

1 **A NATIONWIDE SURVEY OF NEWLY CERTIFIED VISUALLY IMPAIRED INDIVIDUALS**  
2 **IN JAPAN FOR THE FISCAL YEAR 2019: IMPACT OF THE REVISION OF CRITERIA**  
3 **FOR VISUAL IMPAIRMENT CERTIFICATION**

4

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30 **ABSTRACT**

31 **Purpose**

32 To determine the status of visual impairment certifications in Japan in the fiscal year 2019 and the  
33 impact of revising the criteria for visual impairment certification implemented in 2018

34 **Study Design**

35 Observational cross-sectional study

36 **Methods**

37 We requested welfare offices throughout Japan to submit data concerning age, sex, causative diseases,  
38 and visual impairment grades for newly certified visually impaired individuals aged  $\geq 18$  years in the  
39 fiscal year 2019. The certification was based on criteria of the Act on Welfare of Physically Disabled  
40 Persons.

41 **Results**

42 Altogether, data were collected for 16504 newly certified visually impaired individuals. The most  
43 common age group was 80–89 years (29.6%), followed by 70–79 (28.2%) and 60–69 (15.3%) years.  
44 The most common causative disease was glaucoma (40.7%), followed by retinitis pigmentosa  
45 (13.0%), diabetic retinopathy (10.2%), and macular degeneration (9.1%). The most common  
46 impairment grade was grade 2 (40.8%), followed by 5 (21.2%) and 1 (17.0%). Compared to 2015,  
47 there was a considerable increase in the number of individuals certified with glaucoma as the causative  
48 disease in the fiscal year 2019. Moreover, there was a significant increase in the number of individuals

49 with certified grade 1 and grade 2 visual impairment, with a decrease in the number of individuals

50 with certified grade 6 visual impairment.

51 **Conclusion**

52 The changes revealed in this study were primarily due to the revised certification criteria implemented

53 in July 2018, indicating that it is important to review the certification criteria and to repeat national

54 surveys similar to the present study.

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56 **KEYWORDS**

57 Visual impairment, Japan, Certification criteria, Survey, Glaucoma

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## INTRODUCTION

60 Visual impairment is a grave issue that significantly reduces the quality of life. Most diseases  
61 that cause visual impairment in Japan are age-related [1]; therefore, there is an urgent social need to  
62 develop medical and welfare administrative policies to prevent visual impairment and expand  
63 disability welfare services in Japan, where the population is aging at an increasing rate.

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65 In order to promote the planning of policies and expansion of welfare services related to  
66 visual impairment, it is important to understand the actual status of visual impairment in Japan. For  
67 many years, the Ministry of Health, Labour and Welfare (MHLW) has been conducting an annual  
68 survey on the number of newly certified visually impaired individuals in Japan [2]. However, more  
69 detailed information, such as causative diseases and disability grades, has not been available.  
70 Therefore, our research group conducted the first nationwide complete enumeration survey in the  
71 fiscal year 2015 and reported the actual status of new visual impairment certifications [1, 3].

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73 The actual status of visual impairment certification is likely to be affected by factors such as  
74 changes in the demographic composition, changes in the structure of diseases, medical advances,  
75 awareness of disability and welfare among ophthalmologists, patients' awareness of disability and the  
76 extent to which the patients are in need of social welfare services, among others. Therefore, it is

77 necessary to repeat the survey and update the information on the status of visual impairment  
78 certification.

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80 Another factor affecting the status of visual impairment certification is the revision of the  
81 criteria for visual impairment certification. In Japan, welfare services for visually impaired individuals  
82 are determined based on whether or not the person is certified as visually impaired and the grade of  
83 visual impairment, which is determined by the combination of visual acuity and visual field  
84 impairment; therefore, a change in the criteria for visual impairment certification would not only  
85 change the number of people certified and the distribution of causative diseases and grades, but would  
86 also have a significant impact on the quality of life of visually impaired people. However, as per our  
87 PubMed search, there have been no reports to date of a nationwide study examining how changes in  
88 the criteria would affect the status of visual impairment certifications. Recently in Japan, the revision  
89 of criteria for visual impairment certification was implemented in July 2018, after the last survey  
90 (fiscal year 2015); this revision was implemented for the first time in 23 years (Online Resource 1 and  
91 2) [4].

