

# GLASSES FOR ALL: IMPROVING SUPPLY TO THE POOREST

Delivering for the bottom billion: a report for the  
International Agency for the Prevention of Blindness

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## EXECUTIVE SUMMARY

There are about 1 billion people with vision impairment which has not been treated or could have been preventable, mainly from untreated refractive error and presbyopia.<sup>1</sup> The vast majority, around 90%, of them are in low and middle income countries (LMICs).<sup>2</sup>

There are many reasons why someone in a low or middle income country may not have received the glasses that they need. For example, lack of diagnosis, affordability, lack of awareness and the perceived stigma from wearing glasses. These are all examples of “demand-side” issues: reasons why people do not try to acquire glasses. There has been much research to provide an understanding of these demand-side barriers. There has been much less analysis about the supply-side of the market: are firms, supply chains, competition and other supply-side characteristics functioning well-enough to ensure a least cost, efficient supply of glasses?

Frontier Economics Limited was commissioned by the International Agency for the Prevention of Blindness (IAPB) to help improve their understanding of the supply-side market for glasses.

Our methodology combined desk research of relevant literature, data and previous studies on the topic, and qualitative research which involved in-depth interviews with stakeholders in different countries and parts of the supply chain. We used this mix of sources to formulate and test hypotheses grounded in economic theory and draw our conclusions and recommendations. The stakeholder engagement allowed us to explore gaps in the existing evidence base.

While this study focuses on LMICs in general, we have conducted three country deep dives in India, Nigeria and Mexico in order to illustrate the fact that market characteristics vary from country to country. The deep dives allowed us to test the extent to which the conclusions might apply generally or may need to be modified based on local circumstances. The scope of this study limited us to three countries and they are not intended to be representative. Instead, they are used to illustrate how factors vary across countries and where specific examination of local circumstances is needed before finalising the best approach in any particular country.

Analysis of existing and new evidence suggests three areas of focus for IAPB and others to improve the supply-side provision of glasses to those currently unserved.

### 1. Evolution of health policies and the regulation of the sale of glasses

A common theme is the importance of the costs associated with **medical regulations and wider health policies**. The biggest potential to reduce costs and increase access lies in considering reforms to regulations about the sale of glasses. There is variation across countries in the roles of optometrists, ophthalmologists and other staff (such as refractionists or various categories of

<sup>1</sup> World Health Organization: WHO. (2022). Blindness and vision impairment. *www.who.int*. <https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment#:~:text=This%201%20billion%20people%20includes,well%20as%20near%20vision%20impairment>

<sup>2</sup> Essilor See Change (2020). Eliminating Poor Vision in a Generation.

staff with less training periods) in prescribing and acting at the point of sale of glasses, and in the wider application of quality standards.

A move to reduce regulations or more widely de-regulate prescription would benefit the majority of people with URE in LMICs using relatively cheap, mass produced glasses. Our analysis estimates mass-produced glasses can benefit around 60%-80%<sup>3</sup> of the underserved billion people with URE. A more bespoke solution would be needed for those with complex needs.

In practice, implementation of this recommendation would require guidance from suitable medical professionals. Economic analysis can point to the possible cost savings and wider benefits, other inputs will be required to balance any quality trade-offs. The evidence suggests that the cost implications of many current models are so significant in limiting access that alternative regulatory models require more serious consideration.

## 2. Leveraging and supporting entrepreneurial companies in LMICs

Government action to increase the role of the private sector in the supply of glasses can help to **leverage the entrepreneurial activities of many firms**, including the informal sector, to expand coverage. This would include reducing barriers to entry into the formal sector, facilitating new business models to manage the inventory costs of glasses provision and better leveraging development finance to support firms to scale up. Some of the funding required to support these changes (e.g. from international financial institutions) can only be accessed directly by governments or with the support of governments. As such, national government support – potentially with the help of IAPB or others – will be required to access such financing or to increase skills.

## 3 Minimising the costs of glasses across the whole supply chain

Low and middle income consumers in LMICs are very price sensitive. The evidence collected in the interviews provided various metrics including a willingness to pay no more than 10% of monthly salaries (in some cases approximated by an average cost of \$3.80) or to no more than 2-3 days' wages. Our interviews provide mixed evidence about whether this can be achieved, with some stakeholders believing that this cost (excluding prescription and screening costs) can provide sufficient quality of glasses. Important steps can be made **to minimise costs** in a very price sensitive market. These include actions to re-design aspects of the supply chain (eg greater use of regional distribution hubs), to increase competition across the supply chain and to minimise the cost of importing glasses and their components.

There is scope for IAPB (and other NGOs) to influence thinking and actions in each of the three areas. The underserved 1 billion people with URE reflects an unmet need and not necessarily an unmet demand: supply-side measures are needed to complement demand-side activity. Changes to the regulatory framework linked to the prescription and sale of glasses would have the biggest impact. Reducing costs across the supply chain of manufacturing and distributing is important because the

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<sup>3</sup> See footnotes 7-10 for additional sources. This estimate reflects a majority but not consensus view from the interviews.

low income of the consumers in question makes them very sensitive to any cost reduction. However, such reductions alone are likely to lead to relatively marginal gains.

**This leads to three main recommendations for action:**

1. **Making the case for reduced regulation at the point of sale** through changes to when prescriptions are required and who is involved would have the biggest impact. The IAPB can play a role in lobbying for this change, along with others. We note that medical expertise is needed to inform this change.
2. **Supporting a change in business models:** There is a role for governments where regulatory and policy changes are needed for new business models to work (including regional distribution and/or manufacturing hubs), and a role for IAPB and other NGOs in making the case for these changes. There is scope for IAPB or other NGOs to work directly with providers in both the formal and informal sectors to access development finance and develop new business models. For example, funding discussed above to support new business development often requires government sponsorship or applications – it is not funding that companies can access directly. Other specific actions could include facilitating regional hubs through local planning, land and infrastructure availability and training in relevant skills to manage such hubs.
3. **Working to reduce import tariffs and customs frictions** to reduce costs on imports. Lack of expertise in international trade law and agreements within national governments may mean they are not able to develop cases that would reform tariffs in the ways suggested above. Supporting national governments to make the case for treating glasses as medical products at the point of entry would help reduce costs and uncertainty for businesses.

The relative lack of work on supply-side issues also means that further information would be useful to better formulate future supply-side policies. **Areas for more detailed analysis than was possible in this work include:**

- 1 Gather relevant medical and related evidence to understand whether **the role of optometrists and ophthalmologists** (and related staff) could be changed to allow more flexible retail models to be developed. This might focus on developing a more nuanced view of what level of expertise is required for sales to different types of consumers. This would include soliciting expert medical input on the minimum quality levels needed in glasses and the medical risks of deregulation.
- 2 **Options to decrease the cost of shipping and distribution:** this could involve additional research into the impact that new technologies could have on shipping and distribution costs, particularly the potential for greater use of hub-and-spoke models of distribution to reduce the costs of holding inventory in many locations while allowing the central inventory to be distributed more effectively to retail suppliers. This might include greater evidence about the appropriate role for local manufacturing and the future of mass manufacturing in China. There are potential learnings from other sectors and markets (eg Coca Cola or soft drinks more widely) about how to keep distribution costs down in order to serve markets across low and high income countries, and low and high value market segments within a country.

- 3 How the **entrepreneurialism of the informal market can be harnessed to improve supply**, while managing trade-offs around quality. Work to better understand the particular local circumstances that has resulted in the development of the informal market might include research with local informal providers. This could aim to also understand how to make formal provision more attractive, including offering support for expansion that requires entry into the formal sector.
- 4 The extent to which **lack of finance for businesses** is a specific barrier to entry and expansion for retailers, and the dynamics in the informal sector. Stakeholders interviewed for this work had limited knowledge of the evolution and drivers of the informal sector, which differs between countries. Further work could involve speaking directly with suppliers in the informal market to understand their needs, engaging with providers and recipients of microfinance to learn from their experiences, and local public health providers to understand their views on how development finance could best be deployed. This should be accompanied by consideration of existing low-cost lending options that could help support the sector to expand.

Fulfilling these recommendations will help to create an efficient, consumer-oriented supply-side market for glasses that can serve everyone. There is no doubt that demand-side measures (such as educating people about the benefits and providing access to low cost diagnosis) continue to be important. The evidence presented here suggests that more focus on supply-side changes would help in meeting the needs of those on lower incomes impaired by poor vision.

# 1 Introduction

There are about 1 billion people with vision impairment which has not been treated or could have been preventable, much from untreated refractive error and presbyopia.<sup>4</sup> The vast majority, around 90%, of them are in low and middle income countries (LMICs).<sup>5</sup> Millions of people in these countries are not receiving the glasses which could significantly improve their lives, productivity and wellbeing.

There are many reasons why someone in a low or middle income country may not have received the glasses that they need. For example, lack of diagnosis, affordability, lack of awareness, perceived stigma from wearing glasses. These are all examples of “demand-side” issues: reasons why people do not try to acquire glasses. Much research has focused on understanding these demand-side barriers. There has been much less analysis about the supply-side of the market: are firms, supply chains, competition and other supply-side characteristics functioning well-enough to ensure a least-cost, efficient supply of glasses?

Frontier Economics Limited was commissioned by the International Agency for the Prevention of Blindness (IAPB) to help improve their understanding of the supply-side market for glasses. Understanding competition and innovation in the supply of frames and lenses would help to complement the existing research into the barriers to reaching the 1 billion unserved. This work will allow for a more complete picture to be developed about the barriers to owning appropriate glasses for this group. This report is designed to help inform IAPB’s strategies for reducing sight loss and blindness in LMICs.

Our approach combines economic theory and evidence to provide a picture of the supply-side of the market and its impact on the delivery of glasses to customers. We consider six economic concepts that help to explain market functioning: the degree of information asymmetry, incentives in the market, the degree of market power, the existence of economies of scale, the degree of market fragmentation and the extent of innovation. The concepts are used to develop hypotheses about the market that we have then tested through a review of available evidence and new stakeholder interviews. Evidence and theory are combined to identify recommendations and to identify where further analysis and research is needed.

We use three “deep dive” countries brings to life the hypothesis testing and to illustrate how country context differs and will matter when it comes to improving the provision of glasses for all. These three examples are not intended to constitute a comprehensive review of all characteristics in LMICs. They are intended to help understand where different local circumstances might affect our conclusions.

Finally, as noted above, this report fills a gap in the evidence by focusing on supply-side issues. In practice, action will be required on both the demand and supply-side of the market to increase

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<sup>4</sup> World Health Organization: WHO. (2022). Blindness and vision impairment. *www.who.int*. <https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment#:~:text=This%201%20billion%20people%20includes,well%20as%20near%20vision%20impairment>

<sup>5</sup> Essilor See Change (2020). Eliminating Poor Vision in a Generation.



provision to those who would benefit from glasses. We return to emphasise this point in our recommendations and conclusions.

The rest of this report is structured as follows:

- Chapter 2 sets out our framework and overall approach
- Chapter 3 provides a summary of our analysis and findings of the functioning and state of the supply-side market, including our three deep dives into India, Mexico and Nigeria
- Chapter 4 examines the evidence and its implications for our hypotheses, including how we developed these hypotheses
- Chapters 5 through 7 set out the resulting conclusions in detail
- Chapter 8 provides a summary of the conclusions and our recommendations, including areas for further research and analysis.

The annexes provide further information about the evidence and the stakeholder engagement; and detailed analysis of the World Trade Organisation data on trade in lenses and frames.

## 2 Supply-side economic framework approach

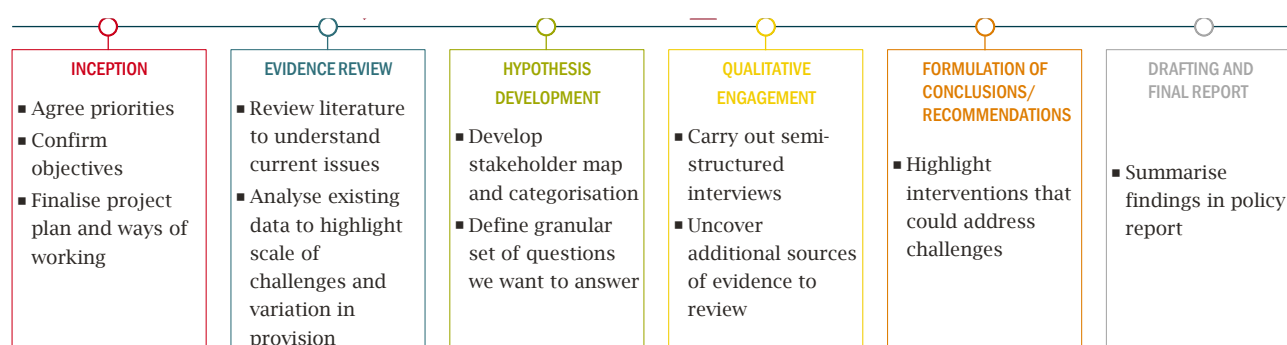
This Chapter summarises our approach and framework, with additional detail in Annex A.

### 2.1 Our overall approach

This study aims to understand and analyse the supply-side of the glasses market and then develop recommendations to help more affordable products reach the poorest. Our methodology combined desk research of relevant literature, data and previous studies on the topic, and qualitative research which involved in-depth interviews with stakeholders in different countries and parts of the supply chain. We used this mix of sources to formulate and test hypotheses grounded in economic theory and draw our conclusions and recommendations. The stakeholder engagement allowed us to explore gaps in the existing evidence base.

Our approach was implemented in six steps, illustrated in the figure below:

**Figure 1 Phases of the study**



Source: Frontier Economics

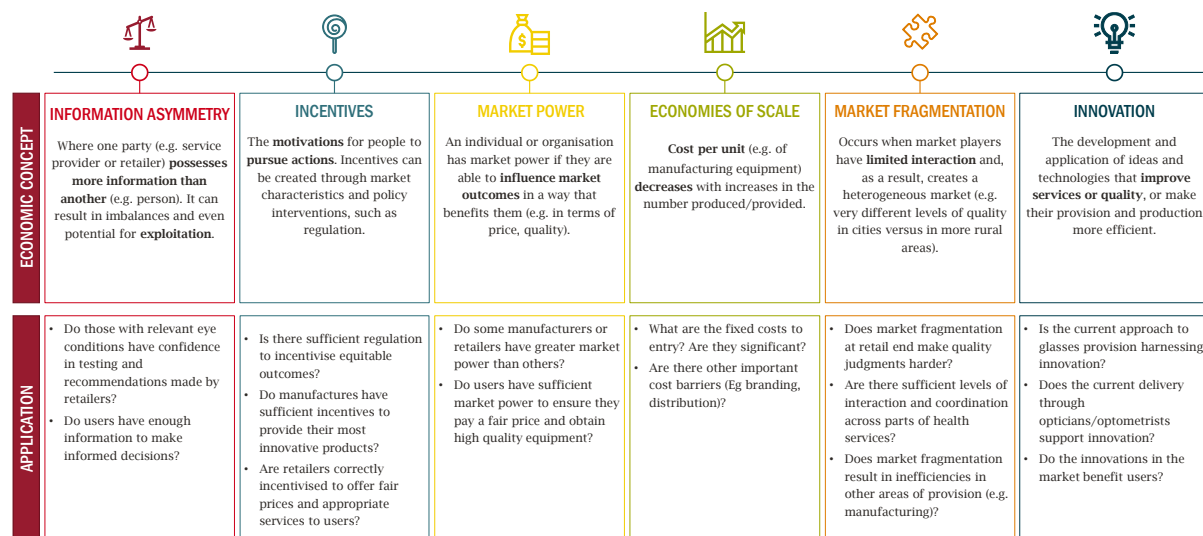
### 2.2 Supply-side economic framework

The supply-side of the market can be characterised by examining six main elements that help to explain how the market functions and where it might fail to deliver suitable outcomes.<sup>6</sup> These are set out in Figure 2 below, with additional detail in Annex A.

Figure 2 explains these concepts with some illustrative questions that may help understand the extent to which the characteristics in question are relevant drivers of market outcomes. They are not intended to be mutually exclusive groups: there may be overlaps in some markets (e.g. all else equal, greater economies of scale might also allow greater market power). Still, they each capture slightly different ways the market may respond (or fail to respond) to population needs.

<sup>6</sup> See, for example, Varian, Hal R., author. (2014). *Intermediate microeconomics: a modern approach*. New York :W.W. Norton & Company.

Figure 2 Economic framework



Source: Frontier Economics

We note that some of these factors also interact with demand-side issues documented in other studies. For instance, the relationship between market incentives and demand's willingness or ability to pay for glasses, or the existence of information asymmetries between providers and consumers.

### 2.2.1 Deep dives

While this study focuses on LMICs in general, we have conducted three country deep dives focused on India, Nigeria and Mexico in order to illustrate the fact that market characteristics vary from country to country. The deep dives allow us to test the extent to which the conclusions might apply generally or may need to be modified based on local circumstances. The scope of this study limited us to three countries and so they are not intended to be representative. Instead, they are used to illustrate how factors vary across countries and where specific examination of local circumstances is needed before finalising the best approach in any particular country.

### 2.2.2 Stakeholder engagement

Supply-side factors are often neglected in studies which often focus on the demand side. Moreover, evidence of unaddressed refractive errors is frequently underreported.<sup>7</sup> In light of this, we sought to supplement our findings from public sources by engaging with stakeholders to gather new information. Their input was particularly valuable in testing parts of our hypotheses where current evidence was lacking, interpreting existing evidence, and ensuring that we had exhausted available evidence and directing us towards new leads.

The scope of this study did not allow widespread interviews with a representative sample of people. Instead, fourteen bespoke interviews were undertaken. We sought to use each interview to

<sup>7</sup> World Health Organization: WHO. (2019). World report on vision.

supplement existing evidence and to test hypotheses. We sought to ensure that across those we interviewed there was a broad range of experience, capturing: different countries, types of organisations (private, public/international, charitable), parts of the supply chain and areas of expertise (e.g. medical and non-medical). We recognise that we have not captured all views, nor have we sought to do so. A more extensive study could be undertaken to understand in more detail whether the conclusions set out here withstand challenge from a broader set of stakeholders.

The following table displays the list of the organisations interviewed, along with the regions and particular topics and hypotheses addressed.

