Title:
Epidemiological surveillance of eye disease and people awareness in the Abruzzo region, Italy

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ABSTRACT

**Background and Objectives:** Vision impairments and related blindness are major public health problems. Prevalence of eye disease and barriers to optimal care markedly vary among different geographic areas. In the Abruzzo region (Central Italy), an epidemiological surveillance on the state of ocular health in the population aged over 50 years was performed in 2019.

**Materials and Methods:** Participants were sampled to be representative of the region inhabitants. Data were collected through a telephone interview and an eye examination. Prevalence of cataract, glaucoma, retinopathy, maculopathy was assessed. The Cohen’s kappa (k) was used to measure the agreement between presence of eye disease and awareness of the disease by the participants.

**Results:** Overall, 983 people with mean age of 66.0±9.5 years were included in the study. The prevalence of cataract, glaucoma, maculopathy, and retinopathy was 52.6%, 5.3%, 5.6%, and 29.1%, respectively. Among the total of affected people, those aware of their condition were 21.8% (k=0.12, slight agreement) for cataract, 65.4% (k=0.78, substantial agreement) for glaucoma, 7.1% (k=0.10, slight agreement) for maculopathy, and 0% for retinopathy (k=-0.004, agreement lower than that expected by chance). Refractive defects were corrected in the vast majority of participants.

**Conclusion:** In the Abruzzo region, about two third of citizens aged 50 years or over suffer from cataract, glaucoma, retinopathy or maculopathy, which are recognized as leading causes of blindness. Many people with eye disease do not know they have it. These data can be used by clinicians and policymakers to undertake clinical, political, and social actions.

**Keywords**

Population screening, eye disease, prevalence, awareness
INTRODUCTION

Vision impairments and related blindness are major public health concerns in middle-aged and elderly adults worldwide, associated with diminished quality of life and increased risk of falls and death [1-3].

Available estimates suggest that 36 million people were blind and 217 million people had moderate or severe vision impairment worldwide in 2015 [4].

The number of people affected by the common causes of vision loss has increased substantially as the population increases and ages. Simultaneously, the number of people with avoidable visual loss has increased. Cataract continues to cause most cases of blindness and moderate or severe vision impairment in adults aged 50 years and older, but also glaucoma, age-related macular degeneration and retinopathy are major problems [1,5].

Estimating prevalence of vision impairment and patient needs are a fundamental basis of public health policies [5].

Based on data, local healthcare systems can implement appropriate actions to address this largely preventable global problem and provide adequate eye care services.

Given these premises, a population-based epidemiological surveillance was conducted among individuals aged >= 50 years in the Abruzzo region (Italy), aiming at estimating the prevalence of visual impairments (i.e. retinopathy, maculopathy, cataract, glaucoma) and people characteristics and attitudes about eye health.

MATERIALS AND METHODS

This was an epidemiological surveillance on the state of ocular health in the population aged over 50 years of the Abruzzo Region in 2019.

Participants were sampled to be representative of the region inhabitants aged 50 years or older (2 stage sampling of randomly selected towns and cities of different size in the four provinces and representative distribution by gender and age classes). The sampling frame for selection was the list of persons living in the community, based on the local population registers held by the municipalities. After stratifying for gender and age, a sampling technique with probabilities proportionate to the size of each population stratum was used.
Data were collected through telephone interviews investigating socio-demographic and anamnestic information. The following data were collected: age, gender, school education, living status, working status, lifestyle information (physical activity, smoking habit, alcohol consumption, and daily exposition to ultraviolet rays), body mass index, and chronic diseases. Information about attention paid to the general and eye health and perceived health status was also collected. Therefore, all participants underwent an eye examination through a mobile clinic. Refractive errors using subjective and autorefractometer evaluation (Auto refractometer AR-600 Nidek), corneal assessment using slitlamp biomicroscopy, Amsler grid test, Ishihara test, cover-uncover test, and tonometric assessment were performed. In addition, in all patients a color fundus retinography was acquired using KOWA Nonmyd WX-3D retinal camera (South Vermont Avenue Torrance, CA).

Attention was paid to the following main eye diseases: cataract, glaucoma-related optic disc modifications, advanced age-related macular degeneration (AMD) (maculopathy), diabetic or hypertensive retinopathy or other retinal vascular diseases (retinopathy). People diagnosed with these diseases were asked if they were aware about their condition.

