# Structural Equation Modeling Using to Eye Disease Patients

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*Abstract-* **Purpose:** This study entitled "Structural equation modeling using to eye disease patients" deals with the untreated eye disease which leads to the condition of blindness in the world. Eye problems can be detected early at the age of 35 with the help of a baseline eye exam which helps to prevent vision loss. If a person is at the risk of acute eye problem, yearly visits are recommended.
**Methods:** The Most common eye disease - radiation, cataract, glaucoma, and AMD-infection condition leads to vision loss. It is detected that 80% of vision loss can be avoided on early detection and treatments.
**Conclusion:** This study clearly tells about there is no association between previous checkup and vision problems and demographic variables.

*Keywords:* Eye disease, Cataract, Radiation, and Structural Equation Modeling (SEM)

## I. INTRODUCTION

Eyes are considered to be the most pretty part of one's face. Many eye disorders are hereditary or of higher incidence in members of a similar family. Examples include refractive errors, strabismus, cataract, glaucoma, retinal detachment, and retinal dystrophy.

**VISUAL ACUITY**
The severity of near and distance vision is tested separately for each eye. One eye is protected with a piece of paper or the palm of the hand placed lightly over the eye. The fingers should not be used in the eyes because the patient will be able to see between them. The general practitioner or student can conduct an approximate test of visual acuity. The patient is first asked to identify certain visual symbols referred to as optotypes at a distance of 5 meters or 20 feet (test of distance vision). These visual symbols are designed hence that optotypes of a certain size can barely be resolved by the normal eye at a specified distance (this standard distance is specified in meters next to the respective symbol). The eye charts must be clean and well illuminated for the checking.

**GLAUCOMA**
Glaucoma is not a single disease process but a group of disarray characterized by a progressive optic neuropathy resulting in a normal appearance of the optic disc and a specific pattern of irremediable visual field defects that are associated frequently but not invariably with raised intraocular pressure (IOP). Thus, IOP is the most typical risk factor but not the only risk factor for the development of glaucoma. Consequently, the term '*ocular hypertension*' is used for cases having constantly raised IOP without any associated glaucomatous damage. Conversely, the term *normal* or *low tension glaucoma (NTG/LTG)* is suggested for the typical cupping of the disc and/or visual field defects associated with a normal or low IOP.

**CATARACT**
The crystalline lens is a transparent structure. Its transparency may be troubled due to the degenerative process leading to the pacification of lens fibers. Nearly everyone knows that cataracts are the effect of the normal process of aging. However, it is an equally important fact that cataracts occur early in the Indian population. And, yes, early onset can be prevented or delayed.

Lotus Eye Hospital, explains that a cataract occurs when the transparent lens (similar to the lens of a camera which enables vision) becomes opaque. The most common cataract is senile cataract – that occurs with age, but it is now occurring at an earlier age, she says. By blocking the source of light that enters the eye, it will cause cloudy or foggy vision and glare.

Once cataract sets in, the prevailing medical prudence are to operate immediately and not wait for it to ripen, especially when it occurs earlier in patients, she explains. The surgery, which lasts for ten minutes, is not performed on both eyes at the same time. Some of the risk factors include excessive exposure to UV rays (from sunlight), lack of adequate nutrition and uncontrolled diabetes and hypertension, doctors point out. The average age of the person with cataract in America is over 70 years, however, in India, we are seeing people in the '50s, Amar Agarwal of Dr. Agarwal's Eye Hospital says. "One reason, of course, is that we have more of sunlight and the U/V rays are harmful to the eyes. Using sunglasses with adequate U/V protection will help delay onset".

## II. LITERATURE SURVEY

**Srihari Atti  and Superna Mahendra,** has discussed Estimation of the second eye in primary angle closure showed excludable angles of the anterior chamber with use to identify risk group, especially above 40 years. And to create awareness in the society for early detection of the disease to prevent angle closure disease-related blindness in our community with a greater life assumption and an expanding age population [1].

**Niladri Saha,** has discussed from the above results, the author's conclusion that in relation to the commonly encountered eye diseases, rural persons are less aware and less-informed about them. But, future longitudinal studies are recommended [2].

**M.Brayden Lundquist, Nishant Sharma, and Kirti Kewalramani,** has discussed Our data suggests that residents in Patna, Bihar India could benefit from educational outreach programs specifically addressing drug eye drop usage and ocular health problems specific to diabetes and glaucoma. The data reported here will help to eye care professionals and health educators target specific educational initiatives for the target population [3].

*Danielle M Ledoux,* has discussed Ophthalmologic findings in pediatric Down syndrome patients are extensive and warrant treatment that can differ from the non-Down syndrome population [4].

