



Impact of COVID-19 on Preventable Blindness Detection in Bali, Indonesia

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ABSTRACT

Introduction: WHO, and the Indonesian government, have agreed to a plan to eradicate preventable blindness by 2020 in VISION 2020. However, the COVID-19 pandemic has caused a strain on the healthcare system. It is difficult to assess the impact of the pandemic on preventable blindness. Here we approach the issue by evaluating hospital visits for visual impairments in one regency in Bali, Indonesia. **Methods:** We collected outpatient visit records from three hospitals providing ophthalmologic clinics in Tabanan, Bali, Indonesia, a regency of 445 thousand people. We then conducted a descriptive analysis of the general changes in outpatient visits to these clinics and changes observed in different diagnoses identified as causes for preventable blindness. **Results:** The result showed a 35% downtrend in outpatient visits to the ophthalmologic clinic throughout the provinces. A more pronounced downtrend (45.22%) was observed for one public hospital that also serves as a COVID-19 referral hospital compared to private hospitals (around 30% each). By diagnoses, visits for cataracts were shown with a less severe downtrend compared to glaucoma, pterygium, and refractive disorders. **Conclusion:** Our study found a downtrend in outpatient visits for visual impairment in ophthalmologic clinics, which may be attributed to COVID-19 preventive measures by the hospital as well as patient reluctance due to fear of COVID-19 transmission. Public health communication needs to address this fear to recover patient confidence while maintaining vigilance in practicing COVID-19 preventive behavior.

1. Introduction

WHO data from 2010 estimated over 39 million people living with blindness globally, with an additional 246 million with low vision and 285 million with visual impairments.¹ In Indonesia, 2013 data showed that 966 thousand people live with blindness and another 2 million in severe low vision.² These data showed the gap that remains to achieve the eradication of preventable blindness by 2020, also known as VISION 2020, set up by WHO.³ VISION 2020 was a global initiative of the International Agency for the Prevention of Blindness (IAPB). The initiative sought to eliminate the main causes of avoidable blindness in order to give all people in the world,

particularly the millions of needlessly blind, the right to sight by the year 2020. Target disease areas for VISION 2020 such as cataracts, refractive error, childhood blindness, low vision, glaucoma, diabetic retinopathy, age-related macular degeneration, etc.

To help achieve this target, WHO has set up a global action plan to help guide policymaking by member countries.⁴ Indonesia adopted the action plan in the form of a national road map.⁵ The crutch of both programs was to provide quality care for health problems that may cause preventable blindness.^{4,5} The Indonesia project was to empower lay health workers (i.e., cadre) to help identify visual impairments in at-risk populations and quickly refer

them to professional health workers to get the specialist care required.⁵

Some conditions that get special attention in both plans include cataracts, glaucoma, diabetic retinopathy, corneal opacity (including pterygium), and uncorrected refractive errors.^{4,5} Although the refractive error was easily correctible by refractive lenses and six most of these conditions require specialist care in secondary and tertiary healthcare facilities.⁷⁻¹⁰ As such, to timely detect and treating these conditions to prevent blindness as a complication would require timely hospital visits to receive necessary treatment.

However, by the year 2020, another setback struck our collective attempt to achieve VISION 2020 in the form of the COVID-19 pandemic. Despite the potential for underestimation,^{11,12} Indonesia still recorded over 1 million confirmed cases with more than 30 thousand deaths by January 2021.¹³ The healthcare system's ensuing burden potentially caused inadequate care provided to non-COVID-19 disease. This could cause excess death and disability due to untreated conditions.¹⁴

Despite the apparent potential threat, the COVID-19 pandemic caused care provision to treat preventable blindness, few attempts to evaluate its impact on excess blindness. However, unlike infectious diseases like HIV, there was no routine survey to assess the prevalence of blindness and visual impairment in the population. It makes measuring excess cases difficult as there was no baseline. As such, we attempt to measure the impact of the COVID-19 pandemic on preventable blindness by analyzing the relative change in hospital visits related to visual impairments and preventable blindness in Tabanan, Bali.