The study was conducted in accordance with the Helsinki Declaration on Medical Research on Humans and with the Good Clinical Practice (GCP). The study did not require approval by the Ethics Committees, since it was based on the voluntary participation of people to an epidemiological screening campaign. Data collected were anonymous. Participant signed an informed consent for data protection according to European and national legislation.

Statistical analysis

Descriptive data were summarized as mean and standard deviation, median and interquartile range or frequencies and proportions.

Characteristics of the study population were assessed overall and by awareness about eye diseases. Groups were compared using Student’s t-test (continuous, normally distributed variables), Mann–Whitney U-test (continuous, not normally distributed variables), chi-square test or Fisher exact test (categorical variables), as appropriate.

The Cohen’s kappa (k) was used to measure the agreement between presence of eye disease and awareness of participants about the disease. A value of 1 implies perfect agreement and values less than 1 imply less than perfect agreement. Five levels of agreement have been identified based on k value: slight (0.01 – 0.20), fair (0.21 – 0.40), moderate (0.41 – 0.60), substantial (0.61 – 0.80), almost perfect (0.81 – 1.00); negative k means that the agreement is less than that expected just by chance [6].
A p-value <0.05 was considered statistically significant. Statistical analyses were performed using the SAS program, version 9.4 (SAS Institute Inc.).

RESULTS

Overall, 983 people were included in the study. Participants’ characteristics are summarized in table 1.

Mean age was 66.0±9.5 years, men represented 45.9% of the sample, school education level was inferior to high school for 65.6% of participants, 20.7% performed physical activity, 15.5% were smokers, 41.8% consumed alcohol regularly, 63.1% were overweight or obese, 41.8% had hypertension. Although unhealthy lifestyle and comorbidities were documented in many patients, 78.0% declared to check regularly their own health status and 60.9% declared to attend an eye examination at least every 2 years. Good/excellent health was reported by 84.8% of participants.

At eye examination, astigmatism was identified as the most frequent refractive defect, while daltonism and strabismus were seldom detected (Table 2).

In terms of primary study objective, the prevalence of cataract, glaucoma, maculopathy, and retinopathy was 52.6% 5.3%, 5.6%, and 29.1%, respectively (Table 2 and Figure 1).

Among the total of affected people, those aware of their condition were 21.8% (k=0.12, slight agreement) for cataract, 65.4% (k=0.78, substantial agreement) for glaucoma, 7.1% (k=0.10, slight agreement) for maculopathy, and 0% for retinopathy (k=-0.004, agreement lower than that expected by chance) (Figure 2).

Comparisons between characteristics of people aware or not aware was feasible for cataract only (for the other diseases prevalence was low and sub-samples stratified by agreement insufficient). Compared to people not aware about their cataract, aware people had older age (73 vs. 67 years), were more often women than men (60% vs. 40%), less likely to be married (23.8% vs. 9.3%), more likely to have a low school education (58.1 vs. 33.9%) (Table 3).

DISCUSSION

Main findings
Low vision affects many people aged over 50 years. However, in our study most individuals could read well with best corrected refractive errors and only 3% had severe visual impairment. Cataract was frequent and affected half of the population, while retinopathy was found in almost one third. Maculopathy and glaucoma affected about 1 out of 200 people. While people reported a good compliance to regular check of their general and eye health, this study suggested an important gap between presence/absence of eye disease and people awareness about the disease. The majority of people with glaucoma (65.5%) knew they had the disease. Level of awareness substantially decreased for the other eye diseases: only 21.8% of people with cataract and 7.1% with maculopathy knew they had the disease, while nobody of 138 affected people was aware about their retinopathy.

**Comparisons with existing knowledge**

Causes of visual impairments were measured in many countries and settings, documenting that prevalence is influenced by ethnicity and healthcare resources availability [7-10]. Recently, an updated review from the Global Vision Database identified 288 studies of 3,983,541 participants from 98 countries. It documented that cataract and uncorrected refractive error combined contributed to 55% of blindness and 77% of vision impairment in adults aged 50 years and older in 2015 [5]. World regions varied markedly in the causes of blindness and vision impairment in this age group, with a low prevalence of cataract (<22% for blindness and 14.1–15.9% for vision impairment) and a high prevalence of age-related macular degeneration (>14% of blindness) as causes in the high-income subregions [5].