**Table 1** List of stakeholders

Organisation	Region	Key Topic
Independent	Global	Regulation
Independent	Global	Supply chain
National Vision	US/Global	Regulation and low cost supply
Sight Savers	Nigeria	Nigerian context
EssilorLuxottica	Global	Supply barriers and market dynamics
KIHT	India	Trade, manufacturing
India Vision Institute	India	Indian context
Sight Savers	India	Demand barriers
Optometry Council of India	India	Regulation
WHO	Global	Policy perspective
Vision Spring	Global, India	Supply barriers and market dynamics
Fundación Ver Bien	Mexico	Mexican context
Independent	US/Global	Innovation, telemedicine
Frontier Economics	UK	Retail market competition

Source: *Frontier Economics*

Note: *Most interviews covered many topics based on pre-prepared topic guides but recognised that the people interviewed had particular areas of specialism which focused the interview on a “key topic”.*

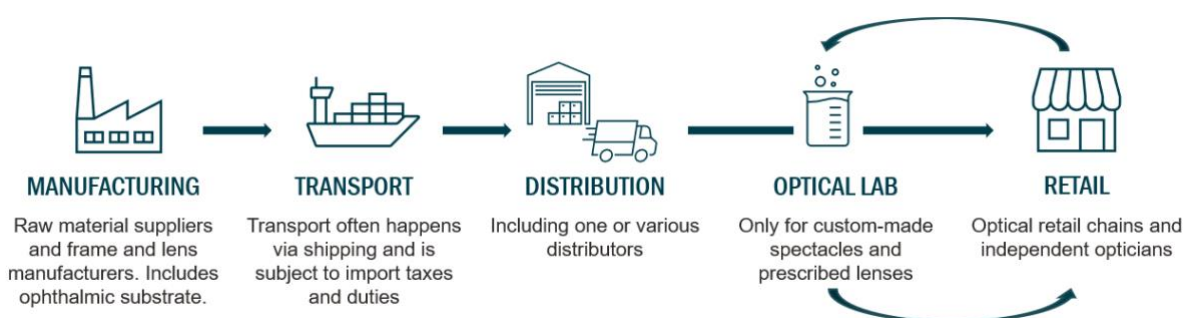
### 3 Understanding the supply-side market and developing hypotheses

This Chapter sets out our analysis and findings about the characteristics and functioning of the supply-side market for glasses.

#### 3.1 Components of the supply chain

The figure below displays a simplification of the main components of the supply chain (or value chain as it is also known).

**Figure 3** Main components of the supply chain



Source: Frontier Economics based on market research<sup>8</sup>

Note: The optical lab is relevant for prescription glasses. The retailer must have access to an optical lab that fits the lens and frame, which will then return the finished product for collection or delivery to the end customer. We have included the iterative loop in the diagram to reflect this.

The supply chain can include the following stages:

- Manufacturing:** (or production) including suppliers of raw materials and manufacturers of lenses, frames and glasses. Many stakeholders identified that China is by far the biggest global producer of glasses, lenses and frames at up to 95% in total global manufacturing<sup>9</sup> and it is widely regarded as low cost due to significant economies of scale and specialisation. Other LMICs, such as India and Brazil, also produce frames but most markets import the majority of their product from

<sup>8</sup> EC merger case between Essilor and Luxottica (Case M.8394); Savage, M., Bhatnagar, T., Liao, C., Chaudron, M., Boyar, J., Laurentius, D., & Holloway, C. (2020). Product Narrative: Digital Assistive Technology. A market landscape and strategic approach to increasing access to digital assistive technology in low-and middle-income countries; Credit Suisse (2017). *Eyewear industry*. Credit Suisse; and insights shared by stakeholders.

<sup>9</sup> Additional sources also identify China as the main manufacturing hub, with around 6,000 manufacturers (Simon-Isunny. (2023, March 10). *China Eyewear Industry & China Glasses Manufacturers You Have to Know-A Condensed Analysis - Isunny*. Isunny. <https://www.isunnypacking.com/china-glasses-manufacturers/>) and 90% of all frames (Eyeglasses.com. (n.d.). <https://www.eyeglasses.com/info/glasses-frame-quality#:~:text=Nowadays%2C%20about%2090%25%20of%20all%20eyeglasses%20are%20made%20in%20China.>)

China.<sup>10</sup> For the low-value segment, various stakeholders identify Chinese manufacturers as the most competitive in prices. For ready-made glasses, assembly occurs at the manufacturing facilities, while custom-made frames and lenses are distributed separately and assembled later.

- **Transport:** from manufacturers to distribution centres is often via ships since most countries rely on imports. Shipping can take a few months and is subject to import taxes and duties plus delays linked to port and customs clearance. Several of our stakeholders pointed to the relatively low costs of shipping for transport costs where mass manufactured glasses and lenses are used but also to delays caused by issues getting products cleared through customs and ports. There is scope for more work on estimating these costs.
- **Distribution:** requires the development of warehouses and logistics. In some cases, more than one distributor may be involved at the regional and local level. The absence of regional distribution centres was identified as a potential barrier in the supply of rural markets due to a lack of infrastructure. The need for new infrastructure will vary by the geography and populations density with more dispersed, rural populations potentially facing higher costs. There was limited existing information about the cost of distribution.
- **Optical lab:** relevant for custom-made glasses and lenses. Once the client chooses a product, the fitting of the lens and frame takes place at a local optical laboratory. These glasses require additional intermediaries, transport costs and time compared to ready-made glasses.

There was a majority, but not consensus view, from stakeholders that cheaper, mass produced glasses are appropriate for the majority (estimated around 60%-80%) of URE patients.<sup>11</sup> One stakeholder strongly believed that mass production is only appropriate for readers whereas another felt there was very little difference. Our evidence review also identified several sources which point to this conclusion of 60%-80% of URE can be addressed with mass produced glasses although the exact level remains uncertain.<sup>12 13 14 15</sup> This suggests that a focus on minimising the costs of mass produced glasses and lenses could help a very large proportion of the population in need.

<sup>10</sup> In the EU there is more manufacturing, and finishing, of glasses, lenses and frames for the high value and luxury markets. See for instance EC merger case between Essilor and Luxottica (Case M.8394);

<sup>11</sup> Several stakeholders separated the market for adults and children, suggesting that children needed more custom glasses and prescription testing.

<sup>12</sup> See Change by Essilor finds 80% of vision problems can be treated with solutions we have today (See Change - Essilor. (2020, January 24). *ABOUT US - Essilor See Change*. Essilor See Change. <https://www.essilorseechange.com/about-us/>).

<sup>13</sup> 70%-90% of children can benefit from ready-made spectacles in Cambodia, China and India (Morjaria, P. (2017). Use of ready-made spectacles in school eye health programmes. *Community Eye Health Journal*, 30(98), 33).

<sup>14</sup> Used glasses were found to be more effective than ready-made in one study, although ready-made glasses did improve vision by users (Shane, T. S., Shi, W., Schiffman, J. C., & Lee, R. K. (2012). Used glasses versus ready-made spectacles for the treatment of refractive error. *Ophthalmic Surgery, Lasers and Imaging Retina*, 43(3), 235-240).

<sup>15</sup> Ready-made glasses improved the visual acuity of the majority of adults in the trial, compared to custom glasses (Angell, B., Ali, F., Gandhi, M., Mathur, U., Friedman, D. S., Jan, S., & Keay, L. (2018). Ready-made and custom-made eyeglasses in India: a cost-effectiveness analysis of a randomised controlled trial. *BMJ Open Ophthalmology*, 3(1), e000123).

- **Retail:** often formed by retail chains and independent opticians. Retail shops entail upfront and human capital costs and require good inventory management to provide consumers with options that meet their prescription needs and style preferences.

In this report, we include diagnosis/ refractive testing and prescriptions in the retail costs. One important characteristics of retail markets is the **degree of competition**. This varies from country to country. Retail is more highly fragmented in LMICs than in higher income countries, such as the UK and EU countries.<sup>16</sup> EssilorLuxottica is the largest global player, with 20% of global market share by revenue in one estimate for eyewear and eyecare market<sup>17</sup>, and with over 40% of the retail corrective lens market and 25% of the frames market from other estimates<sup>18,19</sup>. We note that some sources cite a figure of 80% of the glasses and sunglasses market but our understanding is that this figure stems from a 2014 article with limited sourcing.<sup>20</sup> Only around 17% of EssilorLuxottica's revenue is in Asia-Oceania and Africa and Latin America where the vast majority of LMICs are.<sup>21</sup> These figures relate to revenues whereas the estimate of 95% of manufacturing in China is a volume metric. The range of sources with slightly different views of the market points to limited existing, up to date information on all parts of the supply chain.

There is substantial variation by country for the retail market: our stakeholder interviews identified that retail in India is more fragmented than in Nigeria. Countries such as Nigeria with fewer retail players are more likely to have less price competition in retail.

- Supply chain components are influenced by whether countries have local manufacturing or not, and by the product type. In general, we distinguish between **wholesale and retail markets**. Wholesale markets entail providers that buy products from manufacturers and resell them to other companies who deal with the final consumers (retailers). This is common in countries where products are imported. One stakeholder suggested that wholesale markets can be unreliable in some LMICs, with Nigeria given as an example.
- Many large companies in the eyewear industry are **vertically integrated**, which involves controlling various stages of the supply chain. This can include from manufacturing to retail, as exemplified by EssilorLuxottica and other similar companies. There is some degree of market concentration in the global eyewear market. Global players are focused on high-income countries and market investigations by competition authorities in Europe have found that the market is broadly competitive, with some measures needed in particular markets following consolidation

<sup>16</sup> See for instance EC merger case between Essilor and Luxottica (Case M.8394).

<sup>17</sup> S&P RatingsDirect for EssilorLuxottica April 2022, [https://www.essilorluxottica.com/sites/default/files/RatingsDirect\\_EssilorLuxottica\\_51280556\\_Apr-14-2022.PDF](https://www.essilorluxottica.com/sites/default/files/RatingsDirect_EssilorLuxottica_51280556_Apr-14-2022.PDF)

<sup>18</sup> Statista 2019 figure: <https://www.statista.com/statistics/1087381/share-of-global-cardiovascular-market-by-company/>

<sup>19</sup> See for instance: <https://www.theguardian.com/news/2018/may/10/the-invisible-power-of-big-glasses-eyewear-industry-essilor-luxottica>

<sup>20</sup> The original source appears to be this Forbes article: <https://www.forbes.com/sites/anaswanson/2014/09/10/meet-the-four-eyed-eight-tentacled-monopoly-that-is-making-your-glasses-so-expensive/>

<sup>21</sup> S&P RatingsDirect for EssilorLuxottica April 2022, [https://www.essilorluxottica.com/sites/default/files/RatingsDirect\\_EssilorLuxottica\\_51280556\\_Apr-14-2022.PDF](https://www.essilorluxottica.com/sites/default/files/RatingsDirect_EssilorLuxottica_51280556_Apr-14-2022.PDF)



(e.g. undertakings required in the UK for retail mergers).<sup>22</sup> Our stakeholders pointed to eyewear markets in LMICs generally being more fragmented compared to those in Europe and the USA but also to greater difficulties serving rural and low income populations.

### 3.1.1 Costs of glasses

VisionSpring reports that once people experience improved vision, most are willing to pay approximately 10% of their monthly income for glasses or related products.<sup>23</sup> This is supported by interviews with stakeholders in their views of what could be affordable, although all stakeholders raised concerns about willingness to pay due to lack of awareness of the benefits from glasses and improved sight and from the social stigmas from wearing glasses.

The World Bank defines extreme poverty as living on under \$2.15 (2017 purchasing power parity prices) per day, and that around 9% of the global population was below this level in 2020. It forecasts around 7% in this extreme poverty in 2030.<sup>24</sup> This implies that the poorest could be willing to pay around \$6 for glasses. However, the Kassalow et al. report for Vision Spring estimates this at around \$3.80.<sup>25</sup> There will be significant variation in this value by country.

There is some evidence that it is feasible to manufacture mass produced glasses for around \$3-\$5, with readers around \$0.70-\$1.25, according to our interviews and analysis by Kassalow et al.<sup>26</sup> This does not include additional costs beyond the manufacturing such as transport, distribution or retail costs (importantly this excludes prescription and diagnosis costs).

### 3.1.2 Cost breakdown of glasses across the supply chain

To gain insights about the relative costs of the components of the supply chain, we provide a breakdown in the figure below. This corresponds to the case for a pair of ready-made glasses in the low-value segment. The costs and proportions will vary from country to country. There are few studies that report this breakdown, especially for the low-cost segment. Therefore, we rely predominantly on information shared by stakeholders.

<sup>22</sup> EC merger cases between Essilor and Luxottica (Case M.8394), and EssilorLuxottica and GrandVision (Case M.9569).

<sup>23</sup> Figure and citation from Kassalow, J., Lee, M., Karnani, A., & Garrette, B. (2011). *Better Vision for the Poor*. Stanford Social Innovation Review, 9(2), 66–71. <https://doi.org/10.48558/REYD-KV24>. Supported by several interviews

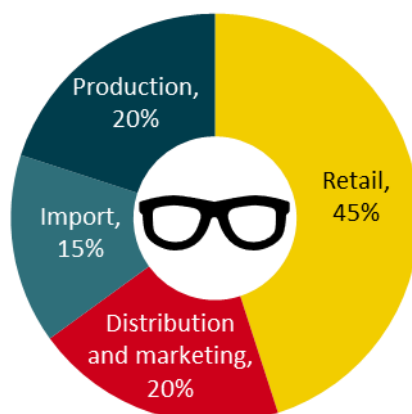
<sup>24</sup> World Bank Poverty overview, pdated November 2022 <https://www.worldbank.org/en/topic/poverty/overview>

<sup>25</sup> Based on calculations from Kassalow, J., Lee, M., Karnani, A., & Garrette, B. (2011). *Better Vision for the Poor*. Stanford Social Innovation Review, 9(2), 66–71. <https://doi.org/10.48558/REYD-KV24> Updated for inflation from 2011 price base to 2022 prices.

<sup>26</sup> Evidence supported by Kassalow, J., Lee, M., Karnani, A., & Garrette, B. (2011). *Better Vision for the Poor*. Stanford Social Innovation Review, 9(2), 66–71. <https://doi.org/10.48558/REYD-KV24>



**Figure 4** Illustrative breakdown costs for ready-made glasses



Source: Frontier Economics based on information provided by a stakeholder

Note: Retail costs exclude the cost of prescription

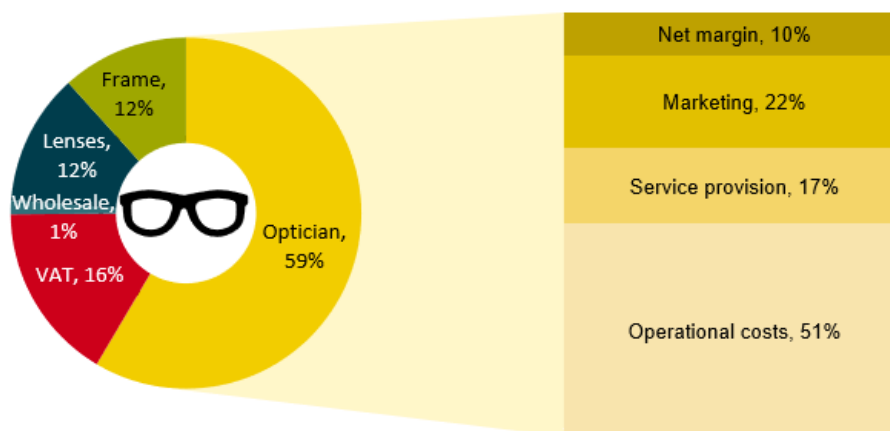
While the precise numbers will vary between countries, the general trends will likely be consistent. In particular, we note that the larger costs are incurred at retail and distribution (45% retail,<sup>27</sup> plus an additional 20% for distribution and marketing costs), and that these would be even larger when including costs of prescription. For custom-made glasses, the additional intermediaries may further increase these costs.

Import costs constitute a significant portion of the total costs (15%), but it is important to note that these could differ significantly from country to country depending on trade barriers and tariffs (which we discuss in section 3.4). Finally, production accounts for around 20% of the total costs.

We have analysed how these costs compare with the high-value segment, based on data from France. These costs are specific to the French context at the time and should be interpreted with caution. The split is slightly different but supports the idea that retail costs are the most significant element in the supply-chain. In France, retail accounts for the majority of costs (59%). A cost breakdown indicates that 51% of these costs were operational. The remaining were attributed to the service provision (17%), marketing (22%), and net margin (10%).

<sup>27</sup> Retail margin is made by the optician when selling glasses to the final consumer. It doesn't include the eye examination cost, which is billed separately. In many cases, when the consumer purchases a pair of glasses, this cost is waived.

**Figure 5** Illustrative breakdown costs, high-value segment in France



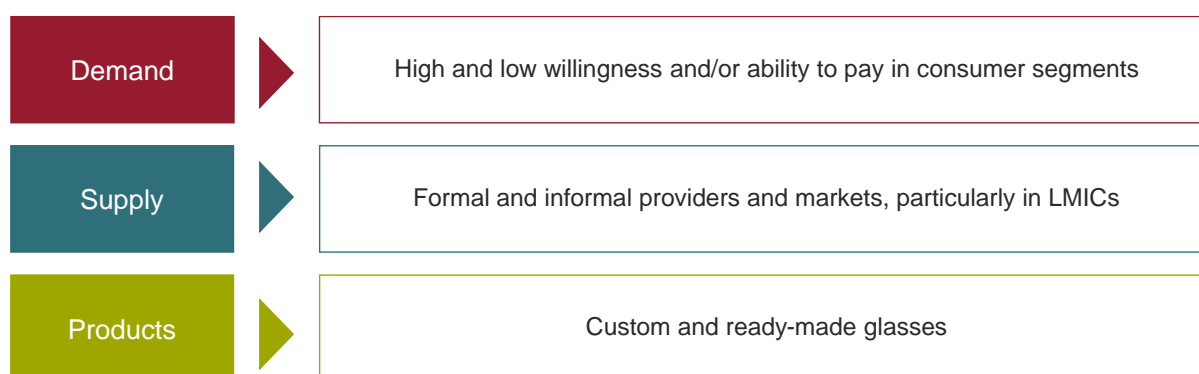
Source: Frontier Economics based on UFC – Que Choisir, d'après données Alcimed, INSEE, GfK, 2013

Note: Total cost of a pair of glasses is 470 €

## 3.2 Segmenting the supply-side market

The market for glasses can be segmented in several ways, as illustrated below.

**Figure 6** Market for glasses' segmentation



Source: Frontier Economics

### 3.2.1 Two consumer segments: high and low value

The main difference between the **high and low value segments** is consumers' ability and willingness to pay.<sup>28</sup> Even these two segments are significantly different in middle-to-higher income countries compared to LMICs.

<sup>28</sup> The concept of 'ability to pay' is related to the socioeconomic status of consumers and is determined by their budget constraints. In contrast, 'willingness to pay' is influenced by their ability to pay but also accounts for their preferences.

The **high-value segment** is located in predominantly in high-income countries (such as Europe or the US) and urban areas in LMICs. High margins characterise it, and consumers display preferences for branded products, especially regarding frames.<sup>29</sup>

By contrast, the **low-value segment** includes consumers with very limited ability to pay who are often located in less urban areas of LMICs. There is a consensus across the literature and interviews that this group is very price-sensitive with affordability as a key issue, and that affordability is compounded by a lack willingness to pay due to lack of understanding of the benefits of glasses and the social stigmas from wearing glasses.<sup>30</sup> Several stakeholders raised the point that style can also be important, and one noted that quality may not be as critical for this particular group. Consumers in high-income countries benefit from more mature markets, and with options ranging from lower to higher-cost products. There is likely to be more limited supply within each segment in LMICs.<sup>31</sup>

### 3.2.2 Two types of sectors: formal and informal

Another important split for LMICs is between **formal and informal sectors**. In this report, we refer to **formal sectors** to describe a more structured market formed by businesses and enterprises that operate within the formal legal rules of the country in question. The **informal sectors** can be more unstructured and fragmented. It includes small businesses and entrepreneurs that commonly operate outside the formal legal framework.<sup>32</sup> For example, they may sell glasses without the officially required licenses or officially required processes in place. The informal sector, subject to lower entry barriers, is a particularly important source of glasses for the poorest people in LMICs.