## III. METHODOLOGY

The structural equation modeling is, in fact, a much generalized statistical model that it is similar to methods such as hierarchical linear modeling and factor analysis in that it tends to be used more often for particular types of models. Structural equation modeling is comparatively a very new statistical method and, while more powerful, is less often used than methods such as regression. As a very general model, structural equation modeling can perform regressions and factor analysis, as well as other methods.
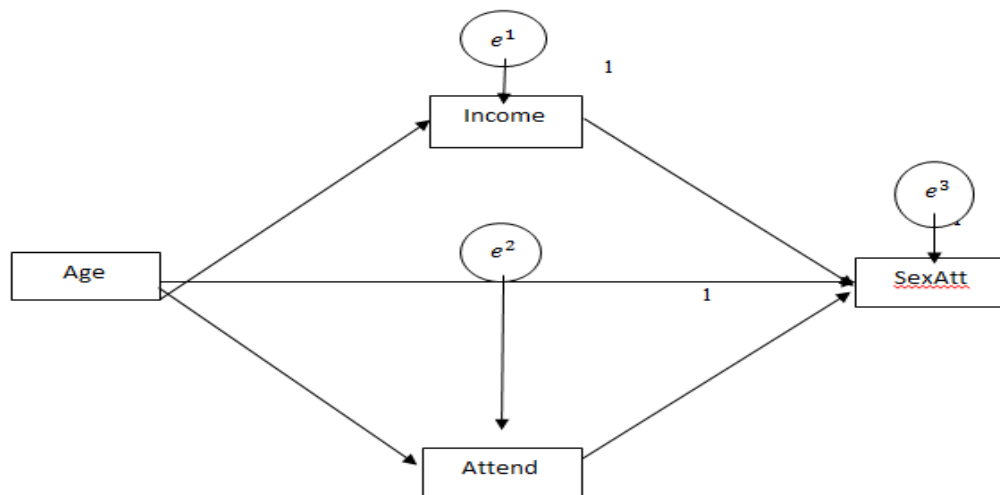


Figure No 1

Figure No 1 shows that, our dependent variable is a single question that measures the respondent's permissiveness or non-permissiveness about sex. We have specified that age affects attitudes toward sex, age affects both income and religious attendance, and both income and religious attendance affect attitudes toward sex. This is a more complex model that cannot be run simply using regression. While in a regression, you could specify a model in which attitude toward sex was predicted using income, age, and religious attendance, you could not specify a model in which one variable affects a second variable, which goes on to effect a third variable, as we have here in the case of age affecting income and religious attendance, which then affect attitudes toward sex.