In another Italian population-based study, the main cause of eye impairment in people aged 40 years and over was unoperated cataract (34.8%), followed by glaucoma (21.7%), degenerative myopia (13.0%), and maculopathy (8.7%) [11]. Furthermore, compared to our study population, in a study conducted in the north-east of Italy and involving 1162 people aged 60 years or over, prevalence of maculopathy was markedly higher (62.7%), due to the inclusion of all stages of ARMD and different age of the patients [12].

Poor health awareness of these conditions and their complications causes a delay in seeking medical care and precludes the chance of early intervention and prevention [5]. Therefore, raising public awareness of ocular diseases plays a significant role in the early diagnosis and treatment of such conditions, thus reducing the burden of visual impairment. To date, variable results have been
reported about the level of awareness of common ocular diseases worldwide [13-19]. For example, in developed countries such as Canada, the level of awareness of ocular diseases was reported at 69% for cataract and 41% for glaucoma [20]. In India, knowledge about ocular diseases was poor both in urban and rural areas [21-22]. For instance, in a report from southern India, the majority of patients (90%) with glaucoma were not aware of the condition and its complications [23]. In another study in India a very poor awareness of glaucoma (3.2%) and diabetic retinopathy (27%) was also reported [24].

*Implications for research and clinical practice*

Vision impairment is a key issue for people quality of life and public health of different countries. The burden of uncorrected refractive error contributes to almost half of the moderate and severe vision impairment burden, especially in low-income countries [25]. In high-income countries, effective diabetic retinopathy screening programs are in place. However, in Italy a standardized national diabetic eye screening program does not exist yet. On the other hand, due to their asymptomatic and/or monocular nature at early stages, in many settings glaucoma and maculopathy are not arrested or mitigated by timely interventions, although they are leading causes of blindness.

Efforts to identify organizational and cultural barriers should be made to improve access, equity, and efficacy of eye care to prevent blindness. Local periodical surveillance or annual patient recall could be effective strategies to identify priority and address actions [5,25].

Moreover, telemedicine in ocular diagnosis needs to be implemented in primary settings worldwide.

*Strengths and limitations*

The study has strengths and limitation. The major strength is that, to the best of our knowledge, this is the first evaluation of the awareness of eye diseases in an Italian population. Furthermore, the study population is quite representative of many Central and Southern Italian communities.

On the other hand, the major limitation was the small number of subgroups examined to assess the factors associated with the awareness of having glaucoma, maculopathy, or retinopathy. Nevertheless, factors associated with the knowledge of having cataract suggest the role of demographic and socio-economic characteristics as correlates of awareness.

**CONCLUSIONS**
This regional epidemiological study provided useful information to clinicians and policymakers, highlighting that in this area the refractive defect is corrected in the large majority of people aged 50 years or over. However, about two third of citizens in this age class suffer from cataract, glaucoma, retinopathy or maculopathy, which are recognized as leading causes of blindness. Many people with eye disease do not know they have it. These data can be used to improve access to care and promote information campaigns.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki. Ethical review and approval were waived for this study, since it was based on the voluntary participation of people to an epidemiological screening campaign.

Informed Consent Statement: Data collected were anonymous. Participant signed an informed consent for data protection according to European and national legislation.

Data Availability Statement:

Study database is not publicly available. It could be provided upon reasonable request to the authors.

Conflict of interest:

None of the following authors have any proprietary interests or conflicts of interest related to this submission.
Abbreviations:

Age-related macular degeneration (AMD)
Good Clinical Practice (GCP)
Cohen’s kappa (k)
REFERENCES

1. Sabanayagam, C.; Cheng, C.Y. Global causes of vision loss in 2015: are we on track to achieve the Vision 2020 target? *Lancet Glob Health.* **2017**, *5*, e1164-e1165.

2. McCarty, C.A.; Nanjan, M.B.; Taylor, H.R. Vision impairment predicts 5 years mortality. *Br J Ophthalmol.* **2001**, *85*, 322-326.