Many stakeholders told us that the informal sector plays an important role in most LMICs. This is not specific to the market for glasses: the informal market is substantial across India, Mexico and Nigeria as shown in Figure 7.<sup>33</sup> For other LMICs, the percentage of total GDP from the informal sector can be as high as 63% (Zimbabwe) with a median across LMICs of 31%.

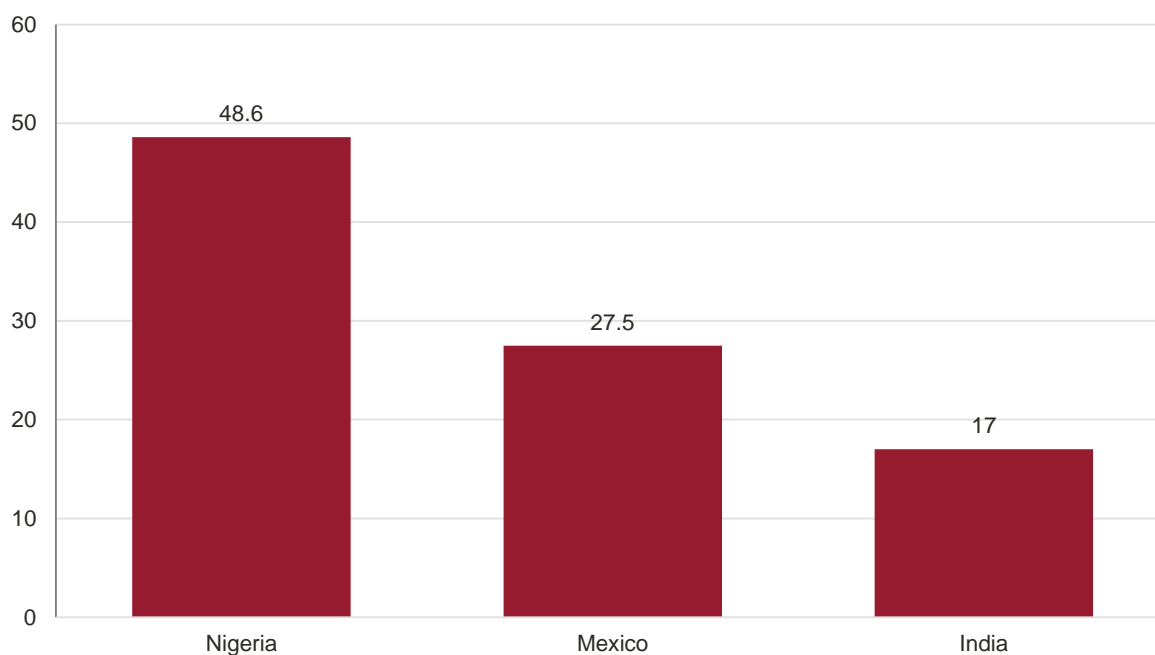
<sup>29</sup> For further details, see EC merger cases between Essilor and Luxottica (Case M.8394), and EssilorLuxottica and GrandVision (Case M.9569). This split was also identified in stakeholder interviews for Nigeria and India.

<sup>30</sup> Evidence from studies and several stakeholders (particularly in India) suggests that certain consumers exhibit price sensitivity in cases where affordability is not a constraint.

<sup>31</sup> Albright, M. et al. (2016). Eyeglasses for global development: Bridging the visual divide. In *World Economic Forum*. [https://www3.weforum.org/docs/WEF\\_2016\\_EYElliance.pdf](https://www3.weforum.org/docs/WEF_2016_EYElliance.pdf)

<sup>32</sup> In the Indian context, these are known as the organised (formal) and unorganised (informal) sectors. Studies also refer to informal providers as those who undertake activities without the required training or certificates as set by the authorities, such as selling medical products or providing health care services (for instance, Bloom, G., Standing, H., Lucas, H., Bhuiya, A., Oladepo, O., & Peters, D. H. (2011). Making health markets work better for poor people: the case of informal providers. *Health policy and planning*, 26:i45–i52).

<sup>33</sup> Elgin, C., M. A. Kose, F. Ohnsorge, and S. Yu. 2021. Understanding Informality. CERP Discussion Paper 16497, Centre for Economic Policy Research, London.

**Figure 7** Informal sector as a percentage of official GDP

Source: *Frontier Economics analysis of Elgin et al. (2021)*

Note: 2017 data

Stakeholders were not able to provide specific figures on the size of the informal market across all the deep dive countries but noted, in particular for India, that it is substantial. Deloitte has estimated that up to 80% of the retail of glasses are from informal providers in India, which is disproportionately bigger than the informal sector in general according to the Elgin et al. (2021).<sup>34</sup> One stakeholder noted that the informal sector is bigger in rural areas in India. Another stakeholder finds that informal providers in India often have long-established and close relationships with local hospitals.

### 3.2.3 Two types of products: custom and ready-made

Finally, we divide products into **ready and custom-made glasses**, with implications for supply chains, demand needs, and barriers. **Custom-made glasses** are tailored to customers' requirements (such as their prescription) and style preferences. These products have more complex supply chains, as they often require the involvement of a local optical laboratory that crafts the final product to the needs of the specific client.<sup>35</sup> **Ready-made glasses** are assembled at the manufacturing level without the same degree of personalisation. Due to their simpler and shorter supply chains, they are generally more affordable and can be obtained in one trip to the shop.

<sup>34</sup> Deloitte (2018). Eyewear market in India.

<sup>35</sup> Savage, M., Bhatnagar, T., Liao, C., Chaudron, M., Boyar, J., Laurentius, D., ... & Holloway, C. (2020). Product Narrative: Digital Assistive Technology. A market landscape and strategic approach to increasing access to digital assistive technology in low and middle-income countries.

One specific type of ready-made glasses are reading glasses dispensed in pharmacies or similar shops. “Readers” might be the most accessible form of glasses but do not involve any expert diagnosis of what is needed to correct for the loss of sight. Other forms of ready-made glasses might still include some element of “diagnosis” with existing, ready-made glasses then selected based on the diagnosis.

### 3.3 Characteristics of the markets in India, Nigeria and Mexico

The three deep dives have informed our findings about the general characteristics of the supply-side market for glasses. Differences in local markets and contexts drive differences in market functioning, which elements are more important and, therefore, which recommendations may be more relevant.

This section outlines how the findings compare in India, Nigeria and Mexico. Specifically, we will explore:

- 1 **Market context:** we examine key themes such as the market growth, the main players and their level of vertical integration, and whether the market is more concentrated or fragmented. We will also compare formal and informal markets and whether any barriers or competitive constraints exist for new entrants.
- 2 **Regulatory landscape:** our aim is to assess the extent of the regulatory burden and understand the rules regarding the sale and prescription of eyewear products. We also present recent regulatory developments.
- 3 **The origin of products:** we analyse whether eyewear products are primarily imported or locally produced to explore trade’s role in Section 3.4.

Before presenting our analysis, we provide some statistics to help quantify the issue and illustrate how these countries compare numerically. The following table shows the number of optometrists and individuals with visual impairment in each country.

**Table 2**      **Statistics on the market for glasses per country**

	<b>India</b>	<b>Nigeria</b>	<b>Mexico</b>
Optometrists per million inhabitants <sup>36</sup>	39.1	14.1	56.3
Prevalence of people with vision loss in the country <sup>37</sup>	19.3%	10.8%	12.1%
People with visual impairment in the region <sup>38</sup>	70 m	20 m	10 m
% of which could have been prevented <sup>39</sup>	75%	75%	55%

Source: *Frontier Economics based on market research*

Note: *The number of inhabitants per optometrist is calculated using the reported number of optometrists and official population figures and rounded to the nearest 5 thousand. This estimate is only an approximation and may be inaccurate at present.*

<sup>36</sup> IAPB. Vision Atlas. Retrieved on 25 May 2023 from <https://www.iapb.org/learn/vision-atlas/>

<sup>37</sup> Ibid. (2022 data).

<sup>38</sup> Approximated based on World Health Organization: WHO. (2019). World report on vision, p.33 (figure 2.4). India represents the South Asian region, Nigeria, Sub-Saharan Africa; and Mexico, Latin America and the Caribbean.

<sup>39</sup> Ibid.

## 3.3.1 Market context

INDIA	<ul style="list-style-type: none"> <li>• Eyewear industry in India has been traditionally minimally regulated, which resulted in large fragmentation. However, there have been recent introductions of regulations around optometrists while the sale of glasses remains unregulated.</li> <li>• In 2018, informal sector (also known as unorganised) accounted for 80% of the total market. From a product perspective, the main difference between formal and informal sectors is branding, with informal providers often offering unbranded products. The price differential between branded and unbranded products remains significant.<sup>40</sup></li> <li>• Formal sector is focused on high-income consumers in urban areas but is expected to grow to medium and small cities in the coming years. In 2017, Lenskart, representing 90% of the privately provided formal sector,<sup>41</sup> announced its goal to achieve 50% of the total eyewear market in 3 years by expanding to tier 2 cities.<sup>42</sup> Studies identify several factors that may explain market growth: increase in eye health conditions, rise in awareness and high margins (up to 300%).<sup>43</sup></li> </ul>
NIGERIA	<ul style="list-style-type: none"> <li>• Eyewear market is less developed than in other territories. Evidence from market studies about growth is mixed, but generally is expected to register moderate expansion due to rise in consumer consciousness regarding image and style and in middle-class population.<sup>44</sup></li> <li>• Market is characterised as unstructured. The presence of grey markets poses challenges to establish a reliable supply of products.<sup>45</sup></li> <li>• Demand studies in the Sub-Saharan region suggest that limited ability to pay and lack of economic development pose particular challenges to reach the last mile.<sup>46</sup></li> </ul>

<sup>40</sup> Deloitte (2018). Eyewear market in India.

<sup>41</sup> Since the formal private sector represents c. 20% of the total market, Lenskart could have 10% of the total market share.

<sup>42</sup> Srivastava, S. (2017, January 4). Lenskart aims 50% market share in next three years. *IndianRetailer.com*. <https://www.indianretailer.com/article/whats-hot/news-feature/Lenskart-aims-50-market-share-in-next-three-years.a5579>

<sup>43</sup> See, for instance, Deloitte (2018). Eyewear market in India.

<sup>44</sup> See, for instance, 6Wresearch (2020). Nigeria Eyewear Market (2020-2026).

<sup>45</sup> We rely on a few conversations with stakeholders due to limited public information on market trends and players.

<sup>46</sup> Albright, M. et al.(2016). Eyeglasses for global development: Bridging the visual divide. In World Economic Forum. [https://www3.weforum.org/docs/WEF\\_2016\\_EYEIalliance.pdf](https://www3.weforum.org/docs/WEF_2016_EYEIalliance.pdf)

## MEXICO

- Eyewear market is very fragmented and is served largely by the informal sector. In 2021, 50% of optical shops were considered informal.<sup>47 48</sup>
- From 2013 to 2017, glasses sales experienced a declining trend until it began to rebound slowly. However, the recovery was hindered in 2020 due to the impact of the COVID-19 pandemic.<sup>49</sup> The market is expected to expand, driven by companies offering lower prices in the coming years.<sup>50</sup> An example is Ben & Frank, whose glasses range from £85 (MXN 1,900). According to the company, controlling manufacturing has enabled them to reduce prices.<sup>51</sup> We note this is still high to reach the poorest in a country with a poverty line of about MXN 2,000/month and MXN 3,200/month in rural and urban areas, respectively.<sup>52</sup>

<sup>47</sup> According to Devlyn (Rodríguez, A. (2021, May 28). Ópticas pierden 24% de sus ventas anuales por COVID. El Financiero. <https://www.elfinanciero.com.mx/empresas/2021/05/28/pierden-opticas-24-de-sus-ventas-anuales-por-covid/>)

<sup>48</sup> We note that the regulations governing the sale of glasses hardened in 2015, which could have impacted the definition and share of the informal market before and after the regulatory change.

<sup>49</sup> Rodríguez, A. (2021, May 28). Ópticas pierden 24% de sus ventas anuales por COVID. El Financiero. <https://www.elfinanciero.com.mx/empresas/2021/05/28/pierden-opticas-24-de-sus-ventas-anuales-por-covid/>

<sup>50</sup> 6Wresearch (2022). Mexico Eyewear Market (2020-2026).

<sup>51</sup> El Contribuyente. (2017, 9 May). ¿Por qué los lentes son tan caros en México? <https://www.elcontribuyente.mx/2017/05/por-que-los-lentes-son-tan-caros-en-mexico/>

<sup>52</sup> Poverty line corresponds to 'Línea de Pobreza por Ingresos' in 2020, defined as the monthly cost of food and non-food expenses per person (CIEPS (2020). Boletín del CIEPS: Líneas de Pobreza por Ingresos en Tiempos de Contingencia. <http://cieps.edomex.gob.mx/sites/cieps.edomex.gob.mx/files/files/7%20julio%202020.pdf>).



### 3.3.2 Regulatory landscape

#### INDIA

- In 2012 the Optometry Council of India was established as the regulatory body for optometrists.<sup>53</sup> Becoming an optometrist requires pursuing a 4-year degree. The Council advocates regulating the profession in India, in an industry that is hardly regulated.
- In 2021, the Drug Controller General removed glasses, lenses and frames from the list of medical devices to ophthalmology after an open debate.<sup>54</sup> The Drugs and Cosmetics Act 1940 establishes medical device safety, quality and performance rules. Including these products within the list of medical devices may have resulted in further restrictions in activities such as import, manufacture, clinical investigation, sale and distribution.<sup>55</sup>

<sup>53</sup> Optometry Council of India. (n.d.). <https://optometrycouncilofindia.org/>

<sup>54</sup> Drug Controller General India (9 Aug 2021). Classification of medical device pertaining to Ophthalmology under the provisions of Medical Devices Rules, 2017 – Reg. [https://cdsco.gov.in/opencms/resources/UploadCDSCOWeb/2018/UploadPublic\\_NoticesFiles/9Ophthalmology\\_classification.pdf](https://cdsco.gov.in/opencms/resources/UploadCDSCOWeb/2018/UploadPublic_NoticesFiles/9Ophthalmology_classification.pdf)

<sup>55</sup> Supported by a few conversations with stakeholders. An in-depth analysis of regulatory implications is required.

<b>NIGERIA</b>	<ul style="list-style-type: none"> <li>• The Optometrists and Dispensing Opticians Registration Board of Nigeria (ODORBN) is a statutory body established by an act of parliament, Cap 09 of the Laws of the Federation of Nigeria 2004 (formerly known as Decree No. 34 of December 1989), which regulates the practice of optometry in Nigeria.<sup>56</sup></li> <li>• The act defines the profession of optometry and outlines the scope of practice.<sup>57</sup> Optometrists can prescribe glasses, although some professionals claim that the scope is still limited, as it does not include the diagnosis of certain disorders, such as glaucoma, or allow them to prescribe medication.<sup>58</sup> Dispensing opticians create and adjust vision aids, such as glasses, according to the prescription provided by an optometrist or ophthalmologist.</li> <li>• Evidence of the presence of an informal sector suggests that these activities are often conducted by individuals that who training.<sup>59</sup></li> </ul>
<b>MEXICO</b>	<ul style="list-style-type: none"> <li>• Since 2015, performing optometry activities (such as prescription or opening an optical shop) requires having an optometry degree.<sup>60</sup> Professionals advocated for optometry to be included as a branch of medicine and for it to be practised as a professional activity rather than just a technical one.<sup>61</sup></li> <li>• Evidence of an informal sector serving c. 50% of clients suggests weak enforcement.<sup>62</sup></li> </ul>

<sup>56</sup> Optometrists and Dispensing Opticians Act, <https://noang.org/wp-content/uploads/2017/02/CAP-O9-LAWS-OF-THE-FEDERATION-OF-NIGERIA-2004.-ODORBN-LAW-doc.pdf>

<sup>57</sup> The practice of optometry includes: a) Eye examinations to determine refractive errors and other departures from the optimally healthy and visually efficient eye; b) Correction of refractive errors using spectacles, contact lenses, low vision aids other devices; c) Correction of errors of binocularity by means of vision training (orthoptics); d) Diagnosis and management of minor ocular infections which do not pose a threat to the integrity of the ocular or visual system; and e) Ocular first aid (Optometrists and Dispensing Opticians Act).

<sup>58</sup> Supported by one stakeholder and an article (Rightway, U. (2022). Call to arms for optometrists in Nigeria – A perspective. *The Guardian Nigeria News – Nigeria and World News*. <https://guardian.ng/features/call-to-arms-for-optometrists-in-nigeria-a-perspective/>). We cannot assess the validity of these opinions based on our expertise.

<sup>59</sup> Gerald Bloom, Hilary Standing, Henry Lucas, Abbas Bhuiya, Oladimeji Oladepo, David H Peters, Making health markets work better for poor people: the case of informal providers, *Health Policy and Planning*, Volume 26, Issue suppl\_1, July 2011, Pages i45–i52, <https://doi.org/10.1093/heapol/czr025>

<sup>60</sup> Decreto por el que se reforma el artículo 79 de la Ley General de la Salud, [https://www.diputados.gob.mx/sedia/biblio/prog\\_leg/232\\_DOF\\_17mar15.pdf](https://www.diputados.gob.mx/sedia/biblio/prog_leg/232_DOF_17mar15.pdf)

<sup>61</sup> Cámara de los Diputados (n.d.). Boletín N° 2925. Se reforma la Ley General de Salud para regular a optometristas. <http://www5.diputados.gob.mx/index.php/esl/Comunicacion/Boletines/2014/Febrero/06/2925-Se-reforma-Ley-General-de-Salud-para-regular-a-optometristas>

<sup>62</sup> See Section 0. View supported by stakeholders.

### 3.3.3 The origin of products

<b>INDIA</b>	<ul style="list-style-type: none"> <li>India has been identified as one of the main producers of frames globally.<sup>63</sup> It also produces lenses and glasses, but imports remain important.<sup>64</sup> In 2018, China accounted for 78% of total eyewear imports.<sup>65</sup></li> </ul>
<b>NIGERIA</b>	<ul style="list-style-type: none"> <li>Nigeria relies significantly on imports, particularly from China (over 90%).<sup>66</sup></li> <li>As a member of the Economic Community of West African States (ECOWAS), establishing a manufacturing hub in one of these countries could provide preferential trade conditions for eyeglasses.</li> </ul>
<b>MEXICO</b>	<ul style="list-style-type: none"> <li>Along with Brazil, Mexico is one of the few countries with local eyewear manufacturing in Latin America.<sup>67</sup> Chinese manufacturers are still important for eyeglasses.<sup>68</sup></li> </ul>

## 3.4 The role of imports in the supply chain for LMICs

The supply of glasses, including lenses and frames, in countries with no local manufacturing relies on international trade. Even in countries such as India with some degree of local manufacturing, there is still a significant reliance on imports. Manufacturing of low-cost lenses, frames and glasses is concentrated in China<sup>69</sup> and so most imports come from China. The cost of the final glasses depends, in part, on country-specific tariff and non-tariff barriers to importing lenses and frames. Tariffs are the additional taxes imposed by some governments on imports. Non-tariff barriers include other measures that make importing items more costly (either financially or in time or other ways) compared to the same item produced domestically (e.g. additional quality checks or requirements that delay items at the border).