Endogenous variables are any variables that are specified to be predicted by one or more other variables. In this model, we have three endogenous variables. Sex attitudes are one endogenous variable because it is affected by income, age, and religious attendance. Income is also an endogenous variable it is affected by age. Religious attendance is our third endogenous variable because it, too, is affected by age. On the other hand, exogenous variables are not predicted by any other variables. Our only exogenous variable in this model is the respondent's age, which is exogenous because there is no path leading into it from another variable. In structural equation modeling, there is no limit to the number of "levels" that you can include in a model.
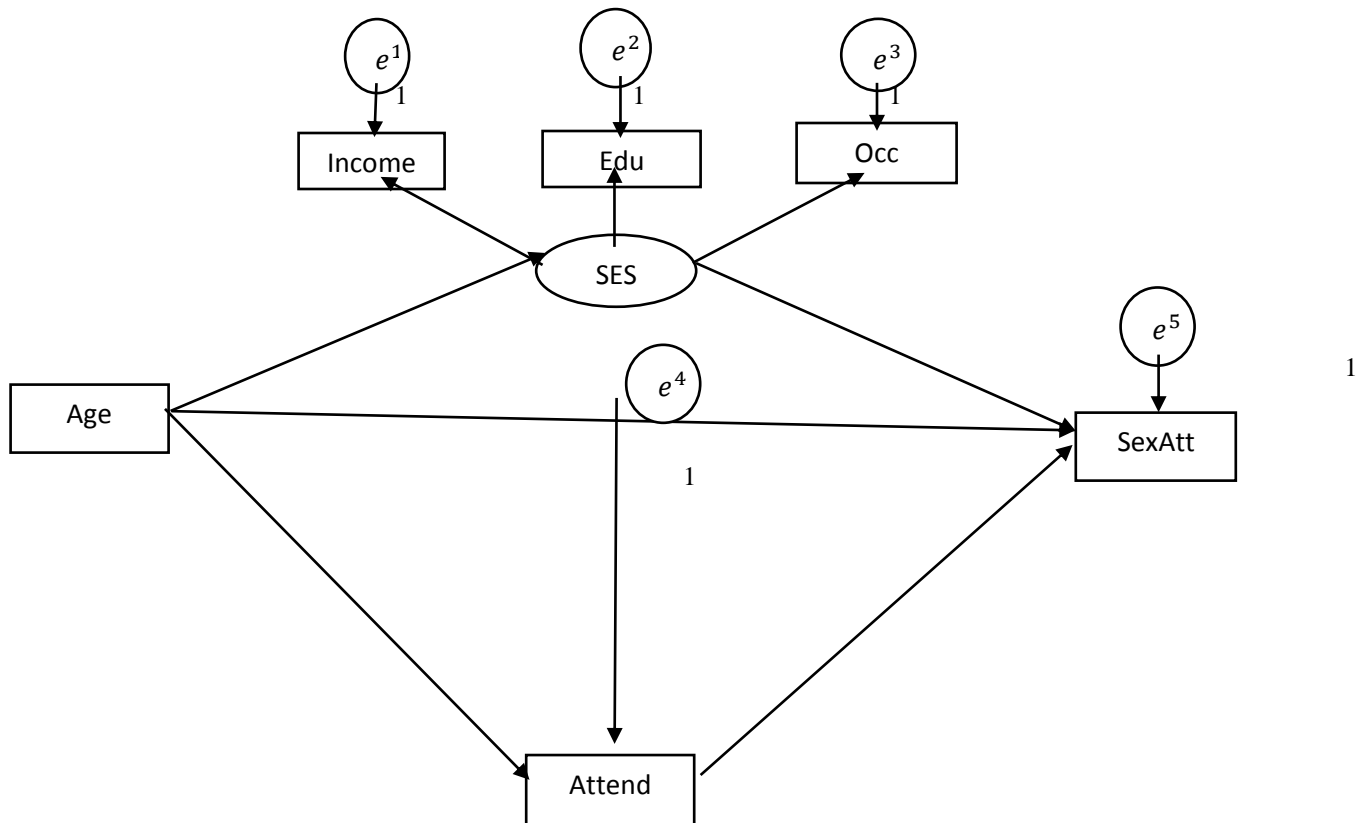


Figure No 2

Figure No 2 shows that, the respondent's income has been replaced with their socioeconomic status. In this model, socioeconomic status is the only latent variable or variable that is not observed directly but instead consists of a series of observed variables. A latent variable can be thought of as a factor (as in factor analysis). The other variables in our model, age, income, education, occupational prestige, religious attendance, and sex attitudes are all observed variables, as they are measured directly. While in regression analysis, factor scores for a factor can be computed and then placed into an analysis, latent variables cannot be placed directly into a model as they can be in structural equation modeling. In structural equation modeling, latent variables are represented by circles or ovals, while observed variables are represented by squares or rectangles.

## IV. STATISTICAL ANALYSIS

**MATERIALS AND METHODS**
**Study setting**

A lotus Eye Hospital hospital-based observational study was conducted during August 2017–August 2018 in Coimbatore district of Tamil Nadu state, India. Coimbatore is the largest district of Tamil Nadu with an approximate population of 16 lakhs. The city is famous for medical tourism because of its wide network of cost-effective tertiary-care hospitals catering to the need of the population of not only from Tamil Nadu but also from neighboring states and even from abroad.

**Study population**
The study population comprised of Eye Disease subjects. To be included in this study, it was a must for subjects to be newly diagnosed for Eye Disease patients mellitus (diagnosed within the last 1 year), during the study period for the first time and willing to participate in the study.

**Sample-size**
A sample size of 172 was decided on the basis of a review of data of the Department of Ophthalmology which revealed that at least 100 subjects (newly diagnosed) were presented every month.

**Procedure for data collection**
After satisfying the case definition and obtaining informed consent (written consent from literate subjects and verbally informed consent from illiterate subjects), 100 subjects were enrolled through the simple random-sampling method. Basic data on age, sex, education, occupation, income, and physical activity were collected from all the subjects. All the subjects were also interviewed regarding the history of Visual acuity and other conditions. The main eye problem three categories are: low (e.g. Refractive errors and Colorblindness), medium (e.g. normal or low tension glaucoma (NTG/LTG)), and high (e.g. test of distance vision and ocular hypertension).

**Frequency analysis**
A frequency is used for looking at detailed information on nominal (category) data and describing the results. Frequencies options include a table showing counts and percentages.