3. Ramrattan, R.S.; Wolfs, R.C.; Panda-Jonas, S.; et al. Prevalence and causes of visual field loss in the elderly and associations with impairment in daily functioning: the Rotterdam Study. *Arch Ophthalmol.* **2001**, *119*, 1788-1794.

4. Bourne, R.R.; Flaxman, S.R.; Braithwaite, T.; et al. Magnitude, temporal trends, and projections of the global prevalence of blindness and distance and near vision impairment: a systematic review and meta-analysis. *Lancet Glob Health.* **2017**, *5*, e888-e897.

5. Flaxman, S.R.; Bourne, R.R.A.; Resnikoff, S.; et al. Global causes of blindness and distance vision impairment 1990-2020: a systematic review and meta-analysis. *Lancet Glob Health.* **2017**, *5*, e1221-e1234.

6. Landis, J.; Koch R.G.G. “The Measurement of Observer Agreement for Categorical Data.” Biometrics, vol. 33, no. 1, 1977, pp. 159–174. JSTOR, www.jstor.org/stable/2529310. Accessed 12 June 2021

7. Congdon, N.; O'Colmain, B.; Klaver, C.C.; et al. Eye Diseases Prevalence Research Group. Causes and prevalence of visual impairment among adults in the United States. *Arch Ophthalmal.* **2004**, *122*, 477-485.

8. Furtado, J.M.; Lansingh, V.C.; Carter, M.J.; et al. Causes of blindness and visual impairment in Latin America. *Surv Ophthalmal.* **2012**, *57*, 149-177.

9. Xu, L.; Wang, Y.; Li, Y.; et al. Causes of blindness and visual impairment in urban and rural areas in Beijing: the Beijing Eye Study. *Ophthalmology.* **2006**, *113*, 1134.e1-11.

10. Taylor, H.R.; Keeffe, J.E.; Vu, H.T.; et al. Vision loss in Australia. *Med J Aust.* **2005**, *182*, 565-568.

11. Cedrone, C.; Nucci, C.; Scuderi, G.; et al. Prevalence of blindness and low vision in an Italian population: a comparison with other European studies. *Eye (Lond).* **2006**, *20*, 661-667.

12. Piermarocchi, S.; Segato, T.; Scopa, P.; et al. The prevalence of age-related macular degeneration in Italy (PAMDI) study: report 1. *Ophthalmic Epidemiol.* **2011**, *18*, 129-136.
13. Haddad, M.F.; Bakkar, M.M.; Abdo, N. Public awareness of common eye diseases in Jordan. *BMC Ophthalmol.* **2017**, *17*, 177.

14. Dandona, R.; Dandona, L.; John, R.K.; et al. Awareness of eye diseases in an urban population in southern India. *Bull World Health Organ.* **2001**, *79*, 96–102.

15. Shresth, M.K.; Guo, C.W.; Maharjan, N.; et al. Health literacy of common ocular diseases in Nepal. *BMC Ophthalmol.* **2014**, *14*, 2.

16. Haddad, M.F.; Bakkar, M.M.; Abdo, N. Public awareness of common eye diseases in Jordan. *BMC Ophthalmol.* **2017**, *17*, 177.

17. Attebo, K.; Mitchell, P.; Cumming, R.; et al. Knowledge and beliefs about common eye diseases. *Aust N Z J Ophthalmol.* **1997**, *25*, 283–287.

18. Chew, Y.K.; Reddy, S.C.; Karina, R. Awareness and knowledge of common eye diseases among the academic staff (non-medical faculties) of University of Malaya. *Med J Malaysia.* **2004**, *59*, 305–311.

19. Noertjojo, K.; Maberley, D.; Bassett, K.; et al. Awareness of eye diseases and risk factors: identifying needs for health education and promotion in Canada. *Can J Ophthalmol.* **2006**, *41*, 617–623.

20. Sathyamangalam, R.V.; Paul, P.G.; George, R.; et al. Determinants of glaucoma awareness and knowledge in urban Chennai. *Indian J Ophthalmol.* **2009**, *57*, 355–360.

21. Noertjojo, K.; Maberley, D.; Bassett, K.; et al. Awareness of eye diseases and risk factors: identifying needs for health education and promotion in Canada. *Can J Ophthalmol.* **2006**, *41*, 617–623.

