		
2. Pseudoexfoliation		
3. Cortical Cataract		
4. Nuclear Cataract		
5. Posterior subcapsular cataract		
6. Advanced cataract		
7. Developmental cataract		
8. Traumatic cataract		
9. Aphakia		
10. Aphakia + PCO		
11. Pseudophakia		
12. Pseudophakia + PCO		
13. Dislocated or subluxated lens/IOL		
66. Others (specify)		

If not seen specify the reason   RE _____ LE _____

If undetermined specify the reason RE _____ LE _____

SECTION H2: LOCS III GRADING

Details of LOCS grading: **Not Applicable RE**   **Not Applicable LE**

EYES	LOCS GRADING				Reasons for ungradable
	Cortical grade (C)	PSC grade (P)	Nuclear opalescence (NO)	Nuclear colour (NC)	1= poor quality 2= advanced opacity 3=aphakia/ pseudophakia 4= pupils not dilated 5= patient Refused
Right Eye					
Left Eye					

H3. IF, PSEUDOPHAKIC/APHAKIC, DETAILS ABOUT CATARACT SURGERY

Not applicable RE   **Not applicable LE**

	Right eye	Left eye
1. Age at operation (years)		
2. Place of operation		
Government hospital		
Voluntary/charitable hospital		
Private hospital		
Eye camp/improvised setting		
Traditional setting		
Don't know		
3. Cost of surgery		
Totally free		
Partially free		
Fully paid		
Don't know		
4. Type of surgery		
Non IOL		
IOL implant (PCIOL/ACIOL)		
Couching		
Don't know		
If aphakic, using aphakic glasses 1=Yes ;2= No If No, state reason		

SECTION I: FUNDUS EXAMINATION

(Present=1; Not present=2; Not seen=3; Undetermined=9)

	RE	LE
1. Normal		
2. Dry ARMD		
3. Wet ARMD		
4. Optic Atrophy		
5. Glaucomatous cupping		
6. High Myopia		
7. Vascular Retinopathy		
8. Diabetic Retinopathy Type(a=NPDR, b=PDR, c=Maculopathy)		
9. Chorioretinitis		
10. Other Maculopathy		
11. Significant Vitreous opacities		
12. Retinitis Pigmentosa		
13. Retinal Detachment		
14. Congenital anomaly		
66. Others (specify)		

If not seen specify the reason   **RE** _____ **LE** _____

If undetermined specify the reason RE _____ **LE** _____

SECTION J: MAIN CAUSE PRESENTING VA<6/18
(Mark only one cause for each eye) (Present=1; Not present=2; Not seen=3; Undetermined=9)

	Not applicable RE	Not applicable LE	Mark one principal disorder
	Right eye	**Left eye**	
1. Phthisical, disorganised or absent globe			1
2. Refractive error			2
3. Cataract, untreated			3
4. Aphakia, uncorrected			4
5. Posterior capsular opacification			5
6. Trachoma			6
7. Optic Atrophy			7
8. Corneal opacity			8
9. Globe abnormality			9
10. Glaucoma			10
11. Diabetic Retinopathy			11
12. ARMD			12
13. Chorioretinitis			13
14. Vascular retinopathy			14
15. Amblyopia			15
66. Other post. segment /CNS			66
Not examined (can see 6/18)			

If not seen specify the reason   RE _____ LE _____

If undetermined specify the reason RE _____ LE _____

Examination completed/ Not completed

PROTOCOL FOR VISUAL ACUITY TESTING

1. RIGHT EYE –UNAIDED

Four Metres						Acuity (Circle one)	# of letters read
First Row	E	m	Ǝ	E	ɯ	6/60	
Second Row	ɯ	Ǝ	E	ɯ	E	6/48	
Third Row	m	E	m	Ǝ	E	6/38	
Fourth Row	ɯ	E	Ǝ	E	Ǝ	6/30	
Fifth Row	m	Ǝ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	Ǝ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	Ǝ	E	6/15	
Eighth Row	Ǝ	ɯ	Ǝ	ɯ	E	6/12	
Ninth Row	Ǝ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	Ǝ	E	m	Ǝ	ɯ	6/6	
Total E's read at 4 meters (actual number of letters + 30)							
One Metre							
First Row	m	Ǝ	ɯ	E	Ǝ	1/40	
Second Row	ɯ	E	Ǝ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	Ǝ	m	Ǝ	E	1/20	
Fifth Row	E	Ǝ	ɯ	E	m	1/16	
Sixth Row	Ǝ	E	ɯ	m	Ǝ	1/12.5	
Total E's read at 1 meter (actual number of letters)							
					Finger Counting close to face	FCCF	
					Hand Movements	HM	
					Light Perception	PL	
					No Light Perception	N PL	