**Frequency Table No 1**

| AGE | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| below 15 years | 44 | 25.6 | 25.6 | 25.6 |
| 15 -50  years | 99 | 57.6 | 57.6 | 83.1 |
| above 50 years | 29 | 16.9 | 16.9 | 100.0 |
| Total | 172 | 100.0 | 100.0 | |
| **SEX** | Frequency | Percent | Valid Percent | Cumulative Percent |
| Male | 88 | 51.2 | 51.2 | 51.2 |
| Female | 84 | 48.8 | 48.8 | 100.0 |
| Total | 172 | 100.0 | 100.0 | |
| **EDUCATION** | Frequency | Percent | Valid Percent | Cumulative Percent |
| Primary | 71 | 41.3 | 41.3 | 41.3 |
| Secondary | 56 | 32.6 | 32.6 | 73.8 |
| Graduate | 32 | 18.6 | 18.6 | 92.4 |
| Uneducated | 13 | 7.6 | 7.6 | 100.0 |
| Total | 172 | 100.0 | 100.0 | |
| **OCCUPATION** | Frequency | Percent | Valid Percent | Cumulative Percent |
| Self | 7 | 4.1 | 4.1 | 4.1 |
| Employed | 80 | 46.5 | 46.5 | 50.6 |
| Unemployed | 85 | 49.4 | 49.4 | 100.0 |

| Total | 172 | 100.0 | 100.0 | |
| **INCOME (MONTHLY)** | Frequency | Percent | Valid Percent | Cumulative Percent |
| < 10,000 | 40 | 23.3 | 23.3 | 23.3 |
| 10 -30,000 | 38 | 22.1 | 22.1 | 45.3 |
| **AGE:** >30,000 | 12 | 7.0 | 7.0 | 52.3 |
| No income | 82 | 47.7 | 47.7 | 100.0 |
| Total | 172 | 100.0 | 100.0 | |

**Inference**

From table 1 shows that 25.6% of the respondents are below 15 years, 57.6 are 15-50 years, and 16.9% are above 50 years. 51.2% of the respondents take for study are Male, 48.8% are Female. 41.3% of the respondents are primary, 32.6% of them are secondary, 18.6% of them are graduate, and 7.6% of them are uneducated. 4.1% of the respondents are self, 46.5% of them are employed, and 49.4% of them are unemployed and 23.3% of Up to Rs below 10,000, 22.1% of them Rs.10,000 to 20,000 and 7.0% of them Above Rs. 30,000, 47.7 of them no income.

H0: There is no Association between previous checkup and vision problems and demographic variables.

**Table No 2 Model Fit Summary**

**CMIN**

| Model | NPAR | CMIN | DF | P | CMIN/DF |
| --- | --- | --- | --- | --- | --- |
| Default model | 15 | 97.734 | 21 | .000 | 4.654 |
| Saturated model | 36 | .000 | 0 | | |
| Independence model | 8 | 269.379 | 28 | .000 | 9.621 |

**RMR, GFI**

| Model | RMR | GFI | AGFI | PGFI |
| --- | --- | --- | --- | --- |
| Default model | .080 | .812 | .678 | .474 |
| Saturated model | .000 | 1.000 | | |
| Independence model | .093 | .736 | .660 | .572 |

**Baseline Comparisons**

| Model | NFI Delta1 | RFI rho1 | IFI Delta2 | TLI rho2 | CFI |
| --- | --- | --- | --- | --- | --- |
| Default model | .766 | .155 | .397 | .173 | .780 |
| Saturated model | 1.000 | | 1.000 | | 1.000 |
| Independence model | .000 | .000 | .000 | .000 | .000 |

**Parsimony-Adjusted Measures**

| Model | PRATIO | PNFI | PCFI |
| --- | --- | --- | --- |
| Default model | .750 | .275 | .285 |
| Saturated model | .000 | .000 | .000 |
| Independence model | 1.000 | .000 | .000 |

**NCP**

| Model | NCP | LO 90 | HI 90 |
| --- | --- | --- | --- |
| Default model | 149.734 | 111.767 | 195.179 |
| Saturated model | .000 | .000 | .000 |
| Independence model | 241.379 | 192.489 | 297.736 |

**FMIN**

| Model | FMIN | F0 | LO 90 | HI 90 |
| --- | --- | --- | --- | --- |

| Default model | .998 | .876 | .654 | 1.141 |
|---|---|---|---|---|
| Saturated model | .000 | .000 | .000 | .000 |
| Independence model | 1.575 | 1.412 | 1.126 | 1.741 |