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93 Therefore, the aims of the present study were to conduct a nationwide survey of visual  
94 impairment certifications for individuals aged  $\geq 18$  years in the fiscal year 2019 in order to determine

95 the latest status of visual impairment certifications in Japan and reveal the impact of the revision of  
96 criteria for visual impairment certification.

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## 98 **SUBJECTS AND METHODS**

### 99 **Survey subjects**

100 The subjects were individuals aged  $\geq 18$  years who were newly certified as visually impaired  
101 on the basis of the certification criteria in the Act on Welfare of Physically Disabled Persons between  
102 April 1, 2019 and March 31, 2020. Survey subjects who met these criteria are hereafter referred to as  
103 “visually impaired individuals”.

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### 105 **Survey methods and items**

106 This study was approved by the Ethics Committee of Yamagata University Hospital,  
107 Yamagata, Japan, and all investigative procedures conformed to the tenets of the Declaration of  
108 Helsinki. There were 161 regional welfare offices throughout Japan with data related to disability  
109 certification. Anonymized data related to visual impairment certification were collected from all these  
110 welfare offices. If a physical disability certificate contained multiple causative diseases, the disease  
111 listed first was considered the causative disease.

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### 113 **Visual impairment grade**



114 Visual impairment was divided into six grades in accordance with the certification criteria  
115 revised in 2018 ([Online Resource 2](#)) [5]. The severity of visual impairment is separately determined  
116 for the corrected visual acuity and visual field, and the final grade is determined by a combination of  
117 these grades.

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### 119 **Distribution of visually impaired individuals according to the visual impairment grade**

120 To calculate the number of certified individuals by the visual impairment grade in the fiscal  
121 year 2015, the annual number of certified individuals reported in the MHLW white paper [2] was  
122 multiplied by the percentage of individuals with each certified grade reported by Morizane et al [1].

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### 124 **Number of certified individuals for each causative disease in past surveys**

125 To calculate the number of certified individuals for each causative disease in the surveys in  
126 the fiscal year 2001-04 and 2007-10, the annual number of certified individuals reported in the MHLW  
127 white paper [2] was multiplied by the percentage of causative disease reported by Nakae et al [6] and  
128 Wako et al [7].

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### 130 **Major outcome measures**

131 The age group, sex, causative disease, and visual impairment grade for newly certified  
132 visually impaired individuals were the major outcome measures.

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## RESULTS

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Visual impairment certification data were obtained from all 161 welfare offices. A total of

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16504 individuals were newly certified as visually impaired in the fiscal year 2019 in Japan.

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Of all newly certified visually impaired individuals, 52.6% were male and 47.4% were

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female. The most common age group was 80–89 years (29.6%), followed by 70–79 (28.2%) and 60–

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69 (15.3%) years (Fig. 1). In total, 89.7% visually impaired individuals were aged  $\geq 50$  years.

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The percentage of causative diseases/conditions is shown in Figure 2. Glaucoma was the

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most common causative disease in 6711 patients (40.7%), followed by retinitis pigmentosa in 2145

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(13.0%), diabetic retinopathy in 1675 (10.2%), and macular degeneration in 1495 patients (9.1%).

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With regard to the visual impairment grade, 2800 (17.0%), 6736 (40.8%), 1168 (7.1%), 1858

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(11.3%), 3501 (21.2%), and 440 (2.7%) individuals had certified grade 1, grade 2, grade 3, grade 4,

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grade 5, and grade 6 visual impairment, respectively (Fig. 3).