Note:
Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre, ircle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

2. LEFT EYE-UNAIDED

Four Metres							
						Acuity (Circle one)	**# of letters read**
First Row	E	m	Ǝ	E	ɯ	6/60	
Second Row	ɯ	Ǝ	E	ɯ	E	6/48	
Third Row	m	E	m	Ǝ	E	6/38	
Fourth Row	ɯ	E	Ǝ	E	Ǝ	6/30	
Fifth Row	m	Ǝ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	Ǝ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	Ǝ	E	6/15	
Eighth Row	Ǝ	ɯ	Ǝ	ɯ	E	6/12	
Ninth Row	Ǝ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	Ǝ	E	m	Ǝ	ɯ	6/6	
Total E's read at 4 meters (actual number of letters + 30)							
One Metre							
First Row	m	Ǝ	ɯ	E	Ǝ	1/40	
Second Row	ɯ	E	Ǝ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	Ǝ	m	Ǝ	E	1/20	
Fifth Row	E	Ǝ	ɯ	E	m	1/16	
Sixth Row	Ǝ	E	ɯ	m	Ǝ	1/12.5	
Total E's read at 1 meter (actual number of letters)							
						Finger Counting close to face	FCCF
						Hand Movements	HM
						Light Perception	PL
						No Light Perception	N PL

Note:
Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre. Circle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

3. RIGHT EYE –PRESENTING

Four Metres							
						Acuity (Circle one)	**# of letters read**
First Row	E	m	Ǝ	E	ɯ	6/60	
Second Row	ɯ	Ǝ	E	ɯ	E	6/48	
Third Row	m	E	m	Ǝ	E	6/38	
Fourth Row	ɯ	E	Ǝ	E	Ǝ	6/30	
Fifth Row	m	Ǝ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	Ǝ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	Ǝ	E	6/15	
Eighth Row	Ǝ	ɯ	Ǝ	ɯ	E	6/12	
Ninth Row	Ǝ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	Ǝ	E	m	Ǝ	ɯ	6/6	
Total E's read at 4 meters (actual number of letters + 30)							
One Metre							
First Row	m	Ǝ	ɯ	E	Ǝ	1/40	
Second Row	ɯ	E	Ǝ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	Ǝ	m	Ǝ	E	1/20	
Fifth Row	E	Ǝ	ɯ	E	m	1/16	
Sixth Row	Ǝ	E	ɯ	m	Ǝ	1/12.5	
Total E's read at 1 meter (actual number of letters)							
						Finger Counting close to face	FCCF
						Hand Movements	HM
						Light Perception	PL
						No Light Perception	N PL

Note:
Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre, circle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

4 LEFT EYE-PRESENTING

Four Metres						Acuity (Circle one)	# of letters read
First Row	E	m	Ǝ	E	ɯ	6/60	
Second Row	ɯ	Ǝ	E	ɯ	E	6/48	
Third Row	m	E	m	Ǝ	E	6/38	
Fourth Row	ɯ	E	Ǝ	E	Ǝ	6/30	
Fifth Row	m	Ǝ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	Ǝ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	Ǝ	E	6/15	
Eighth Row	Ǝ	ɯ	Ǝ	ɯ	E	6/12	
Ninth Row	Ǝ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	Ǝ	E	m	Ǝ	ɯ	6/6	
Total E's read at 4 meters (actual number of letters + 30)							
One Metre							
First Row	m	Ǝ	ɯ	E	Ǝ	1/40	
Second Row	ɯ	E	Ǝ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	Ǝ	m	Ǝ	E	1/20	
Fifth Row	E	Ǝ	ɯ	E	m	1/16	
Sixth Row	Ǝ	E	ɯ	m	Ǝ	1/12.5	
Total E's read at 1 meter (actual number of letters)							
					Finger Counting close to face	FCCF
					Hand Movements	HM
					Light Perception	PL
					No Light Perception	N PL