To understand the impact of tariffs on prices we have analysed World Trade Organisation (WTO) data. WTO publishes data on the “most favoured nation” (MFN) tariff that is applied by each country importing: this is the tariff that is applied to all other members of the WTO unless

<sup>63</sup> EC merger cases between Essilor and Luxottica (Case M.8394).

<sup>64</sup> See Section 3.1.

<sup>65</sup> Deloitte (2018). Eyewear market in India.

<sup>66</sup> OEC Data. Retrieved on 11 May 2013 from <https://oec.world/en/profile/bilateral-product/eyewear/reporter/nga>

<sup>67</sup> Cheng, A. (2021). Eyewear in Latin America: A Unique Competitive Landscape – Part 1. *Euromonitor*. <https://www.euromonitor.com/article/eyewear-in-latin-america-a-unique-competitive-landscape-part-1>

<sup>68</sup> Supported by partial evidence from a conversation with a stakeholder.

<sup>69</sup> See Section 3.1.

there is a specific, preferential agreement. This is the “normal” tariff that is applied.<sup>70</sup> The tariffs are a percentage of the value of the good being imported. In this study, we will refer to the MFN tariffs simply as “tariffs” or “rates”. We identified relevant tariffs for both glasses and lenses.<sup>71</sup>

Our analysis of the WTO tariffs focused on three questions to understand the impact of tariffs on the import of glasses into LMICs:

- **Is the tariff higher than for other medical products and therefore could be reduced to be brought in line with other medical products?** We analyse this by comparing the tariffs for glasses and for lenses to those imposed on vaccines, as an illustrative essential medical product. We are not seeking to use vaccines as a formal benchmark or like-for-like comparison, but to understand if tariffs on glasses and lenses are consistent with tariffs of a medical product commonly recognised as important for society. Further work could explore a range of medical products, such as insulin.
- **Is the tariff lower compared to fashion items, showing that glasses may be considered as a type of medical device?** We explore whether glasses and lenses are perceived as fashionable goods by comparing with the tariffs for sunglasses.<sup>72</sup>
- **Is the tariff below the maximum tariff?**<sup>73</sup> Some countries have higher rates that can be applied under WTO rules. This creates a risk that current tariffs could increase without changes to WTO agreements, creating a degree of commercial risk to importers.

Details of our methodology and the full findings are in Annex B. Overall, we draw two general conclusions from the analysis which inform our overall conclusions.

First, average import tariffs for lenses are lower than for glasses, and tariffs for both lenses and glasses are generally higher than those for a comparable medical product (vaccines in this case) and lower than those for sunglasses

An important driver that explains this finding is the allowance for duty-free imports of some products (i.e. exemptions or reductions in import tariffs). Allowing more products in a particular category (such as medical products) to enter duty-free reduces the average tariff.<sup>74</sup> 84% of

<sup>70</sup> Applied MFN tariffs are ones that a WTO member applies on imports from all other WTO members, unless that member benefits from preferential tariffs under a Free Trade Agreement or a unilateral preference scheme such as the Generalised System of Preferences. MFN tariffs are usually defined based on the Harmonised System (HS) for traded products developed by the World Customs Organisation. Consistent with the WTO definition: [https://www.wto.org/english/thewto\\_e/glossary\\_e/mfn\\_tariff\\_e.htm](https://www.wto.org/english/thewto_e/glossary_e/mfn_tariff_e.htm)

<sup>71</sup> We have used two harmonised system (HS) codes for glasses (corrective spectacles, HS 900490) and lenses (glasses for corrective spectacles, HS 701510) to try to capture the codes for products aimed at correcting refractive errors. For vaccines, we take those for human medicine (HS 300200).

<sup>72</sup> Prescription sunglasses are likely to be included under the general code for sunglasses (HS 900410).

<sup>73</sup> We look at tariff boundaries: the maximum rate on any product a country can apply.

<sup>74</sup> For instance, if the rate is 10%, but the duty-free allowance is 50%, the applied rate will be 5%.

LMICs have some duty-free allowance for vaccines, whereas only 41% and 31% make allowances for lenses and glasses respectively. This implies that lenses are more often considered as medical devices than glasses. Sunglasses have some duty-free allowance in only 12% of LMICs.

The average applied tariff takes into account the proportion of duty free allowance. When looking at these applied tariffs we found that:

- Most countries have a different tariff compared to vaccines and there is substantial variation in rates by country. Only 2 countries (Pakistan and Belarus) have higher rates for vaccines than glasses and only 2 (Armenia and Kazakhstan) compared to lenses. On average, glasses face duties nearly 9 percentage points higher than vaccines and lenses over 3 percentage points higher. Glasses are more highly taxed as imports than vaccines.
- 95% of the LMIC's have a higher rate for sunglasses than for glasses (92% for lenses). Sunglasses face import tariffs that average 8.6 and 3.6 percentage points higher compared to glasses and lenses, respectively. Sunglasses (except in a few LMICs) are taxed more highly on entry to a country than glasses or lenses.<sup>75</sup>
- There are 12<sup>76</sup> countries where the tariff is 0% for glasses and sunglasses, and 10<sup>77</sup> countries where it is 0% for lenses and sunglasses. There is also no further scope to reduce the tariff in those countries.

## Second, there is potential to reduce the commercial risk of importing

Some risks associated with international trade are related to uncertainty about future tariffs, as much as the current tariffs. Changes in government or in government policy might create risks of tariff rises in the future that could reduce incentives to establish costly supply chains today. This risk is more significant where the gap between the maximum allowed tariff under the WTO rules and applied rate that exists today is relatively large (also known as **binding overhang**). It represents the increase in import tariffs (in percentage points) that suppliers could face if authorities decide to tax these products more heavily but still within the rules allowed by the agreed WTO schedules.

Our analysis shows that there is the potential to advocate for a reduction in maximum tariffs in order to decrease the perception of future risks for investors. This would have commercial implications in the present and future and could affect decisions of businesses today about whether to invest in new supply chains or not. There is a significant variation in the binding overhang, with some countries already close to the bound. For both glasses and lenses, 5<sup>78</sup>

<sup>75</sup> 3 regarding glasses (Bolivia, Myanmar and Paraguay) and 6 regarding lenses (Sri Lanka, Tajikistan, Ukraine, China, Pakistan and Belarus).

<sup>76</sup> Vanuatu, Ukraine, Sri Lanka, South Africa, Papua New Guinea, Namibia, Mauritius, Malaysia, Lesotho, Georgia, Eswatini and Botswana.

<sup>77</sup> Vanuatu, South Africa, Papua New Guinea, Namibia, Mauritius, Malaysia, Lesotho, Georgia, Eswatini and Botswana.

<sup>78</sup> 5 for lenses (Nigeria, Angola, Lesotho, Solomon Islands and Rwanda), and 5 for glasses (Pakistan, Angola, Lesotho, Solomon Islands and Rwanda).

countries have a gap of more than 50. This means that current tariffs could be raised by 50 percentage points within agreed WTO frameworks (for example, from 10 to 60%). There are 32<sup>79</sup> LMICs without a bound, meaning existing WTO agreements impose no upper limit. For these countries, the commercial risk is even higher because importers have nothing external they can rely upon to understand the maximum future tariffs that could be imposed.

### 3.5 Summary and conclusions

The evidence about the supply-side market for glasses suggests some common themes:

- The differing regulatory regimes that apply in countries about who can sell glasses and the role of optometrists and other staff in prescribing and selling glasses.
- The importance of China as the manufacturing centre for glasses and their component parts.
- The importance of the international trade system to move glasses from China to consumers. There are two elements to system: the direct costs of trade (e.g. shipment costs, import tariffs) and the indirect costs (e.g. time to get clearance through customs and at ports).
- The size of the informal sector in many countries and the largely fragmented nature of retail supply once glasses arrive at their destination.

While there are important differences between countries, overall this supply process has failed (along with the demand-side issues) the roughly 1 billion people who remain without the right glasses. This leads to three areas for change and reform:

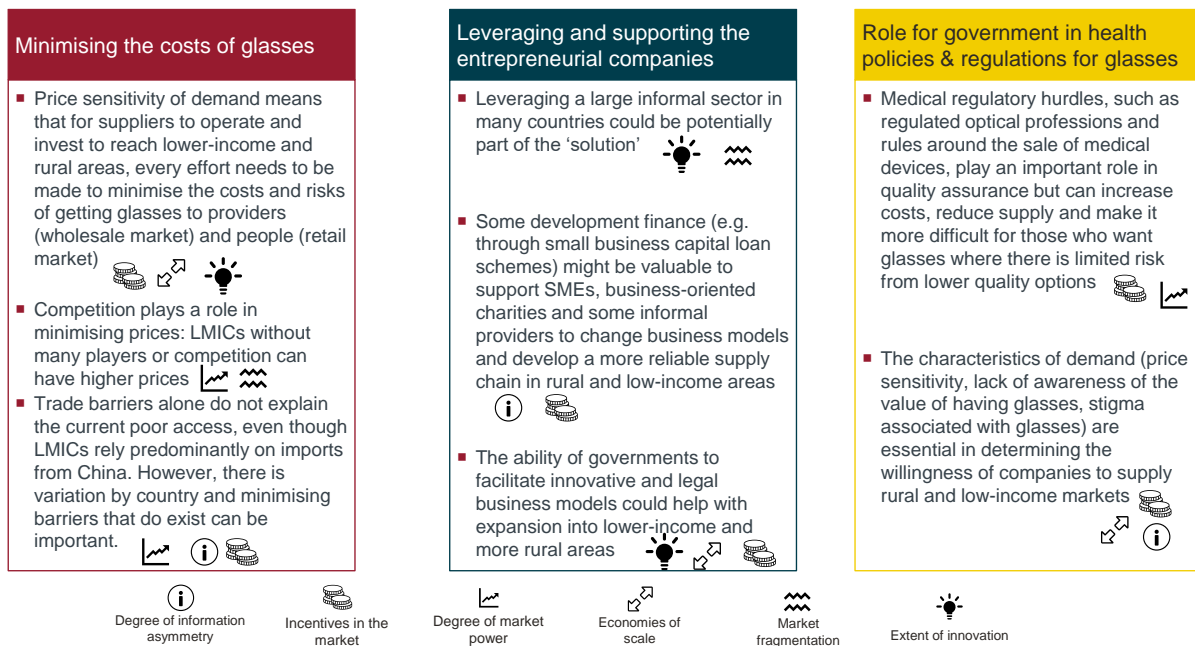
- Evolution of health policies and regulations to facilitate lower cost, faster delivery of glasses
- Leveraging and supporting entrepreneurial companies in LMICs to extend their networks
- Minimising the costs of glasses across the whole supply chain, including the costs to import.

The figure below shows the conclusions within each group and the economic concepts from our supply-side framework that are relevant for each conclusion. The following three sections explore the evidence for the findings in each group and for each of the underlying conclusions.

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<sup>79</sup> See Annex B for the full list.

**Figure 8** Conclusions from the hypothesis testing and economic concepts relevant to each conclusion



Source: Frontier Economics

The analysis and recommendations discussed in the next section focus, deliberately, on the supply-side of the market for glasses. Stakeholders (and wider evidence in the literature) consistently pointed towards the need to consider the demand-side issues. The characteristics of demand (price sensitivity, lack of awareness of the value of having glasses, stigma associated with glasses) are essential in determining the willingness of companies to supply rural and low-income markets.

**" Awareness of vision as an issue – it's low... and that should never be underestimated. That really is a big challenge "**

**Stakeholder**

Compared to products such as smartphones that consumers already desire and demand, people often do not recognise the need for or value of glasses.<sup>80</sup> Therefore, businesses in the low-value segment may need to incur costs to help educate consumers about the value of their products.

Private sector firms need market incentives to either enter or expand into rural markets. Our evidence points to the possibility of making a margin at the lower end of the market but these

<sup>80</sup> See the discussion about 'pull' and 'push' products from Albright, M. et al. (2016). Eyeglasses for global development: Bridging the visual divide. In *World Economic Forum*. [https://www3.weforum.org/docs/WEF\\_2016\\_EYEIalliance.pdf](https://www3.weforum.org/docs/WEF_2016_EYEIalliance.pdf)

will be very small values and will rely on high volumes. Making that business work will require re-visiting the supply-side issues identified (e.g. role of regulation, cost of imports) in order to give businesses dealing with very price sensitive consumers the best chance to deliver products that meet their needs. There is a strong link to a need to generate demand to support market solutions especially for the rural and poorest areas.

There is another model that was supported by a couple of the stakeholders who we interviewed: reliance on charity and related philanthropic institutions to meet the demands of the 1 billion unserved. Under this model, once demand has been generated by the greater penetration of subsidised glasses then private sector models may be more feasible. There was a strong view from several stakeholders that the right model for the private sector has not been found yet and this is related to the lack of demand. However, overall stakeholders did not think there was sufficient financial and human capacity in the voluntary sectors for them to be the main solution to meeting the needs of those who are currently under-served.

As such, supply-side reforms (along with demand-side interventions) can play a significant role in creating the conditions where entrepreneurial firms can extend the provision of glasses into wider geographic areas. The following Chapters expand on each of the three areas of reform.



## 4 The role for government in setting health policies and regulations for the supply of glasses

The evidence presented suggests that the biggest potential to reduce costs and improve access to glasses sits with the regulations at point of sale. There is variation by country on the regulations around the roles of optometrists, ophthalmologists and other staff in prescribing at the point of sale which suggests opportunities to re-consider high cost approaches in many countries.

There is not necessarily a single solution, with the need to balance potential trade-offs between poorer access but higher quality diagnostics and glasses, with better access but lower quality diagnostics and glasses. Our analysis suggests the importance of considering steps that reduce the role of optometrists and ophthalmologists in individual prescriptions while maintaining quality control. This most likely involves removing existing regulations at the point of sale and/or introducing a remote ('tele-medicine') solution.

We distinguish between de-regulating at the point of sale and considering glasses and lenses as medical devices. Classifying glasses as medical devices can allow for quality control requirements in the production process and to facilitate lower import tariffs, consistent with those applied to other medical devices.

A more de-regulated prescription route has the potential to benefit the majority, most likely around 60%-80%,<sup>81</sup> of the underserved nearly 1 billion people with URE, where mass-produced glasses can be appropriate solutions. A more bespoke solution would be needed for those with more complex needs. Such a division could also allow the NGO or charitable sectors to prioritise their work on this more complex group knowing that access for the majority has improved.

The underserved 1 billion people with URE are a combination of those who would like glasses but cannot access them (unmet demand) and those who are currently not asking for glasses (unmet need). Stakeholders strongly pointed towards the need to stimulate demand and overcome demand barriers. This will also require interventions on the demand-side to address unmet need which go beyond the scope of this report. Such interventions would support incentives for companies to supply rural and low-income markets in particular, and likely cannot be achieved without government intervention and support. However, demand-side interventions alone are unlikely to be sufficient given the nature of unmet demand.

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<sup>81</sup> See footnotes 12-13 for additional sources. This estimate reflects a majority but not consensus view from the interviews.

## 4.1 Regulations across the value chain affect access, prices and incentives

Medical regulatory hurdles, such as regulated optical professions and rules around the sale of medical devices, play an important role in quality assurance but also increase costs, reduce supply and make it more difficult for those who want glasses where there is limited risk from lower quality options.

Changes to regulations require careful consideration of unintended consequences: for instance, could changing rules in India for the sale of glasses affect the informal market? Could improving quality restrict supply and access where the regulation is enforced? There is also a question about the ability of governments to enforce regulations as enforcement is often weak (with evidence of the presence of an informal sector in lower-end markets).

There was no consensus view among stakeholders about whether it is appropriate to consider glasses (and lenses and frames) as medical devices, and strong views were held across this spectrum. There is potential to learn more about the changes in India linked to a reversal of the decision to classify glasses as medical devices.<sup>82</sup>

We have so far predominantly focused on how the medical regulations affect retail supply. However, regulation affects several parts of the supply chain, and there is no simple answer on whether there is too much or too little. The following sections consider the role across all parts of the supply chain, including retail with the role of diagnostics and prescriptions.

### 4.1.1 Manufacturing: quality regulations and the link with medical devices

Quality standards are important early in the supply chain to ensure that manufacturing results in products that are not harmful to consumers (e.g. plastics used in frames).

Some countries have minimum quality standards but this is likely to be more common in developed countries. For instance, the EU has standards for optical lenses and frames as these are designated as Class 1 medical devices, and these standards seem to be well enforced including with CE Marks of certification of meeting these standards. However, LMICs with large informal markets are able to circumvent quality standards. And LMICs may not have well enforced quality standards in formal markets.

The EU standards can be used as a reference point but it is also possible that a lower standard of quality is still sufficiently safe and beneficial for most URE. There is then the link between a minimum level of quality and what this means for price. Some stakeholders expressed the view that it is possible to buy lenses cheaply from China that are of sufficient quality. This

<sup>82</sup> Parthasarthy, R. (2021). Spectacles, Lenses and Frames No Longer To Be Listed As Medical Devices: Drug Controller General (India). *VisionPlus Magazine*. [https://visionplusmag.com/optometry/spectacles-lenses-and-frames-no-longer-to-be-listed-as-medical-devices/#:-:text=The%20Drug%20Controller%20General%20\(India,notice%20dated%20Aug%209%202021.](https://visionplusmag.com/optometry/spectacles-lenses-and-frames-no-longer-to-be-listed-as-medical-devices/#:-:text=The%20Drug%20Controller%20General%20(India,notice%20dated%20Aug%209%202021.)

requires a view on what sufficient quality is and a process for confirming the lenses imported do meet this.

#### 4.1.2 Transportation and distribution: glasses as medical devices

As discussed previously, for most LMIC the manufacturing of lenses occurs outside of the country and predominantly in China. The importing process provides an opportunity for rules on quality standards to be applied, although this will only apply to lenses imported through legal channels.

Where glasses and lenses are designated as medical devices, at the point of import this can reduce customs processes and tariffs that are applied. Several stakeholders identified issues in customs delays and lack of organisation in some LMICs: the view was that a medical designation could help overcome these issues but it may not solve all importing frictions.

However, once in the country, a medical designation can mean restrictions are applied on who can handle medical devices. This can limit distribution, again noting that the informal sector is able to work outside of this.

#### 4.1.3 Accessing retail: who can provide diagnostics and prescriptions

Several stakeholders identified the diagnosis and prescriptions as a “bottleneck” for access and for costs. A few went further in suggesting that the current rules about the role of optometrists and ophthalmologists unnecessarily reduce access and affect the supply of glasses. There was not a consensus from stakeholders but several pointed to the dual role of an optometrist having the potential to result in incentives to sell higher margin, more expensive products.

**" The competition failure is controlling access through prescriptions. "**

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**Stakeholder**

Other stakeholders pointed to the role that optometrists play in providing high quality eye care, and diagnosing serious health conditions, as reasons to require this role. Some stakeholders also suggest that in many LMICs, the recognition and acceptance of optometrists pose significant challenges due to the lack of recognition of optometry as a profession or the absence of established educational requirements. Stakeholders consistently agreed that there were limited optometrists in rural areas.

There is no dispute with our earlier findings that this is a costly part of the supply chain. As such, it is very important to understand when and where the cost is justified.