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Figures 4, 5, and [Online Resource 3](#) show the changes over time in the number of newly

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certified visually impaired individuals aged  $\geq 18$  years in Japan according to four most common

152 causative diseases (glaucoma, retinitis pigmentosa, diabetic retinopathy, and macular degeneration)  
153 and the visual impairment grade, respectively [6, 7]. Figure 6 shows the percentage of grades for each  
154 causative disease in the fiscal year 2015 and 2019. We found no change in the rankings of both  
155 causative diseases and grades relative to those in the fiscal year 2015 [1]. However, compared to the  
156 number of people certified by grade in the fiscal year 2015, which was estimated from the percentage  
157 of certified grades reported by Morizane et al. [1], the number of people with grades 1 and 2 increased  
158 1.39 and 1.69 times, respectively, while those with grade 6 decreased 0.51 times in the fiscal year  
159 2019 (Fig. 5). The number of certified individuals with glaucoma as the causative disease increased  
160 1.87 times, with an increase in grade 2 certifications from 37.8% to 48.2% (Figs. 4, 6a and 6b). The  
161 number of certified individuals with retinitis pigmentosa as the cause increased 1.22 times, with  
162 similar percentages for each grade (Figs. 4, 6c and 6d), while the number of certified individuals with  
163 diabetic retinopathy as the cause was almost unchanged at 1.04 times, with an increase in grade 2  
164 certifications from 25.3% to 35.4% and a decrease in grade 5 certifications from 22.1% to 15.8%  
165 (Figs. 4, 6e and 6f). Finally, the number of certified individuals with macular degeneration as the  
166 cause increased 1.49 times, with an increase in grade 1 certifications from 7.9% to 14.0% and grade 4  
167 certifications from 21.6% to 29.6%, and a decrease in grade 5 certifications from 27.5% to 16.4% and  
168 grade 6 certifications from 10.6% to 5.2% (Figs. 4, 6g and 6h).

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## DISCUSSION

171 Our nationwide survey revealed that the number of newly certified visually impaired  
172 individuals in the fiscal year 2019 was 16504. The number of newly certified individuals in the fiscal  
173 year 2015, as reported in our previous study that had a population coverage rate of 96.5%, was 12505.  
174 Therefore, the number of newly certified visually impaired individuals was significantly higher in the  
175 fiscal year 2019 than in the fiscal year 2015 [1]. This result is consistent with the data in the MHLW  
176 white paper report [2], which stated that the number of people certified from the fiscal year 2015 to  
177 2017 was stable at about 12500, whereas it considerably increased to 14817 in the fiscal year 2018 and  
178 further increased to 16344 in the fiscal year 2019. The MHLW white paper also reported a significant  
179 decrease in the number of newly certified visually impaired individuals to 13706 in the fiscal year  
180 2020. This significant change in a very short time could be attributed to the revision of the criteria for  
181 visual impairment certification in July 2018, with four main reasons. First, visual acuity impairment is  
182 more likely to be certified with a higher grade according to the revised criteria than the previous  
183 criteria [8–11]. This may have increased the incentive for eligible persons to apply for new  
184 certification. Second, visual field impairment was mainly evaluated using Goldmann perimetry, and  
185 the revised criteria clarified the criteria for certification using automated perimetry, although the  
186 criteria using Goldmann perimetry and those using automated perimetry are not completely the same  
187 [12–14]. Thereby, the number of facilities that can perform visual field testing for visual impairment  
188 certification has increased, supposedly increasing opportunities for patients to be certified with visual  
189 field impairment [11, 12]. Third, the criteria for certification of visual field impairment now allow

190 patients with decreased retinal sensitivity in the central 10-degree visual field to be certified as  
191 visually impaired, and it is possible that those who were not eligible under the previous criteria now  
192 qualify for visual field impairment certification [8–11]. Finally, the dissemination of news regarding  
193 the revised criteria may have temporarily increased awareness regarding visual impairment among  
194 ophthalmologists. This possibility is supported by the fact that, as mentioned above, the number of  
195 certified individuals nationwide, which had increased in the fiscal year 2019, has dropped to the level  
196 observed between the fiscal year 2017 and 2018 in the fiscal year 2020.