Note:
Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre, circle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

5. RIGHT EYE – SUBJECTIVE ACCEPTANCE

Four Metres						Acuity (Circle one)	# of letters read
First Row	E	m	Ǝ	E	ɯ	6/60	
Second Row	ɯ	Ǝ	E	ɯ	E	6/48	
Third Row	m	E	m	Ǝ	E	6/38	
Fourth Row	ɯ	E	Ǝ	E	Ǝ	6/30	
Fifth Row	m	Ǝ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	Ǝ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	Ǝ	E	6/15	
Eighth Row	Ǝ	ɯ	Ǝ	ɯ	E	6/12	
Ninth Row	Ǝ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	Ǝ	E	m	Ǝ	ɯ	6/6	
Total E's read at 4 meters (actual number of letters + 30)							
One Metre							
First Row	m	Ǝ	ɯ	E	Ǝ	1/40	
Second Row	ɯ	E	Ǝ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	Ǝ	m	Ǝ	E	1/20	
Fifth Row	E	Ǝ	ɯ	E	m	1/16	
Sixth Row	Ǝ	E	ɯ	m	Ǝ	1/12.5	
Total E's read at 1 meter (actual number of letters)							
					Finger Counting close to face		FCCF
					Hand Movements		HM
					Light Perception		PL
					No Light Perception		N PL

Note:

Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre, circle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

6. LEFT EYE – SUBJECTIVE ACCEPTANCE

Four Metres						Acuity (Circle one)	# of letters read
First Row	E	m	Ǝ	E	ɯ	6/60	
Second Row	ɯ	Ǝ	E	ɯ	E	6/48	
Third Row	m	E	m	Ǝ	E	6/38	
Fourth Row	ɯ	E	Ǝ	E	Ǝ	6/30	
Fifth Row	m	Ǝ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	Ǝ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	Ǝ	E	6/15	
Eighth Row	Ǝ	ɯ	Ǝ	ɯ	E	6/12	
Ninth Row	Ǝ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	Ǝ	E	m	Ǝ	ɯ	6/6	
Total E's read at 4 meters (actual number of letters + 30)							
One Metre							
First Row	m	Ǝ	ɯ	E	Ǝ	1/40	
Second Row	ɯ	E	Ǝ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	Ǝ	m	Ǝ	E	1/20	
Fifth Row	E	Ǝ	ɯ	E	m	1/16	
Sixth Row	Ǝ	E	ɯ	m	Ǝ	1/12.5	
Total E's read at 1 meter (actual number of letters)							
						Finger Counting close to face	FCCF
						Hand Movements	HM
						Light Perception	PL
						No Light Perception	N PL

Note:
Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre, circle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

7. NEAR VISION: Right Eye _Unaided_

						Acuity (Circle one)	# of letters read
First Row	ɯ	m	Ǝ	ɯ	E	6/120	
Second Row	m	Ǝ	ɯ	E	ɯ	6/95	
Third Row	E	ɯ	m	ɯ	Ǝ	6/75	
Fourth Row	E	Ǝ	ɯ	E	m	6/60	
Fifth Row	Ǝ	m	E	ɯ	Ǝ	6/48	
Sixth Row	ɯ	E	m	Ǝ	ɯ	6/38	
Seventh Row	m	ɯ	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ɯ	E	m	6/24	
Ninth Row	E	ɯ	m	ɯ	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ɯ	6/15	
Eleventh Row	m	E	ɯ	m	Ǝ	6/12	
Twelfth Row	ɯ	Ǝ	m	ɯ	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ɯ	6/7.5	
Total Es read							

8. NEAR VISION: Left Eye _Unaided_

						Acuity (Circle one)	# of letters read
First Row	ɯ	m	Ǝ	ɯ	E	6/120	
Second Row	m	Ǝ	ɯ	E	ɯ	6/95	
Third Row	E	ɯ	m	ɯ	Ǝ	6/75	
Fourth Row	E	Ǝ	ɯ	E	m	6/60	
Fifth Row	Ǝ	m	E	ɯ	Ǝ	6/48	
Sixth Row	ɯ	E	m	Ǝ	ɯ	6/38	
Seventh Row	m	ɯ	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ɯ	E	m	6/24	
Ninth Row	E	ɯ	m	ɯ	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ɯ	6/15	
Eleventh Row	m	E	ɯ	m	Ǝ	6/12	
Twelfth Row	ɯ	Ǝ	m	ɯ	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ɯ	6/7.5	
Total Es read							

Note: Enter the number of letters read in each row and enter the total in the appropriate box.