2. Methods

Study design and settings

We conducted a longitudinal analysis of hospital visits related to visual impairments in Tabanan Regency, Bali, Indonesia, between 2019 and 2020. In the year 2020, Bali recorded over 17 thousand COVID-

19 cases, an incidence of 0.4% of its population. Of those numbers, 518 mortality was recorded, or a 3% case fatality rate.¹⁵

Tabanan was one regency in the said province, part of the Sarbagita (Denpasar-Badung-Gianyar-Tabanan) metropolitan area covering the southern part of the island. By February 8th, 2021, the regency recorded 3,379 confirmed COVID-19 cases with 92 mortality. It translates to an incidence of 0.7% of its population and a case fatality rate of 2.7% case fatality rate.¹⁶

In 2019, preceding the pandemic, the Tabanan regency recorded 12 hospitals, although only 5 of those have an ophthalmologist clinic, including four private hospitals and one public hospital. From those 12 hospitals, there were collective outpatient visits of 318,227 with BRSU Tabanan, RS Bhakti Rahayu, and RS Wisma Prashanti among the most frequently visited hospitals with 133,210 and 68,677 outpatient visits, respectively. There was no desegregated data for ophthalmology visits.¹⁷

Data source and analysis

We collected the top 10 diagnoses for outpatient visit data from the only hospitals with ophthalmology clinics operating since January 2019 in Tabanan Regency, Bali, Indonesia. We excluded hospitals that began operation of their ophthalmology clinic later than January 2019 as then it would not have adequate data to make a 2019 to 2020 comparison in outpatient visits. We counted visits, not patients, meaning that one patient may be counted more than once if the patient visited the clinic required for a follow-up visit(s) in the treatment course.

The hospitals included in the study were BRSU Tabanan, RS Wisma Prashanti, and RS Bhakti Rahayu. Data were obtained from the patient register's tabulation in the ophthalmology clinic in a respective hospital in the 2019 and 2020 periods. We conducted a descriptive longitudinal analysis of changes in the top 10 diagnosis patterns of each hospital's ophthalmology clinic. We also calculated cumulative figures for all three hospitals and analyzed the change from 2019 to 2020.

Ethical consideration

This study utilized de-identified aggregate data from the hospital’s patient register. As such, it is

exempt from review by the Universitas Udayana Ethical Committee.

3. Results

Table 1. The number of visits changes between 2019 and 2020 for diagnoses of interest.

Diagnoses	Change between 2019 and 2020			
	RS BR ^a	BRSU Tabanan	RS WP ^b	Cumulative
Immature cataract	-16.28%	-54.72%	-17.77%	-21.74%
Mature cataract	-16.29%	-59.17%	-40.22%	-21.68%
Glaucoma	-41.12%	-45.31%	-42.50%	-41.43%
Pterygium	-38.07%	-57.14%	-40.77%	-42.77%
Myopia	-35.18%	-14.44%	-67.68%	-42.83%
Hypermetropia	-53.19%	-17.39%	-39.47%	-47.06%
Presbyopia	-44.67%	-42.50%	-66.07%	-52.46%
Astigmatism	-35.20%	-33.33%	-1.82%	-13.30%

^aRS Bhakti Rahayu; ^bRS Wisma Prashanti.

We included 3 out of 5 hospitals with ophthalmology clinics in Tabanan Regency, Bali, Indonesia. The two other hospitals were excluded as they only began operating their ophthalmology clinic later in 2019 or 2020. Data from the three hospitals reported a total of 14,661 outpatient visits to ophthalmology clinics in 2019, which consisted of 6,080 in RS Bhakti Rahayu, 5,993 in BRSU Tabanan, and 2,588 in RS Wisma Prashanti. It made up 4.61% of the total outpatient visits to hospital clinics in Tabanan, Bali, Indonesia, during the same period. Considering the regency’s total population is 445.7 thousand people, these figures mean there were 3.29 outpatient visits to ophthalmology clinics per year in the regency.

Reported outpatient visits to ophthalmology clinics dropped to 9,491 visits in 2020, which included 4,219 in RS Bhakti Rahayu, 3,463 in BRSU Tabanan, and 1,809 in RS Wisma Prashanti. Assuming no significant change in population size, this adds up to 2.13 outpatient visits to the ophthalmology clinic per year in the regency in 2020. These figures also translate to a 35.26% downtrend in overall outpatient visits to ophthalmology clinics in the regency period from 2019 to 2020. There was variation in the downtrend rate between hospitals with RS Bhakti Rahayu and RS Wisma Prashanti experiencing a nearly equal drop of 30.61% and 30.10%, respectively. In comparison, BRSU Tabanan experienced a considerably more severe 42.22% drop.