#### 4.1.4 Retail: who can sell glasses

Many LMICs have regulations about who can sell glasses, linked to glasses as medical devices. However, there are important exceptions such as in India where glasses are not medical devices and there are no current restrictions on who can sell them. Regulations that couple diagnosis with sale create barriers given the constraints and cost of having diagnosis widely available in many LMICs, particularly in more rural areas.

Where regulations restrict the sale of glasses, optimising the supply chain cannot solve all of the unmet needs given the difficulties in having on-site diagnosis. This is especially true in rural areas where people often need to travel for both the diagnostics and the purchase of the glasses. The link between availability, regulation and cost needs more detailed investigation that could potentially draw on differences between and within countries (e.g. Mexico changed its health regulations in 2015 to require optometrists have a university degree to practice<sup>83</sup> but there is limited evidence about its impact on supply or cost).

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<sup>83</sup> O'Hare, R. (2015, March 23). *Mexican government boosts status of optometry*. Association of Optometrists. <https://www.aop.org.uk/ot/professional-support/clinical-and-regulatory/2015/03/23/mexican-government-boosts-status-of-optometry>

## 5 Leveraging and supporting the entrepreneurial companies in LMICs to scale up

This chapter focuses on how conditions to promote competition and market-based solutions could be further enhanced in LMICs. Our work points in particular to the need to consider how to best engage with the informal sector and greater consideration of the trade-offs between regulation enforcement, price, quality and access.

There is a role for governments where regulatory and policy changes are needed for new business models to work, and a role for IAPB and other NGOs in making the case for this. There is scope for IAPB or other NGOs to work directly with providers in both the formal and informal sectors to access development finance.

### 5.1 Leveraging a large informal sector in many countries could be potentially part of the solution

The existence of large informal sectors creates significant risks to consumers, linked to the quality of their glasses, and for governments, linked to the inability to collect taxes and revenues. If only the formal sector is considered in discussions of how to expand coverage this risks ignoring how many people access glasses. However, the existence of the sector also illustrates the trade-offs that exist between quality and price.

Where glasses are imported illegally there are fewer, if any, controls over the quality of the lenses or frames. Some of our interviews in India highlighted that this risk can mean that people exposed to poor quality glasses do not think glasses are a good use of their money. This in turn may reduce future demand for glasses. However, other stakeholders argued that some improvement in vision, even with poorer quality glasses, is better than no improvement. Governments and regulators may have to be more explicit about the trade-offs that exist. Measures that reduce regulation of the formal sector may result in it expanding at the expense of the informal sector. It may also allow informal providers to leverage their skills into more formal provision of glasses.

There is scope for additional work to consider how the entrepreneurial aspects of the informal market can be harnessed to improve supply, while managing trade-offs around quality.

### 5.2 Facilitating innovative and legal business models

The evidence presented earlier pointed to the scope to reduce costs through establishing a reliable supply and optimising the logistics of the wholesale supply chain. Two general themes emerge to support innovative and legal business models:

- Improvements in stock management and optimising distribution
- New ways to sell glasses

This section sets out the findings from the interviews and wider evidence. More work is needed to understand in detail i) how these new models would work in practice, and ii) country specific barriers that would need to be overcome for this to happen.

### 5.2.1 Improvements in stock management and optimising distribution

Glasses are a slow moving good with differentiated demand (i.e. many different types of lenses are needed such that the right one is available depending on consumer need). This requires shops to have a certain amount of sophistication and volume, even for a small range, to stock the lenses and styles most likely to sell. Otherwise the shop risks using space on glasses that will not sell or will not sell for a long time.

Stakeholders suggested a few potential solutions for this:

1. Improvements in IT systems to monitor and order stock
2. The use of new technology to better forecast demand and optimise supply
3. Wider use of hub and spoke approaches to hold larger stocks at a regional level with faster distribution out to smaller retailers based on demand.

The development of hub-and-spoke models was often mentioned alongside changes to regulations linked to optometrists. The relatively high cost of having optometrists on-site would be reduced if diagnostics/ refractive testing was done by optometrists at the hubs, something already the case in some LMICs.

The hub-and-spoke model might also reduce the demand for scarce, skilled optometrists in many LMICs. The lack of skilled eyecare professionals was raised by most stakeholders. Many developing countries have as few as one optometrist for every 1 million people—the figure for the United Kingdom is one per 8,000 people. In Mali, the ratio is one per 8 million, according to the Centre for Vision in the Developing World.<sup>84</sup> LMICs in general do not meet a target for 1 optometrist per 50,000 people, and a research paper found a “*direct positive relationship existed between age-standardised prevalences of blindness and mild- and severe-vision impairment and optometrist-to-population ratios.... Strong inverse relationships were observed between country GDP and optometrist-to-population ratio.*”<sup>85</sup>

Many developing countries lack sufficiently trained ophthalmic support personnel, such as assistants and technicians, and rely too much on highly skilled ophthalmologists for simple eye screenings. A study in Andhra Pradesh, India, found that 93 percent of those who wore eyeglasses for farsightedness got a prescription from an ophthalmologist.<sup>86</sup> Therefore, relying

<sup>84</sup> Kassalow, J., Lee, M., Karnani, A., & Garrette, B. (2011). *Better Vision for the Poor*. Stanford Social Innovation Review, 9(2), 66–71. <https://doi.org/10.48558/REYD-KV24>

<sup>85</sup> Kavin Naidoo, Pirindhavellie Govender-Poonsamy, Priya Morjaria et al. *Global Mapping of Optometry Workforce*, 18 February 2022, PREPRINT (Version 1) available at Research Square [<https://doi.org/10.21203/rs.3.rs-1286073/v1>]

<sup>86</sup> Dandona, R., Dandona, L., Naduvilath, T. J., Nanda, A., & McCarty, C. A. (1997). Design of a population-based study of visual impairment in India: The Andhra Pradesh Eye Disease Study. *Indian journal of ophthalmology*, 45(4), 251-257.

on this may not be feasible given the lack of trained professionals at this level. Alternative models are needed, including using refractionists, optical assistants and vision technicians alongside optometrists and ophthalmologists. The World Health Organisation has created an Eye Care Competency Framework designed to be used to plan and maintain eye care workforce composed of different levels of education and training.<sup>87</sup>

## 5.2.2 New ways to sell and diagnose

In many LMICs there are limited points of sale for glasses. Some interviewees believe this means people are less aware of the benefits of glasses. Changing this so that glasses are more widely available for purchase could increase sales and provide an incentive to suppliers to enter and expand. The overall trade-offs around changes to medical regulations are discussed further in the next section.

In higher income countries, such as the UK and USA, readers are widely available in supermarkets, pharmacies and other shops without the need for prescriptions. People are able to try on a few different powers for correcting presbyopia (predominantly for reading) and select a pair that they feel improves their near vision, and then purchase a pair in a style they prefer. Our interviews have not identified why this should not be the case for readers in LMICs, although one stakeholder noted that readers are available in some other countries (e.g. Mexico) over the counter. However, it was noted that readers seem to be predominantly available in urban areas with the understanding that a lack of awareness of the need for glasses means no demand and therefore no supply in rural areas.

It would be a more novel and significant change to extend this to glasses for distance vision and a greater set of short distance powers to be readily available without a prescription. This is likely to also improve access. Stakeholders were not in agreement about whether this would be appropriate but it merits further study and consideration.

Another model would be to change where the diagnostics happen, which may also require regulatory changes. There are several ways this could be done:

- Introducing more telehealth with refractive testing through smartphone and computers could help address the issue of not enough trained optometrists, particularly in rural areas.<sup>88</sup> Stakeholders were clear on the need for this new technology to be sufficiently rigorous and accepted as providing legitimate services.
- Refractive error testing could be done with a qualification rather than a full optometry degree. Results which are complex or signal an issue beyond refractive errors can then be referred on to optometrists for additional screening. A potential risk to this identified in

<sup>87</sup> World Health Organisation, *Eye Care Competency Framework*, May 2022  
<https://www.who.int/publications/i/item/9789240048416>

<sup>88</sup> Telemedicine provides various options for conducting eye exams, ranging from a complete and thorough examination that requires specialised equipment to a less comprehensive self-test using a device such as a smartphone. In the first case, the only difference with traditional healthcare is that the professional is not physically present.



a few stakeholder discussions is that people may not continue to attend the multiple appointments that this approach might entail.

Changing the regulations around the point of sale of glasses and in the diagnostics would be significant in reducing the price people pay (total price, inclusive of the diagnostics as well as the glasses themselves) and in reducing access barriers that are inhibiting incentives for companies to enter and expand in the market. Medical expertise will be needed to inform these decisions. Such a change would allow a range of new business models to develop, likely including more hub-and-spoke models of regional distribution hubs connected to more, lower cost rural retail outlets.

### 5.3 Using development finance to develop reliable supply chains

The previous two sections have set out how the informal sector will be important to leverage and how some regulatory changes could support new innovative and legal business models to improve and reduce the cost of their supply chain.

Another element in a solution could be greater use of development finance in this sector. There is evidence that small and medium enterprises (SMEs) struggle to access finance. The International Finance Corporation estimates that for formal SMEs and micro firms in developing countries, there is an unmet finance need of \$5.2 trillion a year and that around half of formal SMEs do not have access to formal credit.<sup>89</sup> The informal sector by its nature is extremely unlikely to have access to formal credit.

There is existing development finance which could be leveraged, including from the World Bank, which aims “to improve SMEs’ access to finance and find innovative solutions to unlock sources of capital.”<sup>90</sup> There appears to be little focus on using these and related funds to support wider roll-out of successful businesses supplying glasses.

One stakeholder suggested that there are limited micro-lending facilities and that in the informal market there is a reliance on support from family and friends.

More work is needed to explore the extent to which lack of finance is a specific barrier to entry and expansion for glasses, and in particular the dynamics of this in the informal sector. There was limited evidence on this from the stakeholder interviews on this. Further work could involve speaking directly with suppliers in the informal market to understand their needs, engaging with providers and recipients of microfinance to learn from their experiences, and local public health providers to understand their views on how development finance could best be deployed. This should be accompanied by consideration of existing low-cost lending options that could help support the sector to expand.

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<sup>89</sup> World Bank SME Finance. (n.d.). *World Bank*. <https://www.worldbank.org/en/topic/sme/finance>

<sup>90</sup> World Bank SME Finance. (n.d.). *World Bank*. <https://www.worldbank.org/en/topic/sme/finance>



## 6 Minimising the costs of glass across the whole supply-side value chain

Low and middle income consumers in LMICs are very price sensitive. The evidence discussed in the previous section suggests a willingness to pay no more than 10% of monthly salaries (an amount equivalent to \$3.80 on average) or to no more than 2-3 days' wages. Our interviews provide mixed evidence on whether glasses can be provided within this budget constraint. Many stakeholders thought it would be possible to achieve this cost (excluding prescription and screening costs) and provide sufficient quality of glasses with if some measures were taken by governments, including those discussed in the previous sections. While the importance of minimising costs will not be a surprise, our analysis has also suggested specific areas of focus.<sup>91</sup>

We have explored which components of the value chain may be contributing the greatest costs in the supply of glasses, recognising that all components should be as efficient and low cost as possible. Promoting competition and innovation may lead to more efficient business models across the supply chain. There are also specific actions that can reduce particular costs: regulations linked to the selling of glasses and costs of importing glasses. There is some scope to reduce import tariffs where glasses and lenses are considered as medical devices. We discuss each in turn.

### 6.1 Promoting competition across the value chain

There are broad trends that, with appropriately competitive markets, will help to minimise the costs at several stages in the supply chain:

- **Manufacturing:** Most of the economies of scale available have been captured in largescale production in China for glasses that are appropriate for around 60%-80%<sup>92</sup> of the current untreated refractive error (URE) in LMICs. Other countries have some local manufacturing capability and this may evolve but the trade-off between largescale manufacturing in one location and reducing transport costs by having more local manufacturing is effectively determined in the current market.

We did not find evidence that market power in manufacturing is limiting the supply of glasses. While there appear to be economies of scale from mass production of lenses and glasses the technology itself is well-known and Chinese-based manufacturers appear capable of producing glasses at very low cost. Some stakeholders believe that there is sufficient volume of supply, and capacity for supply, to meet the URE needs across

<sup>91</sup> We focus here on the supply-side market rather than any public health interventions that could provide subsidies.

<sup>92</sup> View from some but not all stakeholders. See footnotes 12-13 for further sources.

LMICs, although additional research is needed to further understand the manufacturing capacities and capabilities.

- **Transport:** There was no specific suggestion of the need to, or ways to, reduce shipping costs themselves. There was considerable evidence, and concern, about what happens when glasses arrive at the borders of some countries. That is discussed in more detail in the next section.
- **Distribution:** this was identified as a potential barrier in the supply of rural markets due to a lack of infrastructure. The need for new infrastructure will vary by the geography and population density with more dispersed, rural populations potentially facing higher costs. This raises the possibility of new models of distribution, as well as the regulations governing the sale of glasses which we discuss further below (and in Chapter 4).
- **Optical labs:** are relevant for custom (bespoke) glasses. These are more expensive than mass produced glasses and lenses, and necessary for more complex patients. Several stakeholders pointed to higher margins on more expensive glasses, with more add-ons, and concerns that some optometrists may have an incentive to upsell and push people towards custom glasses rather than ready-made. Different measures are necessary, and important, for those where custom solutions are genuinely needed. The trade-off between sufficient quality for most people and higher quality for fewer is explored further in Chapter 4. One solution proposed to keep costs for more complex sight needs low is to use two pairs of glasses where bifocals may otherwise be needed. While more cumbersome, the view is that two pairs of mass manufactured glasses would be substantially cheaper than one pair of bifocals. Another suggestion is to have mass produced lenses that can easily be put into frames to allow for different powers between eyes, while keeping costs down from limited customisation. This solution is currently provided by Vision Spring<sup>93</sup> and See Change from Essilor.<sup>94</sup>
- The greatest potential to lower costs sits in the **retail** part of the supply chain which is responsible for the largest single element of cost. These costs arise from a combination of how inventory is managed at the retail level and the costs of prescribing.

Retail costs could be made more efficient through improved stock management and long-term, stable contracts. This could help improve the business case and result, for instance, in better access to credit. For LMICs with more limited retail operations (such as Nigeria) this is an aspect to consider as the market expands. This is relevant for both formal and informal sectors of the market.

<sup>93</sup> See for instance Citinewsroom.com. (2021). Nsawam residents benefit from free distribution of pop-in eyeglasses developed by VisionSpring. *Citinewsroom - Comprehensive News in Ghana*. <https://citinewsroom.com/2021/11/nsawam-residents-benefit-from-free-distribution-of-pop-in-eyeglasses-developed-by-visionspring/>

<sup>94</sup> See Change - Essilor. (2021, September 20). *Ready2Clip - Essilor See Change*. Essilor See Change. <https://www.essilorseechange.com/see-life-2-5-nvg/ready2clip/>

Secondly, as discussed above, the domestic regulations about who can sell glasses, who can provide refractive screening and whether prescriptions are required provides opportunities for cost reduction in some parts of the supply chain. Eyeglasses have a screening/prescription element which is important, and costs can significantly increase where this is part of the price of glasses. This can also be an access barrier where there are not enough optometrists (or ophthalmologists) to provide this service, and where it is costly to train or hire more.

In rural areas where population density is lower, the fixed costs associated with screening and prescriptions create serious obstacles to the provision of affordable glasses. These are particularly significant for bespoke prescription glasses that require assembly at optical labs. Labs are often concentrated in more urban areas, resulting in additional distribution costs for businesses. To increase demand (and thus volumes) for glasses, it is essential to make it easy and convenient for consumers to access them, bringing the product as close to them as possible.

### 6.1.1 Tensions between finding the lowest costs and other priorities

There are tensions between lowering the cost of supply (particularly in the retail part of the supply chain) and the quality of glasses. Current regulatory regimes are a mixture: large informal provision suggests a desire (even if implicit) to allow lower cost and quality provision while the regulation of retail operations (particularly requirements around prescribing and the role of optometrists) maintains higher quality than many can afford.<sup>95</sup>

Explicit decisions, and then consistent actions, are needed to resolve this trade-off. The cheapest glasses are often found in informal markets, where those are present within a LMIC. However, this can come at the expense of quality and it can make it difficult for the formal, regulated sector to compete on prices. This reduces the incentive for a formal player that would like to expand in the market.

In other areas, the role of medical costs (from screening, diagnosis and prescription), serve to increase quality and also costs, sometimes beyond what is affordable. Following discussions in the previous sections, we recommend considering glasses as medical devices to maintain quality standards but to take actions to reduce the regulations and costs at the point of sale.

### 6.1.2 Case study: learning from Coca Cola's approach

The challenge to serving the billion people without access to the right glasses is largely, although not solely, one of low cost distribution. Other sectors have seen very successful, low cost distribution models. There may be elements from these models that could be applied to

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<sup>95</sup> In other areas, policy supports higher costs without any obvious impact on quality. For example, the potential effect of reducing import tariffs is discussed in detail in the next section. However, we note that governments may be considering trade-offs between tax receipts from tariffs currently applied to glasses and the benefit of reducing the cost of glasses to improve access.

the market for glasses. There are also important differences. The two products are clearly different in many dimensions but running an efficient distribution network shares some similarities.

## How Coca Cola affordably reaches people across the world<sup>96</sup>



Coca Cola operates a franchise distribution system to keep costs low, while maintaining an international brand. The syrup is produced as a concentrate and sold to bottlers over the world, with parallels to lenses that are produced centrally and can be supplied to be paired with frames. Bottlers hold contracts for exclusive operations in local areas. The independently owned and local bottlers allow Coca Cola to expand rapidly without needing to invest in local bottling directly. Coca Cola is focused on growing in LMICs where there are large populations, expanding through local mergers and acquisitions.

Coca Cola also partners with local businesses for retail, such as stores, cinemas and restaurants, and targets rural villages with weekly markets to raise awareness and reach more people. Coca Cola has partnerships with common service centres in India to improve its distribution and retail.

While there are clearly differences between soft drinks and glasses, in a highly competitive market for drinks, Coca Cola's approach demonstrates the value in considering where costs can be reduced through local manufacturing versus importing; building relationships with communities and creatively identifying potential points of sale; and the relevance of a strong brand so people are aware of the product and why they may want it. Coca Cola has extensively invested in branding over many decades and so does not have the same lack of awareness as the glasses market has. It does provide an example of how a private company is able to effectively operate in both low and high income countries, as well as across low and high value market segments within a country.

Coca Cola is a member of Project Last Mile, which leverages logistics expertise to deliver public health programmes and medicines. This shows that there can be learnings from logistics in other sectors including healthcare, but as Project Last Mile focuses on public sector delivery it does not have as many parallels for considering the supply-side private sector solutions for glasses.