9. NEAR VISION: Right Eye _Presenting_

						Acuity (Circle one)	# of letters read
First Row	ɯ	m	Ǝ	ɯ	E	6/120	
Second Row	m	Ǝ	ɯ	E	ɯ	6/95	
Third Row	E	ɯ	m	ɯ	Ǝ	6/75	
Fourth Row	E	Ǝ	ɯ	E	m	6/60	
Fifth Row	Ǝ	m	E	ɯ	Ǝ	6/48	
Sixth Row	ɯ	E	m	Ǝ	ɯ	6/38	
Seventh Row	m	ɯ	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ɯ	E	m	6/24	
Ninth Row	E	ɯ	m	ɯ	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ɯ	6/15	
Eleventh Row	m	E	ɯ	m	Ǝ	6/12	
Twelfth Row	ɯ	Ǝ	m	ɯ	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ɯ	6/7.5	
Total Es read							

10. NEAR VISION: Left Eye _Presenting_

						Acuity (Circle one)	# of letters read
First Row	ɯ	m	Ǝ	ɯ	E	6/120	
Second Row	m	Ǝ	ɯ	E	ɯ	6/95	
Third Row	E	ɯ	m	ɯ	Ǝ	6/75	
Fourth Row	E	Ǝ	ɯ	E	m	6/60	
Fifth Row	Ǝ	m	E	ɯ	Ǝ	6/48	
Sixth Row	ɯ	E	m	Ǝ	ɯ	6/38	
Seventh Row	m	ɯ	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ɯ	E	m	6/24	
Ninth Row	E	ɯ	m	ɯ	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ɯ	6/15	
Eleventh Row	m	E	ɯ	m	Ǝ	6/12	
Twelfth Row	ɯ	Ǝ	m	ɯ	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ɯ	6/7.5	
Total Es read							

Note: Enter the number of letters read in each row and enter the total in the appropriate box.

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11. NEAR VISION : Right Eye _Corrected_

						Acuity (Circle one)	# of letters read
First Row	ш	m	Ǝ	ш	E	6/120	
Second Row	m	Ǝ	ш	E	ш	6/95	
Third Row	E	ш	m	ш	Ǝ	6/75	
Fourth Row	E	Ǝ	ш	E	m	6/60	
Fifth Row	Ǝ	m	E	ш	Ǝ	6/48	
Sixth Row	ш	E	m	Ǝ	ш	6/38	
Seventh Row	m	ш	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ш	E	m	6/24	
Ninth Row	E	ш	m	ш	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ш	6/15	
Eleventh Row	m	E	ш	m	Ǝ	6/12	
Twelfth Row	ш	Ǝ	m	ш	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ш	6/7.5	
Total Es read							

12. NEAR VISION : Left Eye _Corrected_

						Acuity (Circle one)	# of letters read
First Row	ш	m	Ǝ	ш	E	6/120	
Second Row	m	Ǝ	ш	E	ш	6/95	
Third Row	E	ш	m	ш	Ǝ	6/75	
Fourth Row	E	Ǝ	ш	E	m	6/60	
Fifth Row	Ǝ	m	E	ш	Ǝ	6/48	
Sixth Row	ш	E	m	Ǝ	ш	6/38	
Seventh Row	m	ш	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ш	E	m	6/24	
Ninth Row	E	ш	m	ш	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ш	6/15	
Eleventh Row	m	E	ш	m	Ǝ	6/12	
Twelfth Row	ш	Ǝ	m	ш	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ш	6/7.5	
Total Es read							

Note: Enter the number of letters read in each row and enter the total in the appropriate box.