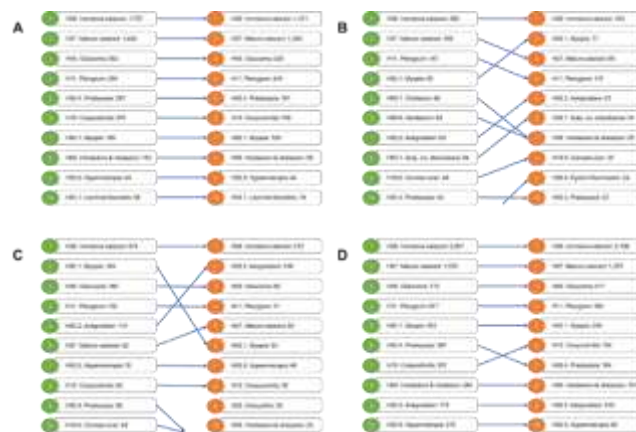


Figure 1. Changes in top ten ophthalmology diagnoses in A) RS Bhakti Rahayu, B) BRSU Tabanan, C) RS Wisma Prashanti, and D) cumulative of all three, between 2019 and 2020.

The top 10 diagnoses from the three hospitals, visible in Figure 1, accounted for 7,808 and 5,447 visits in 2019 and 2020. It counted as 53.25% and 57.39% of total visits in 2019 and 2020, respectively, which showed that these diagnoses make up a significant portion of visits to the ophthalmology clinics included in the study. The figure also showed a cumulative drop of 35.26% for visits for these diagnoses.

Table 1 presented visits for diagnoses of interest as causes for preventable blindness, such as cataracts, glaucoma, pterygium, and refractive disorders included in cumulative top ten diagnoses and top ten diagnoses in individual hospitals. From these diagnoses, we observed a downtrend of 41.81% and 45.33% for glaucoma and pterygium, respectively. Visits for immature and mature cataracts dropped 29.59% and 38.56%, respectively, while collectively visits for cataract dropped 21.72%. Meanwhile, visits for refractive disorders collectively dropped by 42.27%.

There was variation in changes in the number of visits for these diagnoses between hospitals. In BRSU Tabanan, we can observe the most severe drop of visits for immature and mature cataracts, 52.72% and 59.17%, respectively. The same figures for RS Bhakti Rahayu was 16.28% and 16.29%, while for RS Wisma Prashanti it was 17.77% and 40.22%. BRSU Tabanan also observed the most severe drop of visits for pterygium compared to other hospitals. Meanwhile, the hospital observed the least severe decrease of visits for refractive disorders.

4. Discussion

We observe a significant downtrend of outpatient visits to ophthalmology clinics in the entire Tabanan Regency, Bali, Indonesia, from 2019 to 2020. The most significant downtrend of over 40% was observed in public BRSU Tabanan hospital, while the two private hospitals observed reported a similar downtrend rate of around 36%. By diagnoses, immature and mature cataract was observed with the least drop in hospital visits regency-wide. Still, we can see the difference between public BRSU Tabanan hospital, where the

downtrend was more pronounced, compared to private ones. A similar pattern can also be observed for visits to the pterygium.

Drop-in outpatient visits have been reported since early in the pandemic for various types of specialist care clinics. One report from the United States reported a 33% drop in outpatient visits for cardiovascular care, including 53% cancellation for booked visits.¹⁸ Similar reports in Europe described a downtrend in ophthalmology procedures performed in Europe in the early weeks of the pandemic, including near cessation of surgeries for cataract and glaucoma.¹⁹

The reason for this pattern was two-fold. On the one hand, the overwhelmed hospital may restrict services for non-essential and live-saving procedures.¹⁹ Healthcare workers in ophthalmology clinics also needed to adjust to new safety protocols to prevent COVID-19 transmission to themselves and their patients. Ophthalmologists have a higher risk for transmission than other healthcare workers due to the necessity to work close to the patient. This is especially true for surgical procedures.²⁰

Precautionary measures taken by hospitals observed in this study included the cessation of surgical procedures in the first two months of Indonesia's pandemic (March to April 2020). After services was resumed, COVID-19 screening measures were put in place. Patients were tested for fever for routine outpatient care and obliged to test negative for COVID-19 before the surgical procedure could proceed. There was resistance from the patient, mostly stemmed from COVID-19 denialism fueled by conspiracy beliefs, which was considerable in Indonesia.²¹ These measures may affect outpatient visit figures observed in our study.