## 6.2 Costs of importing glasses

Our hypotheses included whether the reliance on imports, and the taxes applied to imports, are important reasons why prices may be higher than under more competitive conditions

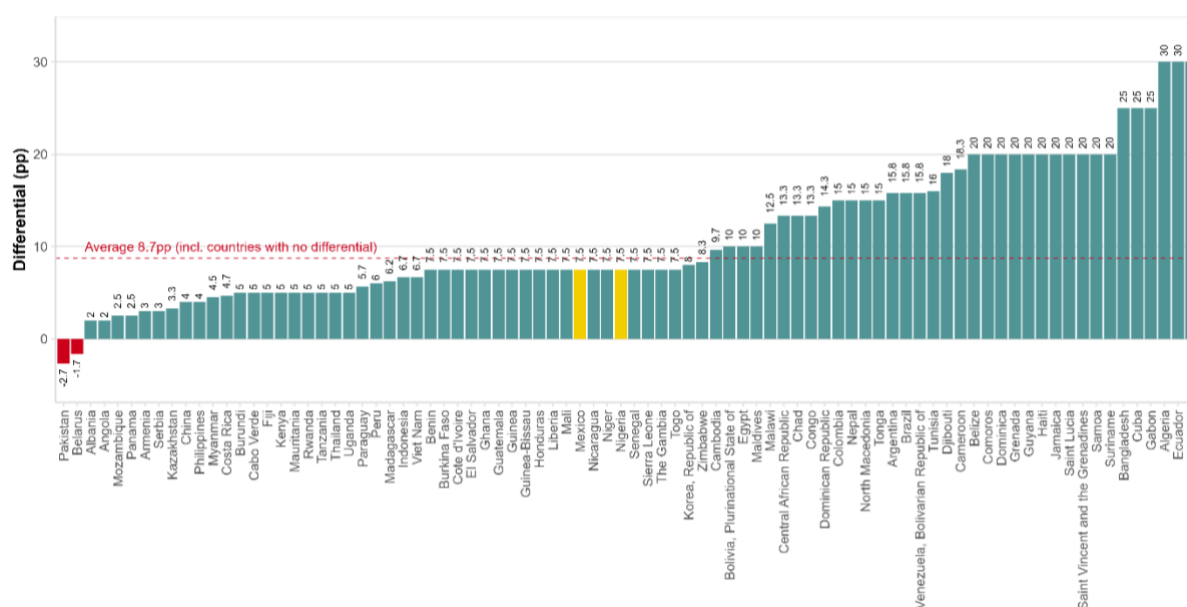
<sup>96</sup> *Strategy Study: How Coca-Cola became one of the most successful brands in history. (n.d.).*  
<https://www.cascade.app/strategy-factory/studies/how-coca-cola-became-successful#:~:text=The%20Coca%2DCola%20Company's%20rapid,various%20bottlers%20around%20the%20world%20;%20https://www.ibef.org/pages/4489%20;%20https://www.drinks-insight-network.com/news/coca-cola-india-csc/>

(compared to facilitating greater free trade). This could be relevant for whole glasses, as well as for lenses and frames. We recommend considering glasses and their components as medical devices as a way to aim to reduce import tariffs.

### 6.2.1 Tariff analysis shows some scope for reductions

The analysis for WTO applied tariffs presented earlier demonstrated that there is scope for some countries to reduce tariffs applied to glasses and lenses, with material variation by LMIC. On average, LMIC have a tariff that is 3.3 percentage points higher for lenses compared to other medical products such as vaccines.<sup>97</sup> However, in some countries (such as Sri Lanka, Zambia and Samoa) this gap is 15 percentage points or higher. Reducing tariffs where they are particularly high could be one important element in minimising the costs of glasses within those countries. Figure 9 shows the variation in tariffs between countries.

**Figure 9** Difference between average tariffs on glasses and vaccines



Source: Frontier Economics analysis of WTO data

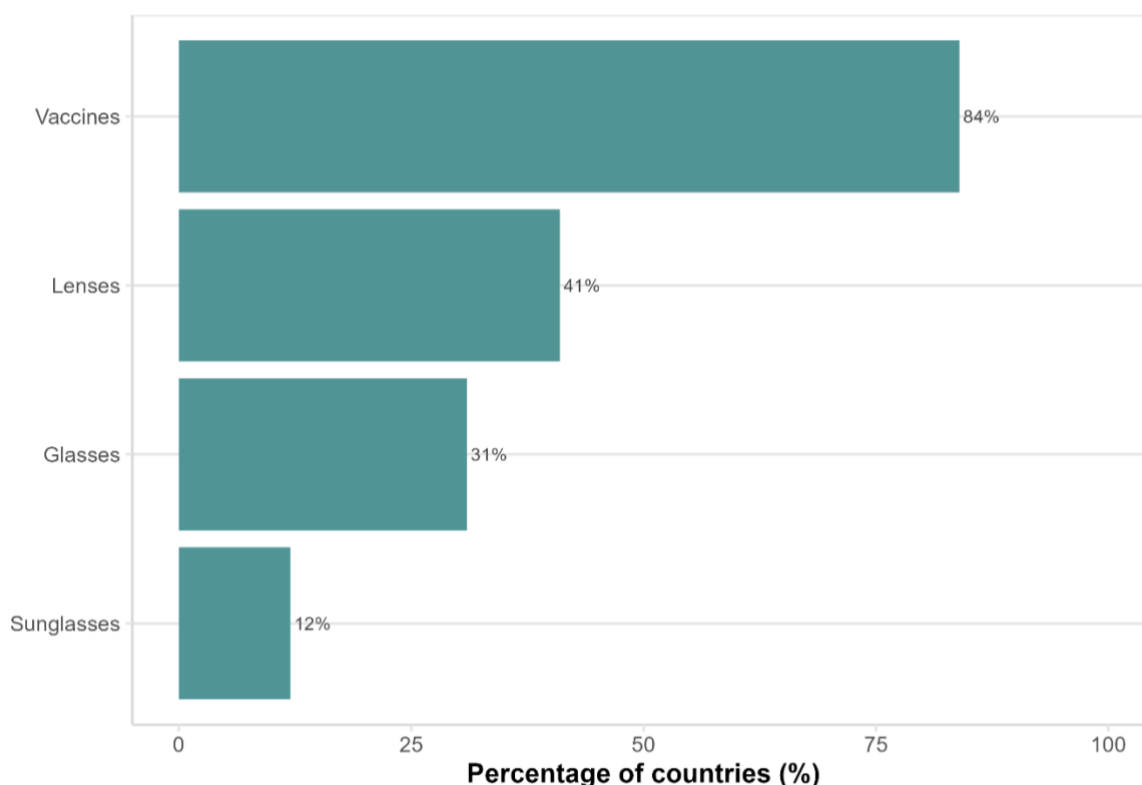
Note: Average glasses' applied MFN tariffs minus average vaccines'. Selected countries including Mexico, Nigeria and India are highlighted in yellow. Countries with negative differential (with higher tariffs for vaccines) are highlighted in red. Applied MFN tariffs are ones that a WTO member applies on imports from all other WTO members, unless that member benefits from preferential tariffs under a Free Trade Agreement or a unilateral preference scheme such as the Generalised System of Preferences. MFN tariffs are usually defined on the basis of the Harmonised System (HS) for traded products developed by the World Customs Organisation. Code for glasses (corrective spectacles, HS 900490), and vaccines for human medicine (HS 300200).

The reduction in tariffs could be done by including glasses and lenses in the group of products with duty-free rates. The WTO data shows that 84% of LMICs apply a duty-free rate to vaccines, whereas there are duty-free exemptions for glasses in only 31% of LMICs, and 41%

<sup>97</sup> We selected vaccines as an example of a medical product widely acknowledged as essential. Our view was that it was unlikely that import duties on glasses could reasonably be lower than those imposed on vaccines and we use vaccines as an illustrative example rather than a benchmark.

for lenses. 12% have a duty-free exemption for sunglasses (which are more often a fashion/consumer good although there can be sunglasses with refractive lenses), showing that glasses and lenses are being treated broadly as something in between a medical category and a consumer goods category. This is shown in Figure 10.

**Figure 10** Countries with duty-free national rates



Source: Frontier Economics analysis of WTO data

Note: Applied MFN tariffs are ones that a WTO member applies on imports from all other WTO members, unless that member benefits from preferential tariffs under a Free Trade Agreement or a unilateral preference scheme such as the Generalised System of Preferences. MFN tariffs are usually defined on the basis of the Harmonised System (HS) for traded products developed by the World Customs Organisation. Code for glasses (corrective spectacles, HS 900490), lenses (glasses for corrective spectacles, HS 701510), vaccines for human medicine (HS 300200), and sunglasses (HS 900410).

## 6.2.2 Processing at ports and through customs

Many stakeholders have noted that unpredictable, and often slow, clearance of glasses or their components through borders adds to costs, over-and-above any formal tariffs. While some have suggested that this can be managed as part of the normal course of business, others have emphasised the uncertainty this creates even for relatively large organisations.

Changes to improve the passage of imported glasses and components through customs creates the potential to reduce an element of cost with no wider impacts on quality or revenue to governments. We note that this may not be an issue specific to importing glasses.

### 6.2.3 These cost reductions alone will not address most of the affordability gap

While addressing the import tariffs and delays at customs may be an important element in minimising costs to consumers, particularly in some countries, the evidence suggests it will not be sufficient by itself to solve the majority of the affordability issue for LMIC. Our earlier analysis shows that retail and distribution costs are more significant.

Consistently changing glasses to be considered as medical devices across all LMICs may also improve the processing at customs and reduce wait times. This is more important in LMICs such as Nigeria where the glasses market is less well developed than in India for instance. Again, the stakeholder engagement suggests this alone would not be sufficient to solve the majority of access issues.

Some LMICs have large, informal markets that are especially prominent in the retail end of the value chain. This is the case in particular in India, where up to 80% of the retail of glasses is thought to be from informal providers.<sup>98</sup> In many instances, the informal segment is able to import glasses, lenses and frames through grey and illegal channels which avoid paying the imports. While this has potential implications for the quality of the glasses, it also suggests that import tariffs alone are not the reason for lack of access. And even with this informal market operating at lower prices in India, there is still a very large population with uncorrected refractive error (23% of the global population with this problem in 2018).<sup>99</sup>

One stakeholder pointed to Bangladesh having local manufacturing and a highly protected market with very high custom duties, which means even with local manufacturing there may still be barriers to the local supply of low cost glasses.

Minimising import costs and customs delays remains important in these markets when final customers are very price sensitive. Investigating options to reduce import tariffs and import delays should be a priority for countries with high levels of unmet need.

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<sup>98</sup> Deloitte (2018). Eyewear market in India.

<sup>99</sup> Essilor See Change (2020). Eliminating Poor Vision in a Generation.



## 7 Conclusions and recommendations

### 7.1 We identified three main themes in our conclusions

Analysis of existing and new evidence suggests three areas of focus for IAPB and others to improve the supply-side provision of glasses to those currently unserved. Our economic concepts from the supply-side framework cut across these three themes.

1. Evolution of health policies and regulations to facilitate lower cost, faster delivery of glasses
2. Leveraging and supporting entrepreneurial companies in LMICs to extend their networks
3. Minimising the costs of glasses across the whole supply chain, including the costs to import.

Low and middle income consumers in LMICs are very price sensitive. The evidence collected in the interviews provided various metrics including a willingness to pay no more than 10% of monthly salaries (an amount equivalent to \$3.80-\$6.00 on average) or to no more than 2-3 days' wages. Our interviews provide mixed evidence on whether this can be done, with some stakeholders believing that this cost (excluding prescription and screening costs) can provide sufficient quality of glasses. Important steps can be made **to minimise costs** in a very price sensitive market. These include actions to increase competition across the supply chain and to minimise the cost of importing glasses and their components.

Government action to increase the role of the private sector in the supply of glasses can help to **leverage the entrepreneurial activities of many firms**, including the informal sector, to expand coverage. This would include reducing barriers to entry into the formal sector, facilitating new business models to manage the inventory costs of glasses provision and better leveraging development finance to support firms to scale up.

A common theme is the importance of the costs associated with **medical regulations and wider health policies**. The biggest potential to reduce costs and increase access lies in considering reforms to regulations about the sale of glasses. There is variation across countries in the roles of optometrists and ophthalmologists in prescribing and the point of sale of glasses, and in the wider application of quality standards.

The de-regulated prescription route will benefit the majority, most likely around 60%-80%,<sup>100</sup> of the underserved nearly 1 billion people with URE, where mass-produced glasses can be appropriate solutions. A more bespoke solution would be needed for those with complex needs.

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<sup>100</sup> See footnotes 12-13 for additional sources. This estimate reflects a majority but not consensus view from the interviews.



The underserved 1 billion people with URE reflects an unmet need not necessarily an unmet demand. Continued demand-side measures will also be needed.

## 7.2 Our recommendations for the potential role for IAPB

The analysis contained in this report leads to three main recommendations for action:

1. **Making the case for reduced regulation at the point of sale** through changes to when prescriptions are required and who is involved would have the biggest impact. The IAPB can play a role in lobbying for this change, along with others. We note that medical expertise is needed to inform this change.
2. **Supporting a change in business models:** There is a role for governments where regulatory and policy changes are needed for new business models to work (including regional distribution and/or manufacturing hubs), and a role for IAPB and other NGOs in making the case for these changes. There is scope for IAPB or other NGOs to work directly with providers in both the formal and informal sectors to access development finance and develop new business models. For example, funding discussed above to support new business development often requires government sponsorship or applications – it is not funding that companies can access directly. Other specific actions could include facilitating regional hubs through local planning, land and infrastructure availability and training in relevant skills to manage such hubs.
3. **Working to reduce import tariffs and customs frictions** to reduce costs on imports. Lack of expertise in international trade law and agreements within national governments may mean they are not able to develop cases that would reform tariffs in the ways suggested above. Supporting national governments to make the case for treating glasses as medical products at the point of entry would help reduce costs and uncertainty for businesses.

The relative lack of work on supply-side issues also means that further information would be useful to better formulate future supply-side policies. **Areas for more detailed analysis than was possible in this work include:**

- 1 Gather relevant medical and related evidence to understand whether **the role of optometrists and ophthalmologists** (and related staff) could be changed to allow more flexible retail models to be developed. This might focus on developing a more nuanced view of what level of expertise is required for sales to different types of consumers. This would include soliciting expert medical input on the minimum quality levels needed in glasses and the medical risks of deregulation.
- 2 **Options to decrease the cost of shipping and distribution:** this could involve additional research into the impact that new technologies could have on shipping and distribution costs, particularly the potential for greater use of hub-and-spoke models of distribution to reduce the costs of holding inventory in many locations while allowing the central inventory to be distributed more effectively to retail suppliers. This might

include greater evidence about the appropriate role for local manufacturing and the future of mass manufacturing in China. There are potential learnings from other sectors and markets (eg Coca Cola or soft drinks more widely) about how to keep distribution costs down in order to serve markets across low and high income countries, and low and high value market segments within a country.

- 3 How the **entrepreneurialism of the informal market can be harnessed to improve supply**, while managing trade-offs around quality. Work to better understand the particular local circumstances that has resulted in the development of the informal market might include research with local informal providers. This could aim to also understand how to make formal provision more attractive, including offering support for expansion that requires entry into the formal sector.
- 4 The extent to which **lack of finance for businesses** is a specific barrier to entry and expansion for retailers, and the dynamics in the informal sector. Stakeholders interviewed for this work had limited knowledge of the evolution and drivers of the informal sector, which differs between countries. Further work could involve speaking directly with suppliers in the informal market to understand their needs, engaging with providers and recipients of microfinance to learn from their experiences, and local public health providers to understand their views on how development finance could best be deployed. This should be accompanied by consideration of existing low-cost lending options that could help support the sector to expand.

Fulfilling these recommendations will help to create an efficient, consumer-oriented supply side market for glasses that can serve everyone. There is no doubt that demand-side measures (such as educating people about the benefits and providing access to low cost diagnosis) continue to be important. The evidence presented here suggests that more focus on supply-side changes would help in meeting the needs of those on lower incomes impaired by poor vision.

## Annex A – Additional detail on our approach, evidence review and hypothesis generation

### A.1 Our approach

#### Our overall approach

There were six steps in our approach:

1. **Inception phase:** we held some initial conversations with IAPB and SightSavers to confirm the objectives and the particular focus of the analysis, discuss the risks and limitations of the study, and agree on the list of stakeholders.
2. **Evidence review:** we conducted desk research on the existing qualitative and quantitative evidence, and categorised the information according to the economic framework set out in Section 2.2. In practice this was iterative with steps 3 and 4 where we identified and reviewed additional evidence as needed. Our evidence review included general evidence relevant for LMICs and country-specific evidence for three deep dive countries. See Chapter 3 for more details.
3. **Hypothesis development:** an initial review allowed us to formulate hypotheses about the potential reasons for the observed outcomes in the market, underpinned by economic theory. See Chapter 4 for more detail.
4. **Qualitative stakeholder engagement:** we conducted 14 interviews with relevant stakeholders that enabled us to test parts of the hypotheses where existing evidence was insufficient, help interpret the evidence, gather additional information, or be pointed in the direction of new evidence. The list of stakeholders covered a wide set of geographies, and provided us with the views of industry bodies, firms, and not-for-profit and international organisations. Details on the organisations interviewed are in Section 2.2.2.
5. **Formulation of conclusions:** the full set of evidence informed our conclusions around the specific hypotheses and the challenges to supply in LMICs.
6. **Reporting:** this report constitutes our findings, formulated recommendations, and identified areas for future analysis.

#### Economic framework: six core concepts

- **Existence of information asymmetries:** the situation in which one party of the transaction (e.g. seller) has more information than the other (e.g. consumer). In markets with information asymmetries, the person with better information can take advantage of it. In the eyewear market, for example, consumers may be much less well informed by their needs and the trade-offs between glasses of different qualities than suppliers.
- **Incentives in the market:** motivations that prompt market players to take action. For instance, an increase in demand of glasses could result in new companies entering the

market. Important drivers of demand growth include the rise in consumer awareness, the prevalence of vision disorders and disposable income.

- **Degree of market power:** market power is defined as the ability of a company to influence (e.g. increase) prices for their products. Companies that display market power can also influence market outcomes. For instance, if consumers have strong preferences for a particular brand, the brand owner could limit competition in the market by preventing retailers from selling other brands.
- **Existence of economies of scale:** the situation in which increasing volumes results in lower (variable and/or fixed) costs per product. Significant economies of scale can make it harder for new players to enter or compete in the market. For instance, the European Commission (EC) found limited economies of scale in ophthalmic lenses and prescription frames in Europe.<sup>101</sup> The capital required to open an optical lab was small compared to the cost of increasing its capacity. However, mass production of glasses is expected to have larger economies of scale.
- **Degree of market fragmentation:** describes the scenario where the supply chain is spread across many different suppliers and manufacturers. Fragmentation also refers to a situation where many companies operate, yet none possess sufficient scale to influence the market. The latter is the definition of market fragmentation used in this study. In some countries like Italy, optical retail markets tend to be very fragmented with many shops each serving a relatively small demand segment.<sup>102</sup> This may lead to more competition to the benefit of consumers or to difficulties in taking advantage of any economies of scale that may exist to the detriment of consumers.
- **Extent of innovation:** the creation and implementation of new ideas and technologies that aim to improve products, services or processes enhancing efficiency. Innovation can be important to cut costs and reduce demand and supply barriers in the market.

## Deep dive selection

The country selection was influenced on whether information was available and the following three main factors:

1. **Burden of disease:** we looked at countries with higher rates of uncorrected refractive errors. The majority of people with this issue concentrate in LMICs, particularly in a few regions, including South-East, East and South Asia, and Sub-Saharan Africa.<sup>103</sup>

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<sup>101</sup> EC merger case between Essilor and Luxottica (Case M.8394).