UVR FORM VI
CLINICAL EXAMINATION FORM for VKC (5-15 YEARS)

SECTION A: IDENTIFICATION DATA

IDENTIFICATION DATA	RESPONSE
Study Location	☐ **Delhi=1, Guwahati=2, Chennai=3**
Name of village	_____
Cluster Code	☐☐
House No.	☐☐☐
Person Number	☐☐
Person Unique ID No.	☐ - ☐☐ - ☐☐☐ - ☐☐ Location ID (1) + Cluster ID (2) + House No(3) + Person No (2)
Respondent Name	_____
Respondent Age **(in completed years)**	☐☐
Gender	☐ **Male = 1 ; Female = 2**
Optometrist Code/Name	☐ _____
Ophthalmologist Code/Name	☐ _____
Place of Examination	☐ **1. Base hospital** **2. Central field site** **3. Home Examination**
Date of Examination **(dd-mm-yyyy)**	☐☐ - ☐☐ - ☐☐☐☐
Photograph taken	☐ **Yes=1, No=2**

SECTION B: ANTHROPOMETRY
WEIGHT

State value in Kg up to one decimal point	
If weight measurement not possible, please state reason why (circle one): 1. Participant refuses 2. Participant is chair/bed bound 3. Participant is too unsteady on feet 66. Other *Please specify:* _____	

STANDING HEIGHT

State value in cm up to one decimal point	
If standing height measurement not possible, please state reason why (circle one): 1. Participant refuses 2. Participant is chair/bed bound 3. Participant is too unsteady on feet 4. Participant has a bent spine 66. Other *Please specify:* _____	

MID UPPER ARM CIRCUMFERENCE

State value (in cm) up to one decimal point	
If circumference not taken, state the reason:	

C1: VISUAL ACUITY

Wearing Glass (Yes=1, No=2)					
Vision		**Right Eye**		**Left Eye**	
		Acuity	**Total 'E's read**	**Acuity**	**Total 'E's read**
Unaided	**Distance**				
	Near				
Presenting (With usual glasses)	**Distance**				
	Near				
If vision not recorded, state the reason: RE_____ LE_____					

C2: SUBJECTIVE ACCEPTANCE

Subjective Acceptance (Done/ Not Done)					
If Not Done, Give reason: Corneal disease, Lenticular opacity, Patient Not Cooperative, Machine Error, Home Visit					
Acceptance		**Sphere**	**Cylinder**	**Axis**	**Acuity**	**Total Es read**
Right Eye	**Distance**					
	Near	**Add** D sph				
Left Eye	**Distance**					
	Near	**Add** DSph				

If undetermined give reasons RE_____   LE_____

SECTION D: SLIT LAMP BIOMICROSCOPY EXAMINATON

☐ **Not Done, please explain:** _____

	OD (Right)				OS (Left)			
	None 0	Mild +1	Moderate +2	Severe +3	None 0	Mild +1	Moderate +2	Severe +3
a. Palpebral VKC	☐	☐	☐	☐	☐	☐	☐	☐
b. Limbal VKC	☐	☐	☐	☐	☐	☐	☐	☐
c. Bitot's spots	☐	☐	☐	☐	☐	☐	☐	☐
d. Corneal Staining	☐	☐	☐	☐	☐	☐	☐	☐
e.Corneal opacity	☐	☐	☐	☐	☐	☐	☐	☐
f. Shield Ulcer	☐	☐	☐	☐	☐	☐	☐	☐
g. Other Pathology	☐	☐	☐	☐	☐	☐	☐	☐
specify:								

PROTOCOL FOR VISUAL ACUITY TESTING

1. RIGHT EYE –UNAIDED

Four Metres							
						Acuity (Circle one)	**# of letters read**
First Row	E	m	Ǝ	E	ɯ	6/60	
Second Row	ɯ	Ǝ	E	ɯ	E	6/48	
Third Row	m	E	m	Ǝ	E	6/38	
Fourth Row	ɯ	E	Ǝ	E	Ǝ	6/30	
Fifth Row	m	Ǝ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	Ǝ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	Ǝ	E	6/15	
Eighth Row	Ǝ	ɯ	Ǝ	ɯ	E	6/12	
Ninth Row	Ǝ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	Ǝ	E	m	Ǝ	ɯ	6/6	
Total E's read at 4 meters (actual number of letters + 30)							
One Metre							
First Row	m	Ǝ	ɯ	E	Ǝ	1/40	
Second Row	ɯ	E	Ǝ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	Ǝ	m	Ǝ	E	1/20	
Fifth Row	E	Ǝ	ɯ	E	m	1/16	
Sixth Row	Ǝ	E	ɯ	m	Ǝ	1/12.5	
Total E's read at 1 meter (actual number of letters)							
						Finger Counting close to face	FCCF
						Hand Movements	HM
						Light Perception	PL
						No Light Perception	N PL