Another reason for downtrend of outpatient visits was patients' reluctance. Fear of contracting COVID-19 has been observed in the general population, along with the perception that healthcare facilities were the breeding ground for COVID-19 transmission. This fear has caused patients to delay seeking medical help, even in medical emergency cases, to their detriment.²²

Such fear has also been observed in other parts of Indonesia and directly linked to delaying outpatient visits to hospitals.²³

Our data also support this observation. As can be seen, there was a pattern of the more severe downtrend in the public BRSU Tabanan hospital compared to private hospitals in our study, especially for diagnoses that would need surgical care, such as cataract and pterygium. The possible reason for this trend was that said public hospital was specially appointed as COVID-19 referral hospital while the private hospitals were not. This could lead to the public perception that COVID-19 referral hospitals to be more dangerous and have a higher risk of COVID-19 transmission to the patient, thus leading to decisions to avoid such hospitals.

Reduced hospital visits for eye care would be detrimental to eradicating preventable blindness as a public health issue. While some diagnoses reported in this study, such as cataracts and pterygium, allow for delayed treatment for emergency conditions that may cause permanent, irreversible blindness. Glaucoma, for which we observed over 40% downtrend in outpatient visits, was one such diagnosis.²⁴

The situation is worsened considering the condition of preventable blindness in Indonesia, and Bali in particular. Recent rapid assessment of avoidable blindness (RAAB) from 15 provinces in Indonesia reported prevalence of preventable blindness nationwide was 3.0%. The prevalence of avoidable blindness in Bali was 2.0%, with an additional 3.8% and 12.1% prevalence for severe and moderate visual impairment. Diagnoses of interest in our study were also listed as major causes for preventable blindness and visual impairments. This is especially true for cataract, which was attributed to causing 77.8% preventable blindness, 83.3% severe visual impairment, and 71.3% moderate visual impairment.²⁵ More delayed diagnosis and treatment due to causes related to the COVID-19 pandemic would lead to further situation deterioration of blindness as a public health issue.

The implication for this result is clear. Addressing the downtrend of hospital visits due to the COVID-19 pandemic must target both the hospital end of the issue and the community end. The hospital-related issue can be addressed by increased precaution, and sustainable practices for pandemic situation.²⁶ These measures have been mostly in place in observed hospitals. However, they can only work as long as the system was not overwhelmed by COVID-19 cases.

Considering this fact, it is crucial also to address the community end of the issue. With the current trend, it is very much possible that the healthcare system in Indonesia in general, and Bali in particular, may be overwhelmed by the COVID-19 case surge.¹³ This is not considering that the reported figures were underestimated due to the lack of healthcare access in some areas.¹¹

In this situation, public health communication should strike a balance in increasing public vigilance for COVID-19 threat but, at the same time, to not be overwhelmed with fear that people delay seeking treatment for a medical condition. This is a delicate balance to achieve. At the beginning of the pandemic, anxiety and panic were the general moods in the population.²⁷ However, as the pandemic went on, the initial fear may have subsided and preventive behavior laxed, which led to the surge around the New Year holiday period.¹³

Although this study shined a light on the understudied issue of blindness as a public health issue during the COVID-19 pandemic in Bali, Indonesia, it also has several limitations. This study's scope was relatively small, with three hospitals covering a regency of 445 thousand people. Therefore, the result of this research cannot be generalized to other regions in Indonesia with different healthcare system. The outpatient visit was also not the perfect measure to evaluate blindness as a public health issue in the population. This research need further investigation to demonstrate a correlation among pandemic and decreased visit in ophthalmology outpatient clinic. More robust studies are needed to understand the situation better and formulate a

solution to help achieve VISION 2020 targets despite the pandemic.

5. Conclusion

Our study showed a 35.26% downtrend of outpatient ophthalmologic visits in hospitals across Tabanan regency. The downtrend was especially severe for diagnoses requiring surgical treatment such as cataracts and pterygium in public COVID-19 referral hospitals compared to other diagnoses in private hospitals. This result implies two-fold causes for the downtrend: precaution for transmission enacted by hospitals and patient reluctance induced by fear of COVID-19. Both these issues need to be addressed to provide better and more timely care for patients in order to treat preventable blindness.

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