COVID-19 and the Unfinished Agenda of VISION 2020

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• PURPOSE: **To critically evaluate the potential impact of the coronavirus disease (COVID-19) pandemic on global ophthalmology and VISION 2020.**
• DESIGN: **Perspective supplemented with epidemiologic insights from available online databases.**
• METHODS: **We extracted data from the Global Vision Database (2017) and Global Burden of Disease Study (2017) to highlight temporal trends in global blindness since 1990, and provide a narrative overview of how COVID-19 may derail progress toward the goals of VISION 2020.**
• RESULTS: **Over 2 decades of VISION 2020 advocacy and program implementation have culminated in a universal reduction of combined age-standardized prevalence of moderate-to-severe vision impairment (MSVI) across all world regions since 1990. Between 1990 and 2017, low-income countries observed large reductions in the age-standardized prevalence per 100,000 persons of vitamin A deficiency (25,155 to 19,187), undercorrected refractive disorders (2,286 to 2,040), cataract (1,846 to 1,690), onchocerciasis (5,577 to 2,871), trachoma (506 to 159), and leprosy (36 to 26). Despite these reductions, crude projections suggest that more than 700 million persons will experience MSVI or blindness by 2050, principally owing to our growing and ageing global population.**
• CONCLUSIONS: **Despite the many resounding successes of VISION 2020, the burden of global blindness and vision impairment is set to reach historic levels in the coming years. The impact of COVID-19, while yet to be fully determined, now threatens the hard-fought gains of global ophthalmology. The postpandemic years will require renewed effort and focus on vision advocacy and expanding eye care services worldwide. (Am J Ophthalmol 2021;224:30–35. © 2020 Elsevier Inc. All rights reserved.)**

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SINCE THE START OF THE GLOBAL CORONAVIRUS DISEASE (COVID-19) pandemic, more than 53 million individuals have been confirmed to be infected, resulting in more than 1.3 million deaths.[1] Healthcare systems remain besieged by local case surges, requiring a near-singular focus within the medical and scientific community to stem the effects of ongoing disease transmission. While the direct impact of COVID-19 on healthcare has been harrowing, there are now growing concerns that the collateral damage of the current crisis will be far more diffuse and destructive to global wellbeing than first appreciated. In global public health, interruptions to initiatives that address HIV/AIDS,[2] malaria,[3] tuberculosis,[2] vaccine-preventable infections,[4] maternal and child health,[5] and the neglected tropical diseases (NTDs)[6] threaten to derail decades of progress. There are now dire projections that an additional 100 million[7] individuals will be forced into extreme poverty (earnings <US $1.90/day) in 2020 alone, along with an additional 200 million[8] set to experience extreme food insecurity. Together with mass socioeconomic upheaval and frozen global supply chains, these early forecasts paint a grim picture of a world where many excess millions will lack basic access to employment, food, and healthcare.

In the international eye care community, 2020 was intended to be a banner year to celebrate our collective progress in alleviating the global burden of vision impairment and blindness. VISION 2020: The Right to Sight was launched in 1999 by the World Health Organization (WHO) and the International Agency for the Prevention of Blindness (IAPB), the latter composed of a consortium of nongovernmental organizations involved in global eye care delivery. VISION 2020 set the audacious goal of eliminating avoidable blindness by this year, providing an international framework for coordinated advocacy and program implementation across global, regional, and national levels. Now supported by 4 World Health Assembly resolutions, the programs overseen by VISION 2020 can lay claim to many stunning successes, as shown by a reduction in the combined age-standardized prevalence of moderate-to-severe vision impairment (MSVI, 20/70 to 20/400 Snellen distance acuity) and blindness (<20/400 Snellen distance acuity in the better eye) across *all* world regions between 1990 and 2020 (Figure 1).[9]

Improvements in global eye care have been particularly pronounced in low-income countries that have a gross national income of less than US $1,035 per capita per year, as