Note:
Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre, ircle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

2. LEFT EYE-UNAIDED

Four Metres						Acuity (Circle one)	# of letters read
First Row	E	m	ⱻ	E	ɯ	6/60	
Second Row	ɯ	ⱻ	E	ɯ	E	6/48	
Third Row	m	E	m	ⱻ	E	6/38	
Fourth Row	ɯ	E	ⱻ	E	ⱻ	6/30	
Fifth Row	m	ⱻ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	ⱻ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	ⱻ	E	6/15	
Eighth Row	ⱻ	ɯ	ⱻ	ɯ	E	6/12	
Ninth Row	ⱻ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	ⱻ	E	m	ⱻ	ɯ	6/6	
Total E's read at 4 meters (actual number of letters + 30)							

One Metre							
First Row	m	ⱻ	ɯ	E	ⱻ	1/40	
Second Row	ɯ	E	ⱻ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	ⱻ	m	ⱻ	E	1/20	
Fifth Row	E	ⱻ	ɯ	E	m	1/16	
Sixth Row	ⱻ	E	ɯ	m	ⱻ	1/12.5	
Total E's read at 1 meter (actual number of letters)							

Finger Counting close to face	FCCF
Hand Movements	HM
Light Perception	PL
No Light Perception	N PL

Note:
Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre. Circle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

3. RIGHT EYE –PRESENTING

Four Metres						Acuity (Circle one)	# of letters read
First Row	E	m	Ǝ	E	ɯ	6/60	
Second Row	ɯ	Ǝ	E	ɯ	E	6/48	
Third Row	m	E	m	Ǝ	E	6/38	
Fourth Row	ɯ	E	Ǝ	E	Ǝ	6/30	
Fifth Row	m	Ǝ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	Ǝ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	Ǝ	E	6/15	
Eighth Row	Ǝ	ɯ	Ǝ	ɯ	E	6/12	
Ninth Row	Ǝ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	Ǝ	E	m	Ǝ	ɯ	6/6	
						Total E's read at 4 meters (actual number of letters + 30)	
One Metre							
First Row	m	Ǝ	ɯ	E	Ǝ	1/40	
Second Row	ɯ	E	Ǝ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	Ǝ	m	Ǝ	E	1/20	
Fifth Row	E	Ǝ	ɯ	E	m	1/16	
Sixth Row	Ǝ	E	ɯ	m	Ǝ	1/12.5	
						Total E's read at 1 meter (actual number of letters)	
						Finger Counting close to face	FCCF
						Hand Movements	HM
						Light Perception	PL
						No Light Perception	N PL

Note:
Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre, circle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

4. LEFT EYE-PRESENTING

Four Metres							
						Acuity (Circle one)	# of letters read
First Row	E	m	Ǝ	E	ɯ	6/60	
Second Row	ɯ	Ǝ	E	ɯ	E	6/48	
Third Row	m	E	m	Ǝ	E	6/38	
Fourth Row	ɯ	E	Ǝ	E	Ǝ	6/30	
Fifth Row	m	Ǝ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	Ǝ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	Ǝ	E	6/15	
Eighth Row	Ǝ	ɯ	Ǝ	ɯ	E	6/12	
Ninth Row	Ǝ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	Ǝ	E	m	Ǝ	ɯ	6/6	
						Total E's read at 4 meters (actual number of letters + 30)	
One Metre							
First Row	m	Ǝ	ɯ	E	Ǝ	1/40	
Second Row	ɯ	E	Ǝ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	Ǝ	m	Ǝ	E	1/20	
Fifth Row	E	Ǝ	ɯ	E	m	1/16	
Sixth Row	Ǝ	E	ɯ	m	Ǝ	1/12.5	
						Total E's read at 1 meter (actual number of letters)	
						Finger Counting close to face	FCCF
						Hand Movements	HM
						Light Perception	PL
						No Light Perception	N PL

Note:

Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre, circle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