<sup>102</sup> EC merger case between Essilor and Luxottica (Case M.8394).

<sup>103</sup> See 'World Health Organization: WHO. (2019). World report on vision', which reports that the prevalence of people with vision impairment that could have been prevented is larger in (1) South East Asia, East Asia and Oceania, (2) South Asia, and (3) Sub-Saharan Africa; or 'Essilor See Change (2020). Eliminating Poor Vision in a Generation.'

2. **Global coverage:** this study aimed to cover multiple regions and, thus, select countries that span several different parts of the world. Where neighbouring countries share similar characteristics, it allows us to capture the common characteristics and the findings may be more generally applicable.
3. **Target based on hypotheses:** selected countries would help us test our initial hypotheses, taking into account variations in market regulations, local manufacturing industries, market concentration, and the level of challenges faced in rural populations.

Keeping this in mind, we selected India and Nigeria as they represent areas with a high prevalence of unaddressed refractive errors. Additionally, India has a local production industry, while Nigeria relies significantly on imports. We also included Mexico to gain insight into how the Latin American market compares to others. The Mexican market is expanding, and there is evidence of new entrants offering disruptive prices. The following figure provides further details on the country selection.

**Figure 11 Country selection’s criteria**



Source: *Frontier Economics*

## A.2 Evidence review

The following table provides an overview of the studies and articles reviewed.

**Table 3 List of studies used in the evidence review**

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Source: *Frontier Economics review*

## A.3 Hypothesis generation

### Barriers to entry and expansion

This area explores the challenges for new companies to enter the market or for those already operating to expand their business. It covers from manufacturing to retail.

- **There is market power in manufacturing and distribution that may limit the supply of glasses.** Market power can impose competitive constraints in the market. The global market players in the eyewear market display significant global market shares<sup>104</sup> and are present in all stages of the supply chain. We explored the concentration in the market or whether fragmentation is large.
- **Vertically integrated corporates can prevent rival opticians from accessing their products.** Economic theory predicts that vertical integration, the situation in which a firm controls more than one stage of the supply chain, can enable the firm to monopolise the market. For instance, by preventing other companies from distributing their products. For this to be true, some pre-conditions must be fulfilled, such as obtaining enough market power.<sup>105</sup> The existence of economies of scale can contribute to market power. Given the evidence of some degree of vertical integration in the market, we explored this hypothesis.
- **The human and capital requirements imply relatively high upfront costs and limited economies of scale in retail markets.** The prevailing regulations limit who can prescribe and dispense, making human resources a critical aspect for scaling up the supply. Additionally, setting up the necessary logistics and points of sale entails upfront costs.<sup>106</sup> We anticipated that the fixed costs associated with increasing capacity at the retail level could pose constraints to reduce cost per unit.
- **Limited competition may result in high margins in the formal market.** Market research studies find substantial price differentials between branded and non-branded products and report high margins at the retail level.<sup>107</sup> This suggests that the high-value

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<sup>104</sup> Credit Suisse (2017). Eyewear industry. Credit Suisse.

<sup>105</sup> For further details, see EC merger cases between Essilor and Luxottica (Case M.8394), and EssilorLuxottica and GrandVision (Case M.9569).

<sup>106</sup> Savage, M., Bhatnagar, T., Liao, C., Chaudron, M., Boyar, J., Laurentius, D., ... & Holloway, C. (2020). Product Narrative: Digital Assistive Technology. *A market landscape and strategic approach to increasing access to digital assistive technology in low-and middle-income countries.*

<sup>107</sup> See, for instance, Deloitte (2018). *Eyewear market in India.*

segment provides large incentives for companies and that competition is likely to be still limited.

- **Custom-made glasses have complex, larger and more expensive in-country supply chains.** Producing custom-made glasses requires access to an optical laboratory, and cover additional expenses in human capital, distribution, and facilities.<sup>108</sup> Production and distribution of ready-made glasses will likely be subject to larger economies of scale, and lesser market fragmentation.
- **Market fragmentation can impede reaching a sufficient scale, which can improve access to credit and obtain better deals with suppliers.** When the market is very fragmented into small players, firms may find it challenging to reach an adequate scale of operations. This can hamper their ability to secure favourable credit terms and negotiate better prices with suppliers due to the lack of market power or a strong business case. Evidence suggests that market for the low-value segment is fragmented.<sup>109</sup>

## Regulation

Regulation covers the barriers that suppliers may face when attempting to conduct manufacturing, transport, distribution and retail activities.

- **Insufficient regulation or enforcement, restrictive access requirements and limitation on optometry practice may hinder the expansion of the workforce.** Some evidence suggests that eye care professionals are scarce and tend to concentrate in urban areas.<sup>110</sup> Assuming that a minimum level of screening and prescription needs to happen and that optometrists are important to these activities, we explored whether the regulations provide the right incentives to increase the workforce.
- **Lack of regulation can lead to (optical) shops providing poor quality services, hampering users' trust and reducing demand.** Demand studies suggest that consumers are concerned about quality issues and have misconceptions about the potential harm caused by eyeglasses. Therefore, it will be important to assess if services or products available in the market may hamper consumers' demand.<sup>111</sup> The existence of information asymmetries and price-sensitivity of demand can prompt providers to reduce their quality below adequate standard to cut costs.

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<sup>108</sup> Savage, M., Bhatnagar, T., Liao, C., Chaudron, M., Boyar, J., Laurentius, D., ... & Holloway, C. (2020). Product Narrative: Digital Assistive Technology. A market landscape and strategic approach to increasing access to digital assistive technology in low-and middle-income countries.

<sup>109</sup> This is the case, for instance, in India.

<sup>110</sup> Albright, M. et al. (2016). Eyeglasses for global development: Bridging the visual divide. In *World Economic Forum*. [https://www3.weforum.org/docs/WEF\\_2016\\_EYEIalliance.pdf](https://www3.weforum.org/docs/WEF_2016_EYEIalliance.pdf)

<sup>111</sup> See, for instance, Burnett, A. M., Yashadhana, A., Lee, L., Serova, N., Brain, D., & Naidoo, K. (2018). Interventions to improve school-based eye-care services in low-and middle-income countries: a systematic review. *Bulletin of the World Health Organization*, 96(10), 682.

- **Regulatory barriers and high import duties inhibit the reduction of delivery costs around the world.** A few conversations with stakeholders and studies suggested that import duties can unnecessarily increase costs for glasses.
- **Eyeglasses are regulated as medical devices but taxed as fashion accessories.** The hypothesis is based on the premise that eyeglasses should be considered as medical devices and, therefore, should not be subjected to luxury or fashion taxes. If authorities fail to recognise the importance of glasses, they may view them as a source of additional revenue and increase taxes.
- **Other regulatory barriers may limit entry benefiting incumbents.** Regulatory barriers can create significant hurdles for new companies attempting to enter a market. A few suppliers expressed their concerns that this could benefit established firms. It is important to carefully examine these claims and weigh the potential negative impacts, including stifling innovation and hindering competition.
- **The duality of roles (prescriber and seller) stymies competition, inflates prices and hinders the uptake of eye examinations for people with limited disposable income.** In Western countries, eye care professionals such as optometrists are often required to prescribe and dispense eyewear, creating a potential conflict of interest as they profit from the sale.

## Cost of rural provision

In this theme, we focus on distribution and retail in areas with observed limited points of sale.

- **Incentives to supply development in rural areas may be weak due to low population density and increased demand barriers.** Achieving viable profit margins typically requires businesses to operate at scale, which can be challenging in areas with low population density or limited demand. Additionally, in rural areas, fewer customers may be willing to pay a premium for high-value products or services, which can reduce the incentive to invest in these markets. Other barriers to market entry may include misconceptions, stigma, and lack of awareness, making it more costly to effectively market and sell products to potential customers.<sup>112</sup>
- **Poor infrastructure and lack of services and sales points in rural areas may increase distribution costs, hampering supply development.** Studies suggest that points of sale are often far from rural communities, and travel distances can be substantial.<sup>113</sup> In areas with poor economic development, insufficient infrastructure may increase business supply costs further reducing the ability to pay of local residents.

<sup>112</sup> See, for instance, Albright, M. et al. (2016). Eyeglasses for global development: Bridging the visual divide. In *World Economic Forum*. [https://www3.weforum.org/docs/WEF\\_2016\\_EYEIalliance.pdf](https://www3.weforum.org/docs/WEF_2016_EYEIalliance.pdf)

<sup>113</sup> Nsubuga, N., Ramson, P., Govender, P., Chan, V., Wepo, M., & Naidoo, K. S. (2016). Uncorrected refractive errors, presbyopia and spectacle coverage in Kamuli District, Uganda. *African Vision and Eye Health*, 75(1), 1-6.

- **Credit opportunities for businesses in rural areas are likely to be limited and more expensive than in urban areas.** Entrepreneurs operating in rural areas may have smaller profit margins and require sufficient scale to be viable. As a result, lenders may view these businesses as less attractive than their urban counterparts, resulting in limited and more expensive credit opportunities.
- **Some national and regional rather than international suppliers may play a role in developing a supply.** Regional and national players are better positioned to understand local markets and networks, which can translate into a competitive edge in product supply.

## Annex B – Detailed analysis and findings on the World Trade Organisation import tariff data

We have analysed the WTO data on applied most-favoured-nation (MFN) tariffs<sup>114</sup> (“rates” or “tariffs”) to assess whether import tariffs for optical products:<sup>115</sup>

- **Could be reduced in line with some other medical products.**<sup>116</sup> In particular, we assess whether rates for glasses and lenses be reduced in line with vaccines.
- **Are adequate in the sense that products are not taxed as fashionable items.**<sup>117</sup> Specifically, we analyse whether glasses and lenses are taxed as sunglasses.
- **Are below the maximum tariff.**<sup>118</sup> This allows us to assess the commercial risk of relying on imports.

Could rates for glasses and lenses be reduced in line with vaccines?

Figure 12 and Figure 13 display the **countries that have the same average rates for glasses and lenses compared to vaccines, respectively**. In both cases, rates range between 0 and 10%. For these countries, tariffs could not be reduced using vaccines as the benchmark.

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<sup>114</sup> Applied MFN tariffs are ones that a WTO member applies on imports from all other WTO members, unless that member benefits from preferential tariffs under a Free Trade Agreement or a unilateral preference scheme such as the Generalised System of Preferences. MFN tariffs are usually defined on the basis of the Harmonised System (HS) for traded products developed by the World Customs Organisation.

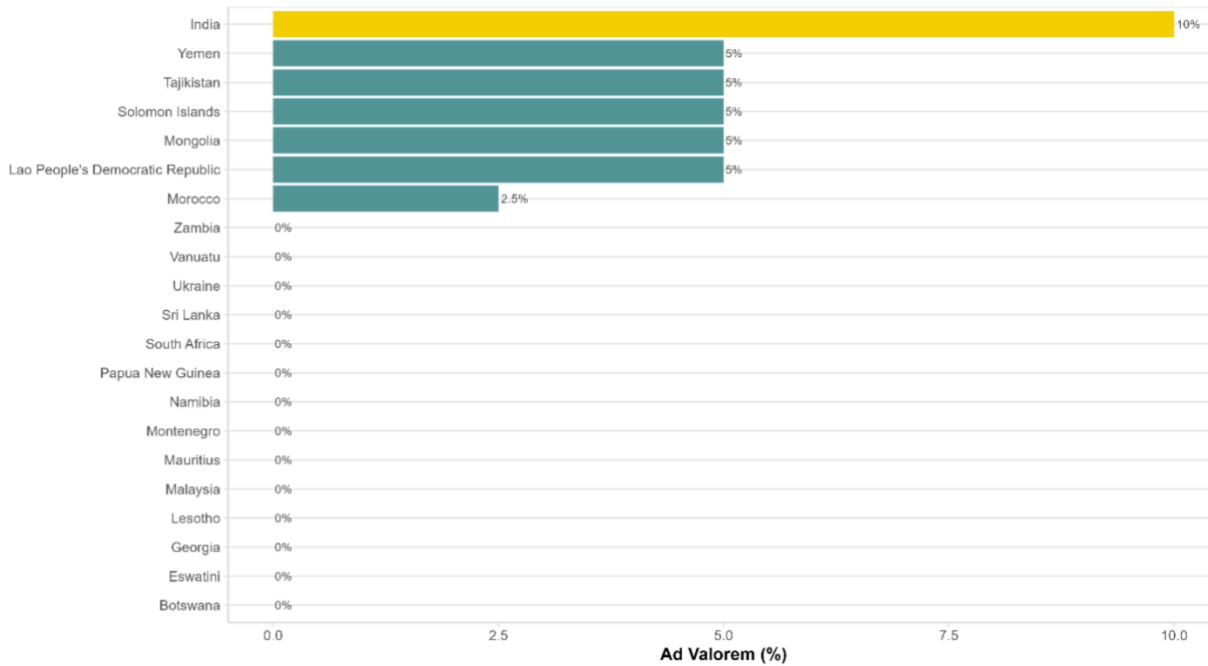
<sup>115</sup> We have used two harmonised system (HS) codes to capture the codes for optical products aimed at correcting refractive errors: ‘corrective spectacles’ (HS 900490) and ‘glasses for corrective spectacles’ (HS 701510). These are known in this analysis as ‘glasses’ and ‘lenses’, respectively.

<sup>116</sup> We use ‘vaccines for human medicine’ (HS 300200) as the benchmark. Also known in this analysis as ‘vaccines’.

<sup>117</sup> We use ‘sunglasses’ (HS 900410) as the benchmark. Prescription sunglasses will likely be included under the general code for sunglasses.

<sup>118</sup> This is the ‘bound tariff’ or the maximum rate on any product a country can apply.

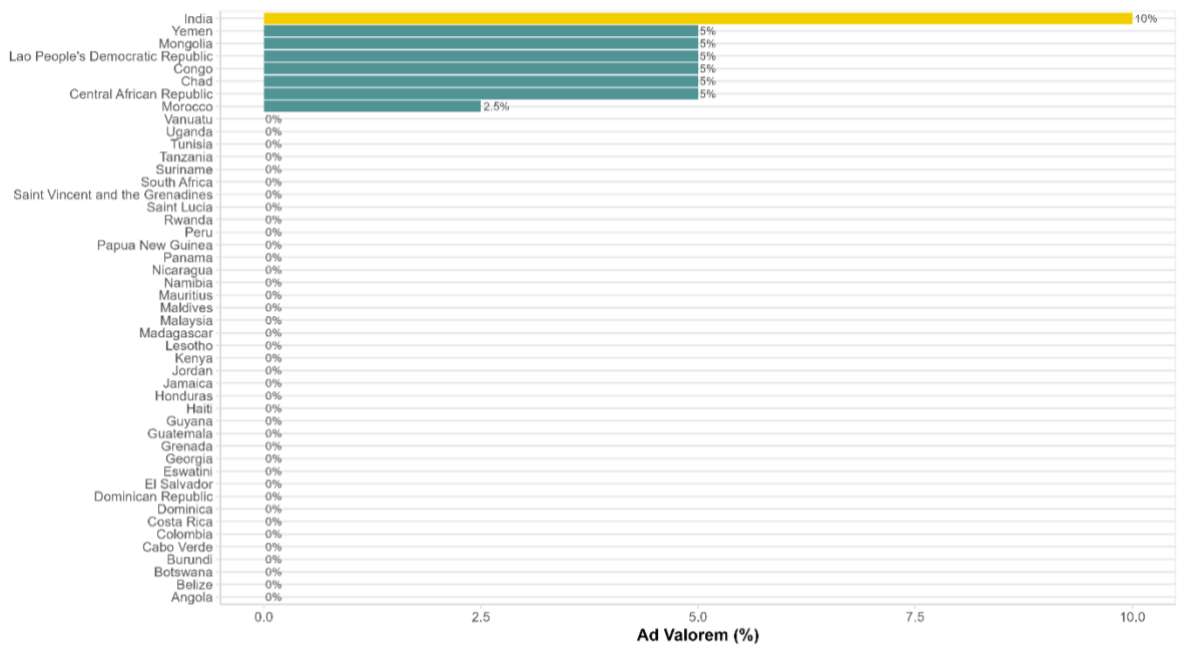
**Figure 12 Equal average tariff for glasses and vaccines**



Source: Frontier Economics analysis of WTO data

Note: Selected countries including Mexico, Nigeria and India are highlighted in yellow

**Figure 13 Equal average tariff for lenses and vaccines**

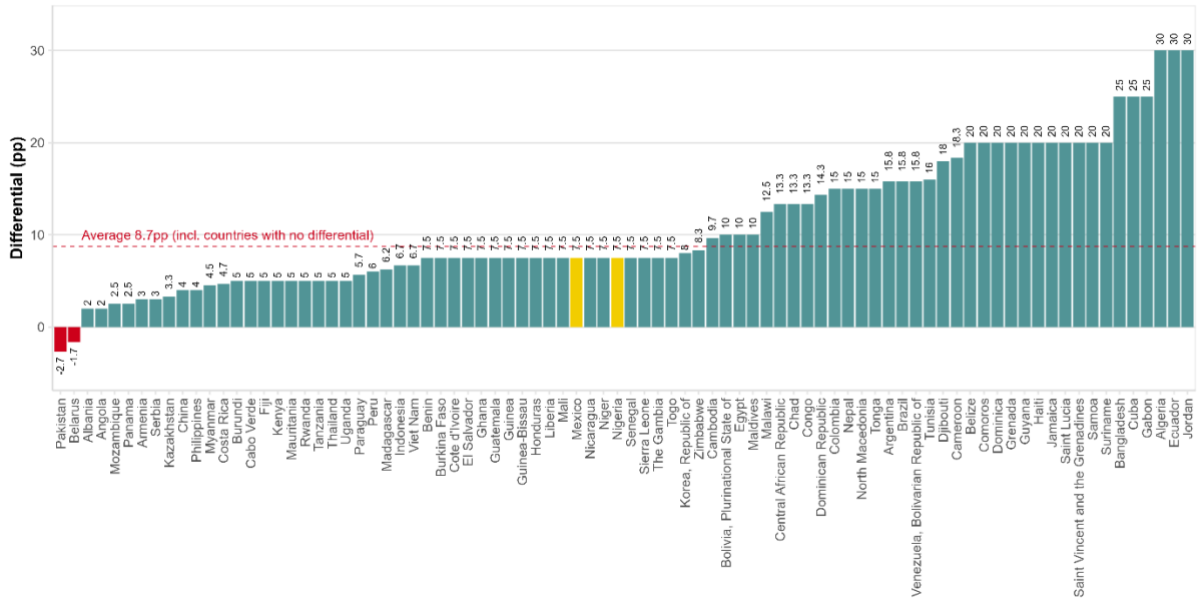


Source: Frontier Economics analysis of WTO data

Note: Selected countries including Mexico, Nigeria and India are highlighted in yellow

Figure 14 and Figure 15 display the **difference average rates between glasses and lenses compared to vaccines, respectively**. In most of cases,<sup>119</sup> rates could be reduced in line with vaccines (2-30 percentage points for glasses, and 1-20 percentage points for lenses).