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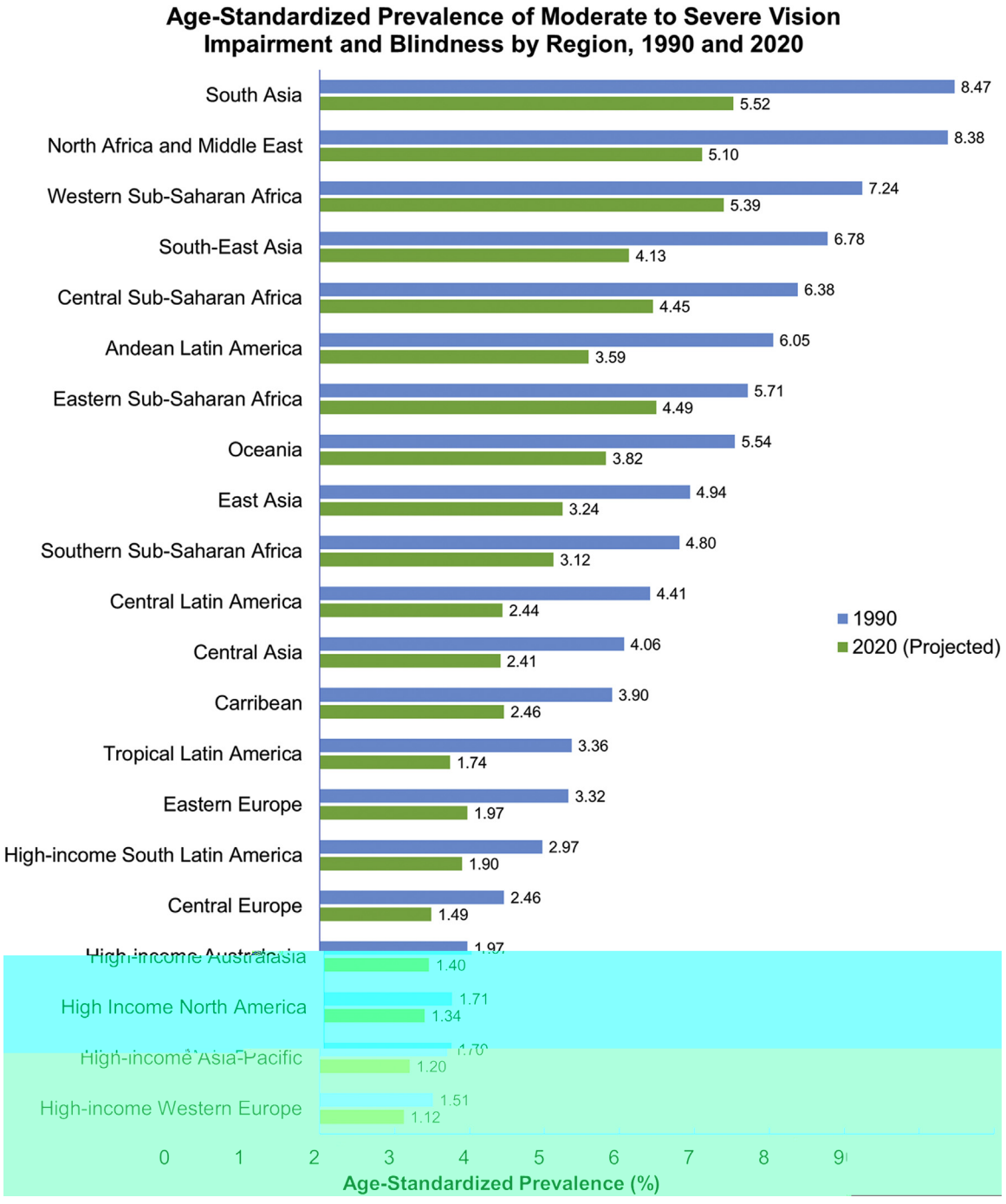


FIGURE 1. Age-standardized prevalence of combined moderate-to-severe vision impairment (20/70 to 20/400 Snellen distance acuity) and blindness (< 20/400 Snellen distance acuity in the better eye), 1990 and 2020. The 2020 figures have been projected from 2015 data. Regions are those captured by the Global Burden of Disease Study. Data source: Vision Loss Expert Group and Global Vision Database, 2017.[9,10]

identified by the World Bank. The Global Burden of Disease Study showed that between 1990 and 2017, these countries experienced marked declines in the total age-standardized prevalence per 100,000 persons for vitamin A deficiency (25,155 to 19,187), undercorrected refractive disorders (2,286 to 2,040), cataract (1,846 to 1,690), onchocerciasis (5,577 to 2,871), trachoma (506 to 159), and leprosy (36 to 26).[11] More recent VISION 2020 efforts have included programs for noncommunicable diseases related to age and/or lifestyle, including age-related macular degeneration, glaucoma, and diabetic retinopathy, as well as inherited disorders such as the retinal degenerations

for which low vision rehabilitation and genetic counseling are critically important.[12] VISION 2020 also remains the leading and irreplaceable voice in the global effort to embed high-quality eye care services within models of universal health coverage as promoted by the United Nations Sustainable Development Goals.[13,14]