5. RIGHT EYE – SUBJECTIVE ACCEPTANCE

Four Metres						Acuity (Circle one)	# of letters read
First Row	E	m	Ǝ	E	ɯ	6/60	
Second Row	ɯ	Ǝ	E	ɯ	E	6/48	
Third Row	m	E	m	Ǝ	E	6/38	
Fourth Row	ɯ	E	Ǝ	E	Ǝ	6/30	
Fifth Row	m	Ǝ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	Ǝ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	Ǝ	E	6/15	
Eighth Row	Ǝ	ɯ	Ǝ	ɯ	E	6/12	
Ninth Row	Ǝ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	Ǝ	E	m	Ǝ	ɯ	6/6	
Total E's read at 4 meters (actual number of letters + 30)							

One Metre							
First Row	m	Ǝ	ɯ	E	Ǝ	1/40	
Second Row	ɯ	E	Ǝ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	Ǝ	m	Ǝ	E	1/20	
Fifth Row	E	Ǝ	ɯ	E	m	1/16	
Sixth Row	Ǝ	E	ɯ	m	Ǝ	1/12.5	
Total E's read at 1 meter (actual number of letters)							

Finger Counting close to face	FCCF
Hand Movements	HM
Light Perception	PL
No Light Perception	N PL

Note:
Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre, circle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

6. LEFT EYE – SUBJECTIVE ACCEPTANCE

Four Metres							
						Acuity (Circle one)	**# of letters read**
First Row	E	m	Ǝ	E	ɯ	6/60	
Second Row	ɯ	Ǝ	E	ɯ	E	6/48	
Third Row	m	E	m	Ǝ	E	6/38	
Fourth Row	ɯ	E	Ǝ	E	Ǝ	6/30	
Fifth Row	m	Ǝ	ɯ	ɯ	m	6/24	
Sixth Row	E	ɯ	Ǝ	m	ɯ	6/19	
Seventh Row	ɯ	m	E	Ǝ	E	6/15	
Eighth Row	Ǝ	ɯ	Ǝ	ɯ	E	6/12	
Ninth Row	Ǝ	E	ɯ	E	m	6/9.5	
Tenth Row	ɯ	m	E	m	ɯ	6/7.5	
Eleventh Row	Ǝ	E	m	Ǝ	ɯ	6/6	
					Total E's read at 4 meters (actual number of letters + 30)		

One Metre							
First Row	m	Ǝ	ɯ	E	Ǝ	1/40	
Second Row	ɯ	E	Ǝ	m	ɯ	1/32	
Third Row	m	E	ɯ	E	E	1/25	
Fourth Row	ɯ	Ǝ	m	Ǝ	E	1/20	
Fifth Row	E	Ǝ	ɯ	E	m	1/16	
Sixth Row	Ǝ	E	ɯ	m	Ǝ	1/12.5	
					Total E's read at 1 meter (actual number of letters)		

Finger Counting close to face	FCCF
Hand Movements	HM
Light Perception	PL
No Light Perception	N PL

Note:
Enter the number of letters read in each row and enter the total in the appropriate box depending on whether read at 4 metres or 1metre. If there is no recording even at 1 metre, circle one of the four visual acuities (FCCF/HM/PL/NPL) as appropriate.

7. NEAR VISION: Right Eye _Unaided_

						Acuity (Circle one)	# of letters read
First Row	ш	m	Ǝ	ш	E	6/120	
Second Row	m	Ǝ	ш	E	ш	6/95	
Third Row	E	ш	m	ш	Ǝ	6/75	
Fourth Row	E	Ǝ	ш	E	m	6/60	
Fifth Row	Ǝ	m	E	ш	Ǝ	6/48	
Sixth Row	ш	E	m	Ǝ	ш	6/38	
Seventh Row	m	ш	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ш	E	m	6/24	
Ninth Row	E	ш	m	ш	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ш	6/15	
Eleventh Row	m	E	ш	m	Ǝ	6/12	
Twelfth Row	ш	Ǝ	m	ш	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ш	6/7.5	
Total Es read							

8. NEAR VISION: Left Eye _Unaided_

						Acuity (Circle one)	# of letters read
First Row	ш	m	Ǝ	ш	E	6/120	
Second Row	m	Ǝ	ш	E	ш	6/95	
Third Row	E	ш	m	ш	Ǝ	6/75	
Fourth Row	E	Ǝ	ш	E	m	6/60	
Fifth Row	Ǝ	m	E	ш	Ǝ	6/48	
Sixth Row	ш	E	m	Ǝ	ш	6/38	
Seventh Row	m	ш	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ш	E	m	6/24	
Ninth Row	E	ш	m	ш	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ш	6/15	
Eleventh Row	m	E	ш	m	Ǝ	6/12	
Twelfth Row	ш	Ǝ	m	ш	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ш	6/7.5	
Total Es read							

Note: Enter the number of letters read in each row and enter the total in the appropriate box.