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198           One of the factors affecting the status of visual impairment certification is the revision of the  
199 criteria for visual impairment certification. Therefore, when the revision of criteria for visual  
200 impairment certification is implemented, it is necessary to fully examine the impact of the revision on  
201 the actual status of visual impairment certification. However, there are no nationwide reports that  
202 investigate the impact of the revision of criteria for visual impairment certification as per our PubMed  
203 search. This study revealed the impact of the revision of the certification criteria implemented in 2018  
204 on the actual status of visual impairment certification. The revision of the certification criteria in 2018  
205 was implemented to solve the problems of the previous criteria, i.e., the fact that there are many cases  
206 in which the degree of impairment in daily life does not correspond with the grade, as represented by  
207 the use of the sum of visual acuities of both eyes as the certification criteria [15], and the lack of clear  
208 certification criteria using automated perimetry, which is widely used in daily medical practice [16].

209 We compared the results for the fiscal years 2015 and 2019 and found that the rate of increase in the  
210 number of people certified with glaucoma was extremely high compared to other diseases.  
211 Specifically, the number of certified individuals with glaucoma increased from approximately 3,600 in  
212 the fiscal year 2015 to approximately 6,700 in the fiscal year 2019. This significant change in a very  
213 short time could be attributed to the revision of the criteria. In particular, the main reason is believed to  
214 be the increased opportunities for certification due to the clarification of the certification criteria using  
215 automated perimetry and the increased awareness of ophthalmologists following the revision of the  
216 criteria. In Japan, welfare services for visually impaired individuals are determined based on whether  
217 the person is certified as visually impaired and the grade of visual impairment; therefore, this result  
218 implies that more than 3,000 patients were not able to receive the welfare services they needed before  
219 the criteria were revised, indicating that the criteria for visual impairment certification should be  
220 reviewed as needed.

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222           Glaucoma was found to be the leading causative disease in our survey, and it was closely  
223 followed by retinitis pigmentosa, diabetic retinopathy, and macular degeneration (Fig. 2). The most  
224 common certified visual impairment grade was grade 2, followed by grades 5, 1, 4, 3, and 6 (Fig. 3).  
225 Although the rankings of both causative diseases and grades in 2019 remained unchanged relative to  
226 those in 2015 [1], the number of people with grades 1 and 2 increased while those with grade 6  
227 decreased in the fiscal year 2019 (Fig. 5). This could be due to an increase in the overall grade of both

228 visual acuity and visual field impairment as a result of revision and relaxation of the certification  
229 criteria.

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231           With regard to changes in the number of certified individuals and percentage of certified  
232 grades from the fiscal year 2015 [1] to the fiscal year 2019 by the causative disease, we found  
233 differences in the rate of change in the number of certified individuals and in the percentage of grades  
234 for each causative disease (Figs. 4 and 6). In particular, the rate of increase in the number of certified  
235 individuals with glaucoma as the cause was significant. Since visual field testing using automated  
236 perimetry is regularly performed for glaucoma in routine medical care, the revised criteria, which  
237 clarified the criteria for visual field impairment on the basis of automated perimetry, may have led to  
238 the sharp increase in the number of certified individuals with glaucoma as the cause. In addition, we  
239 speculated that the number of people with grade 2 visual impairment particularly increased because it  
240 became easier to certify people with decreased retinal sensitivity in the central 10-degree visual field  
241 with grade 2 impairment using Goldmann perimetry or grade 2 or grade 5 impairment using automated  
242 perimetry under the revised criteria; these individuals were originally certified with grade 5  
243 impairment under the previous criteria based on Goldmann perimetry. Macular degeneration was  
244 second to glaucoma in terms of the percentage increase in the number of certified individuals, with a  
245 particularly large increase in grade 4 certifications being the most notable feature. Since the main  
246 symptoms of macular degeneration are decreased visual acuity and decreased retinal sensitivity in the