22. Vijaya, L.; George, R.; Arvind, H.; et al. Prevalence of primary angle-closure disease in an urban south Indian population and comparison with a rural population. The Chennai Glaucoma Study. *Ophthalmology.* **2008**, *115*, 655–660. e1

23. Vijaya, L.; et al. Prevalence of primary open-angle glaucoma in an urban south Indian population and comparison with a rural population. The Chennai Glaucoma Study. *Ophthalmology.* **2008**, *115*, 648–54. e1

24. Dandona, R.; John, R.K.; McCarty, C.A.; et al. Awareness of eye diseases in an urban population in southern India. *Bull World Health Organ.* **2001**, *79*, 96–102.

25. Bourne, R.R.A.; Jonas, J.B.; Bron, A.M.; et al. Prevalence and causes of vision loss in high-income countries and in Eastern and Central Europe in 2015: magnitude, temporal trends and projections. *Br J Ophthalmol.* **2018**, *102*, 575-585.
Table 1: Characteristics of the study participants

| N | 983 |
|---|-----|
| **Socio-demographic characteristics** |   |
| Men (%) | 451 (45.9) |
| Mean age (years) | 66.0±9.5 |
| Age in classes (%): |   |
| <65 years | 438 (44.6) |
| >=65 years | 545 (55.4) |
| School education (%): |   |
| <5 years | 62 (6.3) |
| Primary school | 271 (27.6) |
| Secondary school | 312 (31.7) |
| High school | 280 (28.5) |
| University degree | 58 (5.9) |
| Civil status (%) |   |
| Married/Partner | 851 (86.6) |
| Single/Divorced/Widow | 132 (13.4) |
| Working status (%) |   |
| Employed | 230 (23.4) |
| Unemployed/retired | 753 (76.6) |
| **Lifestyle** |   |
| Physical activity (%) |   |
| Regular | 95 (9.7) |
| Occasional | 108 (11.0) |
| Never | 780 (79.3) |
| Alcohol consumption (%) |   |
| Regular | 411 (41.8) |
| Occasional | 107 (10.9) |
| Never | 465 (47.3) |
| Smoking (%) |   |
| Yes | 152 (15.5) |
| Ex | 273 (27.8) |
| No | 558 (56.8) |
| If yes, no. of cigarettes/day (%) |   |
| <=10 | 88 (60.7) |
| 11-20 | 48 (33.1) |
| >20 | 9 (6.2) |
| If ex, date of cessation (%) |   |
| <10 years | 28 (10.3) |
| >10 years | 56 (20.5) |
| >20 years | 64 (23.4) |
| >30 years | 77 (28.2) |
| >40 years | 40 (14.7) |
| Unknown | 8 (2.9) |
| Daily exposition to ultraviolet rays (%) |   |
| None | 4 (0.4) |
| Low | 230 (23.4) |
| Intermediate | 320 (32.6) |
| High | 428 (43.6) |
| **Clinical characteristics** |   |
| Mean BMI (kg/m²) | 26.6±4.1 |
| BMI in classes (%) |   |
| Underweight | 11 (1.1) |
| Normal weight | 346 (35.7) |
| Condition                                | Percentage  |
|------------------------------------------|-------------|
| Overweight                               | 430 (44.4)  |
| Obesity                                  | 181 (18.7)  |
| Type 2 diabetes (%)                      | 130 (13.2)  |
| Hypertension (%)                         | 411 (41.8)  |
| Cardiovascular diseases (%)              | 119 (12.1)  |
| Neurologic diseases (%)                  | 26 (2.6)    |
| Renal diseases (%)                       | 50 (5.1)    |
| Rheumatological diseases (%)             | 234 (23.8)  |

Attention to the own health status

| Frequency of Eye Examination (%)        | Percentage  |
|-----------------------------------------|-------------|
| More than once a year                   | 75 (7.6)    |
| Once a year                             | 305 (31.0)  |
| Every 2 years                           | 219 (22.3)  |
| Occasionally                            | 384 (39.1)  |