**RMSEA**

| Model | RMSEA | LO 90 | HI 90 | PCLOSE |
|---|---|---|---|---|
| Default model | .204 | .176 | .233 | .000 |
| Independence model | .225 | .201 | .249 | .000 |

**AIC**

| Model | AIC | BCC | BIC | CAIC |
|---|---|---|---|---|
| Default model | 200.734 | 202.400 | 247.946 | 262.946 |
| Saturated model | 72.000 | 76.000 | 185.310 | 221.310 |
| Independence model | 285.379 | 286.268 | 310.559 | 318.559 |

**ECVI**

| Model | ECVI | LO 90 | HI 90 | MECVI |
|---|---|---|---|---|
| Default model | 1.174 | .952 | 1.440 | 1.184 |
| Saturated model | .421 | .421 | .421 | .444 |
| Independence model | 1.669 | 1.383 | 1.998 | 1.674 |

**HOELTER**

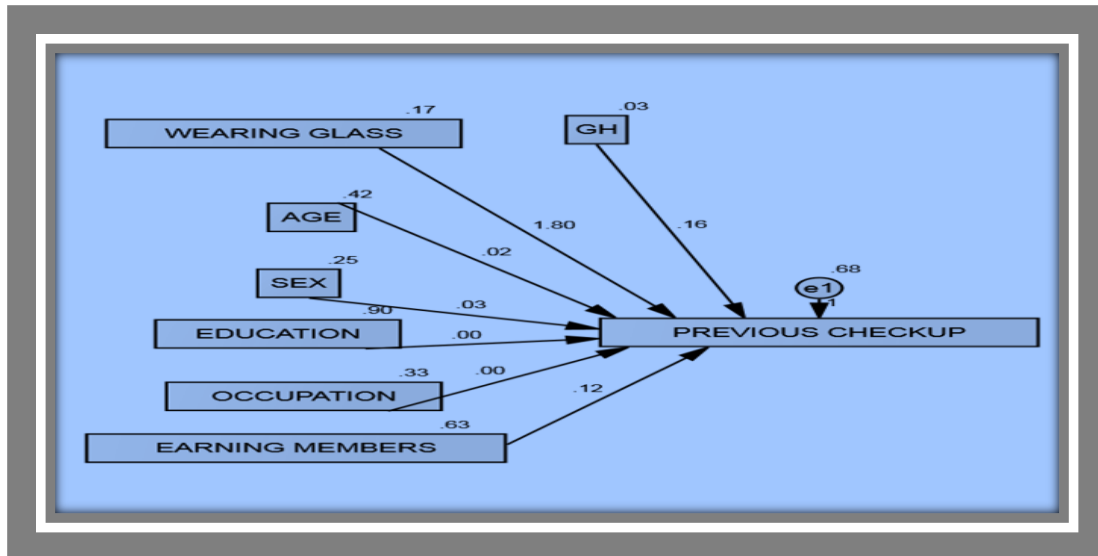| Model | HOELTER | HOELTER |
|---|---|---|
| Default model | .05 | .01 |
| Saturated model | 33 | 39 |
| Independence model | 27 | 31 |



Figure No 3

## V. RESULT AND DISCUSSION

From the table 2 shows that, more popular measures of model fit include the significance level of our chi-square value, the ratio of chi-square divided by its degrees of freedom(CMIN/DF), NFI(Normed Fit Index) and CFI(comparative fit index),RMSEA(root mean square error of approximation) and hoelter's critical N. Our actual chi-square value for the model is presented in the CMIN column is 4.65 is less than 5, so it would be considered to have good model fit using this measure. Next, NFI and CFI are popular measures of model fit. Both of these measures range on a scale from 0 to 1. Our values for both NFI and CFI were 0.76 and 0.78 respectively. In general models with scores for these measures of 0.9 or above are considered to have acceptable model fit and RMSEA is also a very popular measure this value is 0.20. This value indicates a not good model fit but its acceptable model.

## VI. CONCLUSION

Figure No 3 shows that, there is an association between previous checkup and vision problems and demographic variables. So we concluded that if not regularly going to checkup it definitely will occur severe eye problems.

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**APPENDIX:**
AGE,SEX,EDUCATION,OCCUPATION,INCOME,EARNINGMEMBERS,PREVIOUSCHECKUP,CONSULTATION, AVAILABILITY WITHIN (10 KMS),COMPLAINTS,WEARINGCLASS,ANY SX DONE,ANY MEDICATION TAKEN,PRESCRIBED BY, ALTERNATIVE MEDICINE TAKEN,GH,VISION,TLE,DIAGNOSIS

2,2,3,3,4,1,4,4,4,4,2,5,2,1,5,1,2,1,6
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