9. NEAR VISION: Right Eye _Presenting_

						Acuity (Circle one)	# of letters read
First Row	ɯ	m	Ǝ	ɯ	E	6/120	
Second Row	m	Ǝ	ɯ	E	ɯ	6/95	
Third Row	E	ɯ	m	ɯ	Ǝ	6/75	
Fourth Row	E	Ǝ	ɯ	E	m	6/60	
Fifth Row	Ǝ	m	E	ɯ	Ǝ	6/48	
Sixth Row	ɯ	E	m	Ǝ	ɯ	6/38	
Seventh Row	m	ɯ	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ɯ	E	m	6/24	
Ninth Row	E	ɯ	m	ɯ	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ɯ	6/15	
Eleventh Row	m	E	ɯ	m	Ǝ	6/12	
Twelfth Row	ɯ	Ǝ	m	ɯ	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ɯ	6/7.5	
Total Es read							

10. NEAR VISION: Left Eye _Presenting_

						Acuity (Circle one)	# of letters read
First Row	ɯ	m	Ǝ	ɯ	E	6/120	
Second Row	m	Ǝ	ɯ	E	ɯ	6/95	
Third Row	E	ɯ	m	ɯ	Ǝ	6/75	
Fourth Row	E	Ǝ	ɯ	E	m	6/60	
Fifth Row	Ǝ	m	E	ɯ	Ǝ	6/48	
Sixth Row	ɯ	E	m	Ǝ	ɯ	6/38	
Seventh Row	m	ɯ	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ɯ	E	m	6/24	
Ninth Row	E	ɯ	m	ɯ	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ɯ	6/15	
Eleventh Row	m	E	ɯ	m	Ǝ	6/12	
Twelfth Row	ɯ	Ǝ	m	ɯ	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ɯ	6/7.5	
Total Es read							

Note: Enter the number of letters read in each row and enter the total in the appropriate box.

11. NEAR VISION : Right Eye *Corrected*

						Acuity (Circle one)	# of letters read
First Row	ш	m	Ǝ	ш	E	6/120	
Second Row	m	Ǝ	ш	E	ш	6/95	
Third Row	E	ш	m	ш	Ǝ	6/75	
Fourth Row	E	Ǝ	ш	E	m	6/60	
Fifth Row	Ǝ	m	E	ш	Ǝ	6/48	
Sixth Row	ш	E	m	Ǝ	ш	6/38	
Seventh Row	m	ш	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ш	E	m	6/24	
Ninth Row	E	ш	m	ш	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ш	6/15	
Eleventh Row	m	E	ш	m	Ǝ	6/12	
Twelfth Row	ш	Ǝ	m	ш	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ш	6/7.5	
Total Es read							

12. NEAR VISION : Left Eye *Corrected*

						Acuity (Circle one)	# of letters read
First Row	ш	m	Ǝ	ш	E	6/120	
Second Row	m	Ǝ	ш	E	ш	6/95	
Third Row	E	ш	m	ш	Ǝ	6/75	
Fourth Row	E	Ǝ	ш	E	m	6/60	
Fifth Row	Ǝ	m	E	ш	Ǝ	6/48	
Sixth Row	ш	E	m	Ǝ	ш	6/38	
Seventh Row	m	ш	Ǝ	m	E	6/30	
Eighth Row	Ǝ	E	ш	E	m	6/24	
Ninth Row	E	ш	m	ш	Ǝ	6/19	
Tenth Row	Ǝ	m	E	Ǝ	ш	6/15	
Eleventh Row	m	E	ш	m	Ǝ	6/12	
Twelfth Row	ш	Ǝ	m	ш	E	6/9.5	
Thirteenth Row	E	m	E	Ǝ	ш	6/7.5	
Total Es read							

Note: Enter the number of letters read in each row and enter the total in the appropriate box.