Do you check regularly your health status? (%)

| Frequency of Eye Examination (%)        | Percentage  |
|-----------------------------------------|-------------|
| Yes                                     | 767 (78.0)  |
| Sometimes/Only in case of problems     | 198 (20.1)  |
| Never                                   | 18 (1.8)    |

How would you define your health? (%)

| How would you define your health? (%) | Percentage |
|---------------------------------------|------------|
| Excellent                             | 109 (11.1) |
| Good                                  | 724 (73.7) |
| Intermediate                          | 142 (14.5) |
| Poor                                   | 7 (0.7)    |

| How would you define your health? (%) | Percentage |
|---------------------------------------|------------|
| Excellent                             | 109 (11.1) |
| Good                                  | 724 (73.7) |
| Intermediate                          | 142 (14.5) |
| Poor                                   | 7 (0.7)    |
Table 2: General eye health status and prevalence of eye diseases

| Eye examination                                      |   |
|------------------------------------------------------|---|
| N                                                    | 983|
| Visual perception (%)                                 |   |
| Reading well with glasses                            | 708 (96.1) |
| Reading well without glasses                         | 231 (23.5) |
| See well                                             | 550 (56.0) |
| Best corrected visual acuity (%)                     |   |
| Visually impaired                                    | 14 (3.3) |
| Reduced vision                                       | 46 (10.8) |
| Uncorrected visual acuity (%)                        |   |
| Visually impaired                                    | 18 (3.2) |
| Reduced vision                                       | 127 (22.6) |
| Refractive error (%)                                 |   |
| Myopia                                               | 96 (11.4) |
| Hyperopia                                            | 313 (37.1) |
| Astigmatism                                          | 435 (51.5) |
| AMSLER grid (%)                                      |   |
| Slight metamorphosia                                 | 55 (5.7) |
| Extended metamorphosia                              | 8 (0.8) |
| Scotoma                                              | 2 (0.2) |
| Scotoma and metamorphosia                            | 2 (0.2) |
| Discromatopsia (Ishihara test) (%)                   | 38 (3.9) |
| Cover-uncover test (%)                               |   |
| Latent strabismus                                    | 33 (3.4) |
| Manifest strabismus                                  | 13 (1.3) |
| Corneal disorder (%)                                 | 5 (0.5) |
| Tonometry (%)                                        | 14.7±3.2 |
| Cataract (%)                                          | 482 (52.6) |
| History of surgical treatment for cataract (%)       | 97 (52.2) |
| Satisfaction with surgical treatment for cataract (%) |   |
| Very satisfied                                       | 9 (9.3) |
| Satisfied                                            | 83 (85.6) |
| Partly satisfied                                     | 5 (5.2) |
| Glaucoma-related optic nerve head alterations (%)    | 52 (5.3) |
| Advanced Age-Related Macular Degeneration (AMD) / maculopathy (%) | 27 (5.6) |
| Vascular eye diseases (diabetic retinopathy, hypertensive retinopathy, occlusive vasculopathies) / retinopathy (%) | 138 (29.1) |
Table 3: Characteristics of patients by awareness about their cataract