**Figure 14** Difference between average tariffs on glasses and vaccines



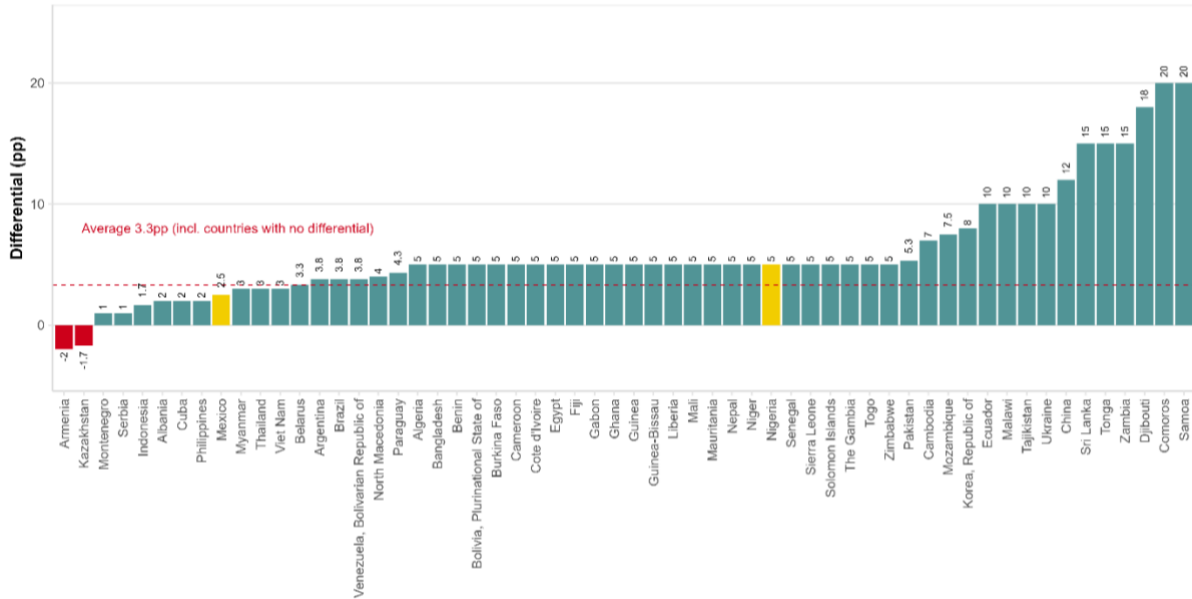
Source: Frontier Economics analysis of WTO data

Note: Average glasses' applied MFN tariffs minus average vaccines'. Selected countries including Mexico, Nigeria and India are highlighted in yellow. Countries with negative differential (with higher tariffs for vaccines) are highlighted in red.

<sup>119</sup> Except for Pakistan and Belarus regarding glasses and for Armenia and Kazakhstan regarding lenses, which apply higher rates to vaccines than to these optical products.



Figure 15 Difference between average tariffs on lenses and vaccines



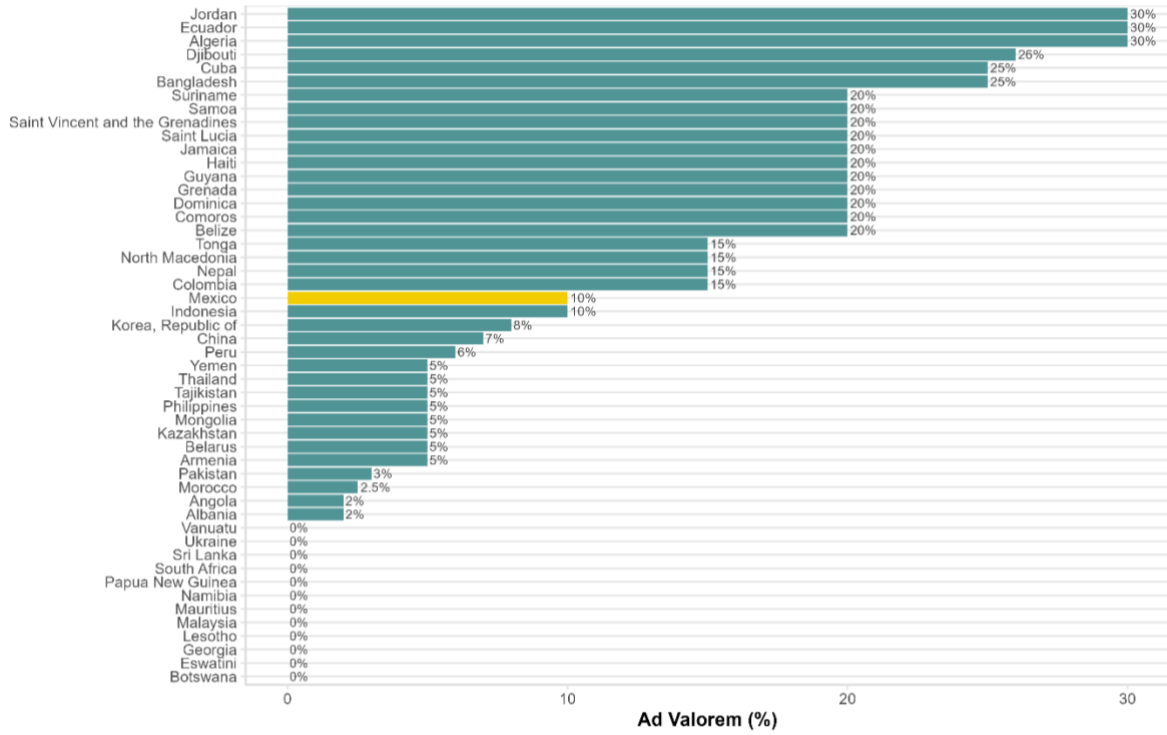
Source: Frontier Economics analysis of WTO data

Note: Average lenses' applied MFN tariffs minus average vaccines'. Selected countries including Mexico, Nigeria and India are highlighted in yellow. Countries with negative differential (with higher tariffs for vaccines) are highlighted in red.

### Are glasses and lenses taxed as sunglasses?

Figure 16 and Figure 17 display the countries that have the same average rates for glasses and lenses compared to sunglasses, respectively. Rates range between 0 and 30% for glasses, and 0 and 26% for lenses. For these countries, these optical products are taxed as sunglasses, suggesting that are perceived as fashionable items.

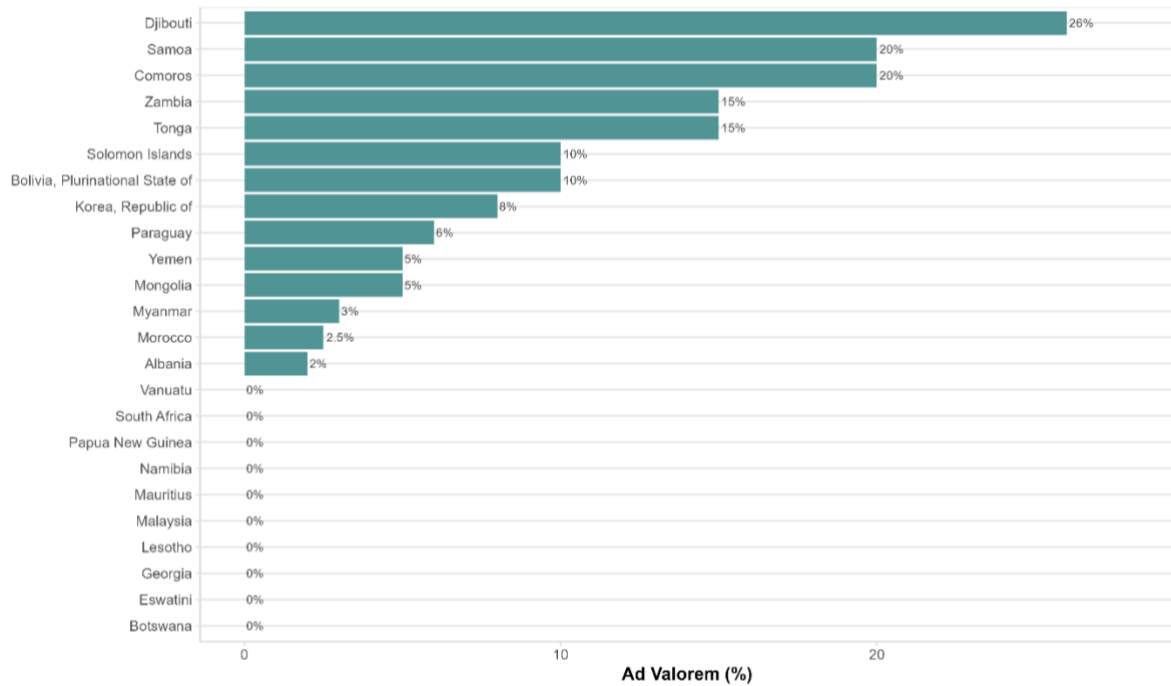
Figure 16 Equal average tariff for glasses and sunglasses



Source: Frontier Economics analysis of WTO data

Note: Selected countries including Mexico, Nigeria and India are highlighted in yellow

Figure 17 Equal average tariff for lenses and sunglasses

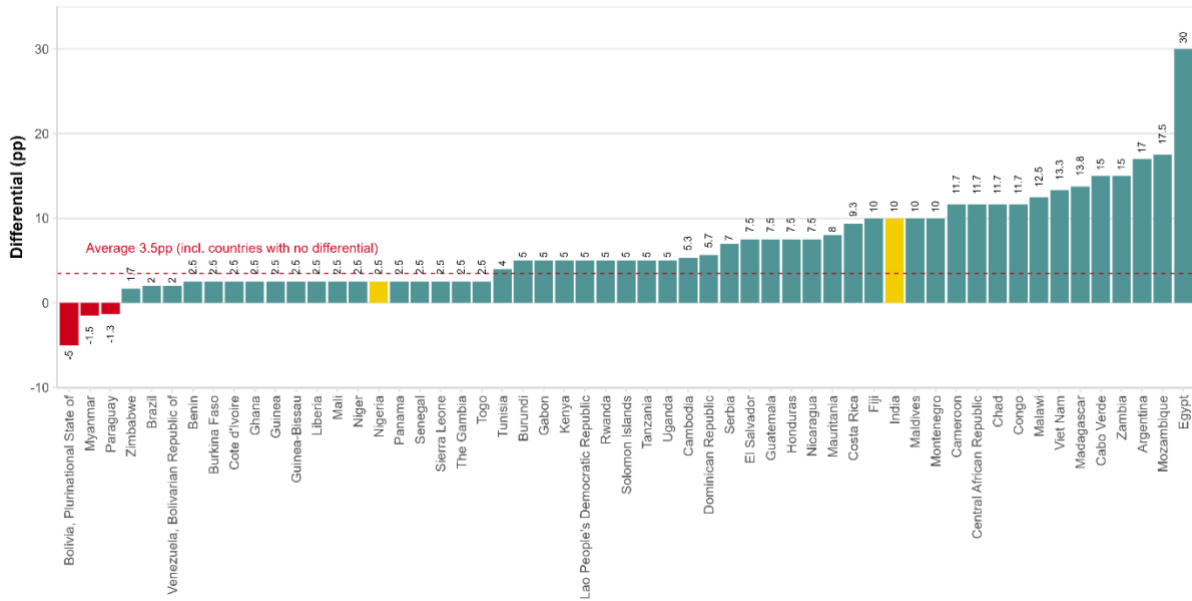


Source: Frontier Economics analysis of WTO data

Figure 18 and Figure 19 display the **difference average rates between glasses and lenses compared to sunglasses, respectively**. In most of cases,<sup>120</sup> sunglasses face higher tariffs than glasses and lenses, suggesting that optical products aiming at correct refractive errors are not perceived as fashionable items (above 1-30 percentage points for glasses, and 2-35 percentage points for lenses).

<sup>120</sup> Except for Bolivia, Myanmar and Paraguay for glasses; and Sri Lanka, Tajikistan, Ukraine, China, Pakistan and Belarus for lenses. These countries apply higher rates to these optical products compared to sunglasses.

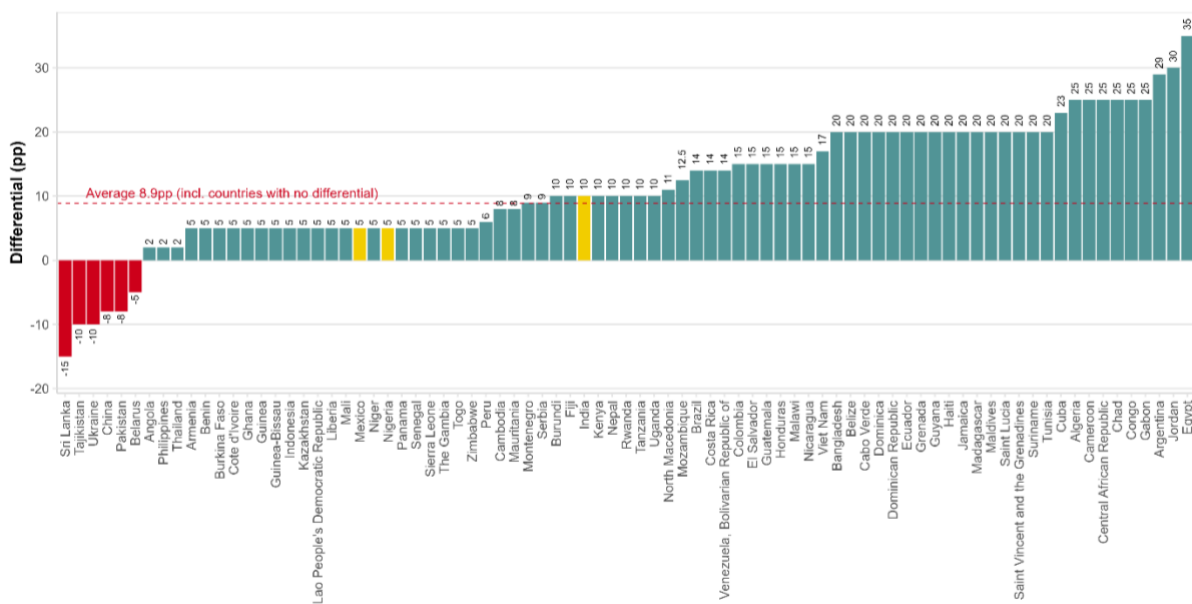
Figure 18 Difference between average tariffs on glasses and sunglasses



Source: Frontier Economics analysis of WTO data

Note: Average sunglasses' applied MFN tariffs minus average glasses'. Selected countries including Mexico, Nigeria and India are highlighted in yellow. Countries with negative differential (with lower tariffs for sunglasses) are highlighted in red.

Figure 19 Difference between average tariffs on lenses and sunglasses



Source: Frontier Economics analysis of WTO data

Note: Average sunglasses' applied MFN tariffs minus average lenses'. Selected countries including Mexico, Nigeria and India are highlighted in yellow. Countries with negative differential (with lower tariffs for sunglasses) are highlighted in red.

### What is the commercial risk of relying on imports?

Bound tariffs are those which a country has specified in its WTO tariff schedule. In essence, these are the maximum tariff rates on any product that a country can apply.

The table below provides a list of countries with no bound for either glasses or lenses. For these countries, there is no ceiling for how much tariffs could increase to for the given product. Therefore, the commercial risk of relying on imports could be significant as the potential increase is illimited.

**Table 4** Countries without bound

Country name	Glasses	Lenses
Bangladesh	X	X
Benin	X	X
Burkina Faso	X	X
Burundi	X	X
Cameroon	X	X
Central African Republic		X
Chad	X	X
Congo	X	X
Cuba	X	X
Fiji	X	X
Ghana	X	X
Guinea	X	X
India	X	X
Kenya	X	X
Madagascar	X	X
Malawi	X	X
Mali	X	X
Mauritania	X	X
Mauritius	X	X
Mozambique	X	X
Myanmar	X	X

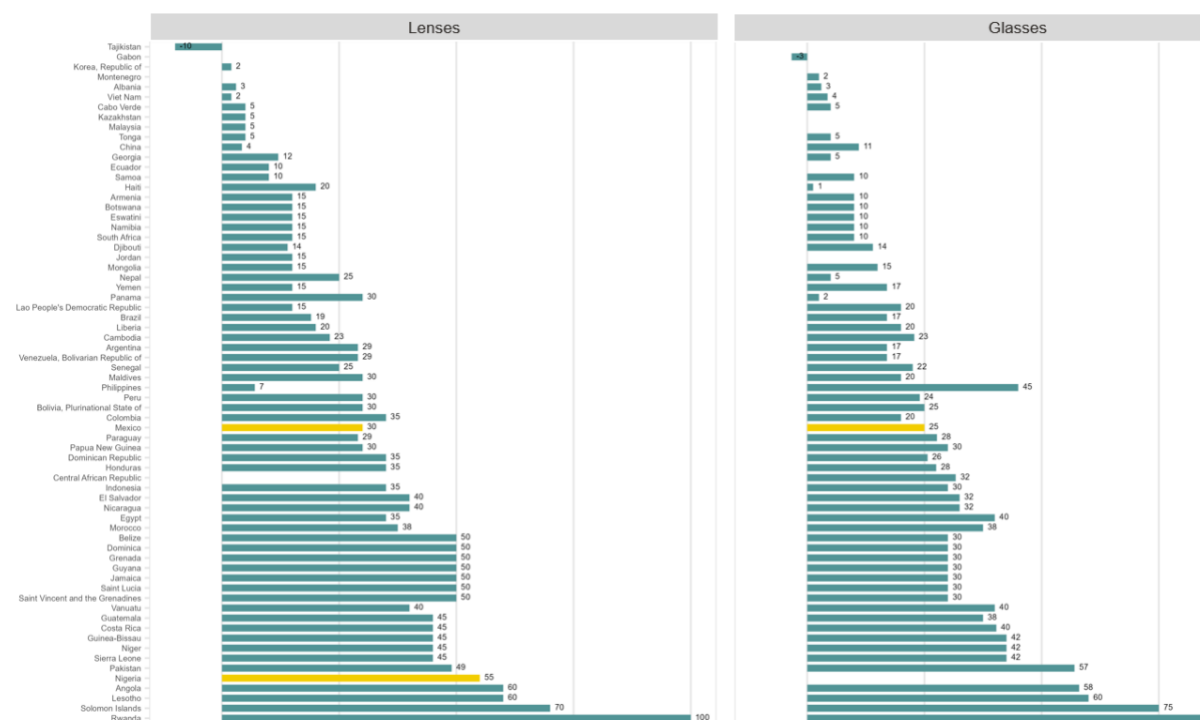
Country name	Glasses	Lenses
Nigeria	X	
Sri Lanka	X	X
Suriname	X	X

Source: Frontier Economics analysis of WTO data

Note: For each country, products with no bound tariffs are indicated as 'X'.

Another important concept related to maximum tariffs is the binding overhang: the difference with applied rates (Figure 20). This represents the increase in import tariffs (in percentage points) that suppliers could face if authorities decide to tax these products more heavily within the agreed WTO schedules. For some countries, the commercial risk of relying on imports may still be important (ranging from 2 to 100 percentage points increase for lenses and from 1 to 95 for glasses).

Figure 20 Potential increase in import rates (binding overhang)



Source: Frontier Economics analysis of WTO data

Note: Selected countries including Mexico, Nigeria and India are highlighted in yellow. Units are in percentage points.

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