247 central visual field, it was initially difficult to certify visual field impairment with the previous criteria,  
248 and visual impairment was often certified only on the basis of visual acuity impairment. However, as  
249 mentioned earlier, the revision of the criteria in 2018 made it easier to certify visual acuity impairment  
250 with a higher grade; moreover, it increased the number of individuals certified with visual field  
251 impairment by facilitating the certification of decreased retinal sensitivity in the central 10-degree  
252 visual field as visual field impairment [6]. Consequently, there was a considerable increase in the  
253 number of visually impaired individuals with macular degeneration as the cause. The large increase  
254 in the number of grade 4 certifications and the decrease in the number of grade 5 certifications may be  
255 because the combination of visual acuity that was grade 5 under the previous criteria can be grade 4  
256 under the revised criteria. Additionally, in patients with grade 5 visual acuity impairment, if the central  
257 retinal sensitivity is reduced to a level considered a visual field impairment as described above, the  
258 final grade would be grade 4 under the revised criteria.

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260 The following points should be noted when interpreting the results. First, not all patients who  
261 qualify for visual impairment certification actually receive it [17–19]. Second, causative diseases were  
262 limited to the first disease on the disability certificates. Therefore, for cases with multiple causative  
263 diseases, only one disease name was included in this survey. Finally, only the combined grades of  
264 visual acuity and visual field impairment were available for investigation; therefore, accurate  
265 examination of the relationship between each impairment and the revised criteria was not possible.



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267           In conclusion, in the fiscal year 2019 in Japan, glaucoma was the leading causative disease  
268 for newly certified visually impaired individuals aged  $\geq 18$  years, while the most common certified  
269 grade of visual impairment was grade 2. Compared with the data for the fiscal year 2015, there was a  
270 substantial increase in the number of certified individuals, particularly those with glaucoma and  
271 macular degeneration as the cause, while there was a substantial increase in grade 1 and 2  
272 certifications and a decrease in grade 6 certifications. These changes were primarily attributed to  
273 revision of the certification criteria in July 2018. Since this survey was conducted in the year  
274 following the criteria revision, we believe it is important to continue the survey in the future in order  
275 to understand the actual status of visual impairment certification after excluding the impact of the  
276 revised criteria.

277

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## 354 **Figure legends**

355 **Fig. 1 Proportion of newly certified visually impaired individuals in Japan according to the age**  
356 **group in the fiscal year 2019**

357 y.o., years old

358

359 **Fig. 2 Distribution of causative diseases/conditions among all newly certified visually impaired**  
360 **individuals in Japan in the fiscal year 2019**

361

362 **Fig. 3 Distribution of different grades of newly certified visual impairment in individuals aged**  
363  **$\geq 18$  years in Japan in the fiscal year 2019**

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365 **Fig. 4 Changes over time in the number of newly certified visually impaired individuals aged  $\geq 18$**   
366 **years in Japan according to the four most common causative diseases**

367 Figures for the fiscal year 2015 are estimated. The open circles, solid triangles, open squares, and solid  
368 circles represent glaucoma, retinitis pigmentosa, diabetic retinopathy, and macular degeneration,  
369 respectively.

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371 **Fig. 5 Changes over time in the number of newly certified visually impaired individuals aged  $\geq 18$**   
372 **years in Japan according to the grade of visual impairment**

373 Figures for the fiscal year 2015 are estimated. The open circles, solid triangles, open squares, solid  
374 circles, open triangles, and solid squares represent grades 2, 5, 1, 4, 3, and 6, respectively.

375

376 **Fig. 6 Distribution of different grades of newly certified visual impairment in individuals aged**  
377  **$\geq 18$  years in Japan according to the diagnoses of glaucoma (a and b), retinitis pigmentosa (c and**  
378 **d), diabetic retinopathy (e and f), and macular degeneration (g and h)**

379 Charts a, c, e, and g show the distribution in the fiscal year 2015.

380 Charts b, d, f, and h show the distribution in the fiscal year 2019.