|                                   | Aware     | Not aware | p-value |
|-----------------------------------|-----------|-----------|---------|
| **N**                             | 105       | 377       |         |
| **Socio-demographic characteristics** |           |           |         |
| Men (%)                           | 42 (40.0) | 172 (45.6)| 0.30    |
| Mean age (years)                  | 73.0±6.8  | 67.0±8.4  | **<0.0001** |
| School education (%)              |           |           |         |
| <secondary school                 | 61 (58.1) | 128 (33.9)| **0.0005** |
| >=secondary school                | 44 (41.9) | 249 (66.1)|         |
| **Civil status:**                 |           |           |         |
| Married/Partner                   | 78 (74.3) | 333 (88.3)| **0.0003** |
| Single/Divorced/Widow             | 27 (25.7) | 44 (11.7) |         |
| **Working status (%)**            |           |           |         |
| Retired                           | 88 (83.8) | 245 (65.0)| **<0.0001** |
| Employed                          | 17 (16.2) | 132 (35.0)|         |
| **Lifestyle**                     |           |           |         |
| Physical activity (%)             |           |           |         |
| Regular                           | 3 (2.9)   | 28 (7.4)  | 0.16    |
| Sometimes                         | 9 (8.6)   | 42 (11.1) |         |
| Never                             | 93 (88.6) | 307 (81.4)|         |
| Alcohol consumption (%)           |           |           |         |
| Regular                           | 37 (35.2) | 160 (42.4)| 0.15    |
| Sometimes                         | 9 (8.6)   | 45 (11.9) |         |
| Never                             | 59 (56.2) | 172 (45.6)|         |
| Smoking (%)                       |           |           |         |
| Yes                               | 10 (9.5)  | 62 (16.4) | 0.18    |
| Ex                                | 29 (27.6) | 106 (28.1)|         |
| No                                | 66 (62.9) | 209 (55.4)|         |
| **Clinical characteristics**      |           |           |         |
| Mean BMI (kg/m$^2$)               | 27.1±4.7  | 26.7±4.0  | 0.95    |
| BMI in classes (%)                |           |           |         |
| Underweight                       | 0 (0.0)   | 4 (1.1)   | 0.78    |
| Normal weight                     | 37 (36.3) | 123 (33.2)|         |
| Overweight                        | 43 (42.2) | 170 (45.8)|         |
| Obesity                           | 22 (21.6) | 74 (19.9) |         |
| Type 2 diabetes (%)               | 16 (15.2) | 60 (15.9) | 0.87    |
| Hypertension (%)                  | 62 (59.0) | 158 (41.9)| **0.002** |
| Cardiovascular diseases (%)       | 19 (18.1) | 45 (11.9) | 0.10    |
| Neurologic diseases (%)           | 2 (1.9)   | 11 (2.9)  | 0.74    |
| Renal diseases (%)                | 8 (7.6)   | 25 (6.6)  | 0.72    |
| Rheumatological diseases (%)      | 27 (25.7) | 106 (28.1)| 0.63    |
| **Attention to the own health status** |         |           |         |
| Do you check regularly your health status? (%) |           |           |         |
| Yes                               | 85 (81.0) | 299 (79.3)| 0.37    |
| Sometimes/Only in case of problem | 20 (19.0) | 71 (18.8) |         |
| Never                             | 0 (0.0)   | 7 (1.9)   |         |
| How would you define your health? (%) |           |           |         |
| Excellent                         | 2 (1.9)   | 34 (9.0)  | **0.003** |
| Good                              | 76 (72.4) | 286 (76.1)|         |
| Intermediate                      | 26 (24.8) | 55 (14.6) |         |
| Poor                              | 1 (1.0)   | 1 (0.3)   |         |
| Frequency of eye examination (%)  |           |           |         |
| More than once a year             | 9 (8.6)   | 26 (6.9)  | 0.21    |
| Frequency | Glaucoma (% | Maculopathy (%) | Retinopathy (%) |
|-----------|-------------|-----------------|-----------------|
| Once a year | 39 (37.1) | 8 (7.6) | 1 (1.0) |
| Every 2 years | 22 (21.0) | 3 (2.9) | 0 (0.0) |
| Occasionally | 35 (33.3) | 91 (27.6) | 156 (41.4) |

Other eye disease

- Glaucoma (%): 8 (7.6) vs. 8 (2.1) | p = 0.01
- Maculopathy (%): 3 (2.9) vs. 5 (1.3) | p = 0.38
- Retinopathy (%): 1 (1.0) vs. 0 (0.0) | p = 0.22

**Figure 1:** Prevalence of eye diseases among the general population aged >= 50 years

**Figure 2:** People aware about their eye disease

- **Cataract**
  - Awareness
    - Yes: 106 (21.8) vs. 41 (9.4)
    - No: 377 (78.2) vs. 393 (90.6)
  - K = 0.12

- **Glaucoma**
  - Awareness
    - Yes: 34 (65.4) vs. 0 (0.0)
    - No: 18 (34.6) vs. 931 (100.0)
  - K = 0.76

- **Maculopathy**
  - Awareness
    - Yes: 2 (7.1) vs. 4 (0.9)
    - No: 26 (92.9) vs. 459 (99.1)
  - K = 0.10

- **Retinopathy**
  - Awareness
    - Yes: 0 (0.0) vs. 1 (0.3)
    - No: 138 (100.0) vs. 345 (99.7)
  - K = 0.004