Equally important, 2020 was marked as a pivotal year to plan for the changing eye care needs of a fast-growing and aging global population. The 2019 WHO World Report on Vision estimates that at least 2.2 billion individuals live with some form of vision impairment, with at least 1 billion of these cases being preventable.[13] A 2017 modeling analysis performed by the Vision Loss Expert Group estimated that MSVI and blindness will affect 237 and 39 million individuals, respectively, in 2020, for a global population of 7.75 billion.[10] In 2050, a projected global population of 9.69 billion will have an estimated 587.6 and 114.6 million individuals affected by MSVI and blindness, respectively. Therefore, even though the age-adjusted prevalence of many common causes of vision impairment have fallen in the last 3 decades, the number of people affected by MSVI and blindness continues to grow (Figure 2). A marked increase in the number of affected elderly individuals will also likely dramatically worsen other measures of visual morbidity, such as quality- and disability-adjusted life years. Updated projections from the Vision Loss Expert Group are anticipated over coming months, but these conclusions will likely remain unchanged.[15] Undercorrected refractive disorders and cataract, though often considered the low-hanging fruit in ophthalmology, remain by far the most common causes of vision impairment (Figure 3). This fact alone underscores the urgency with which ophthalmic services must be better integrated into healthcare systems across the world.

It is an unfortunate truism in public health that the burden of social, political, economic, and environmental crises is felt most acutely by the most vulnerable members of society. Historically underserved populations are already pushed to the fringes of society—migrants, refugees, internally displaced persons, indigenous peoples, the disabled, the elderly, women, and children. They are almost certain to suffer the worst multisectoral effects of COVID-19, including loss of economic and food security, work productivity, shelter, and widening health disparity. Indeed, eye care remains unequally distributed in most parts of the world, and relentless cycles of global poverty are only worsened by the profound human and economic costs of vision impairment. Low-to middle-income (LMIC) countries in Asia, North Africa and the Middle East, and Sub-Saharan Africa account for nearly 80% (218.7 million) of the world's combined MSVI and blindness in 2020 (Figure 2).[9,10] Heartrending images of impoverished migrant workers across India walking home from cities placed under unanticipated COVID-19 lockdown[16] inspire little confidence that these millions of individuals will have access to healthcare of any sort in the foreseeable future. As ministries of health ration their scarce resources to areas that are deemed immediately lifesaving, eye care may once again be relegated to a matter of secondary importance, thereby undermining years of VISION 2020 advocacy.[17]

COVID-19-related disruptions to existing eye care services in LMICs have been profound. With the redirection of staffing and resources to manage local outbreaks, community-based programs that form the bedrock of low-cost, high-return preventive eye care have been either entirely dismantled or suspended indefinitely, in most cases with no recourse to telemedicine.[18–20] Years-long efforts to provide continuums of eye care based on health literacy, prevention, treatment, and visual rehabilitation now face a long and uncertain wait before they can be safely recommenced. For example, extensive outreach programs coordinated by the Aravind Eye Care System—the largest network of eye hospitals in world—remain on hold, and patient volume at its centers have only recently reached 80% of prepandemic levels after a nadir of 10% in mid-June (Prajna NV, written communication, November 19, 2020).[21] Moreover, interim WHO NTD guidance recently called for the temporary suspension of all mass drug administration (MDA) campaigns, active case finding, and epidemiologic surveys, which will further delay aspirations to eliminate onchocerciasis, trachoma, and leprosy,[22] including in regions that are agonizingly close to achieving target objectives.[17] The impact of program cessation may be particularly severe in young children (<5 years), for whom MDA campaigns may also significantly reduce all-cause childhood mortality.[23,24] With interrupted global nutrition programs[25] and projections that up to 117 million children across 37 LMICs will not receive their routine vaccinations,[4] it is entirely possible that vitamin A deficiency and measles—2 leading causes of pediatric mortality and blindness[26]—will become newly resurgent in many countries.

COVID-19 has certainly not spared ophthalmic practice in higher-income countries. The consequences of deferred care resulting from reduced clinic volume and elective procedure postponement have led to lost opportunities for early intervention across a broad range of common ocular conditions. These include the ocular manifestations of systemic disease (eg, diabetes mellitus[27]) (Figure 3), and conditions that are readily amenable to surgical intervention (eg, corneal transplantation, which in many countries has come to a standstill). As with LMICs, the costs of deferred care are most obvious in historically marginalized populations, with COVID-19 laying bare deep healthcare inequalities that exist along racial, social, and/or economic lines.[28] Telemedicine has been used as a stopgap measure to continue clinical services, though coverage remains sporadic. Certain aspects of basic ophthalmic examination, including visual acuity, intraocular pressure checks, and thorough anterior segment examination, are difficult to perform accurately in virtual settings.[29] As in-person

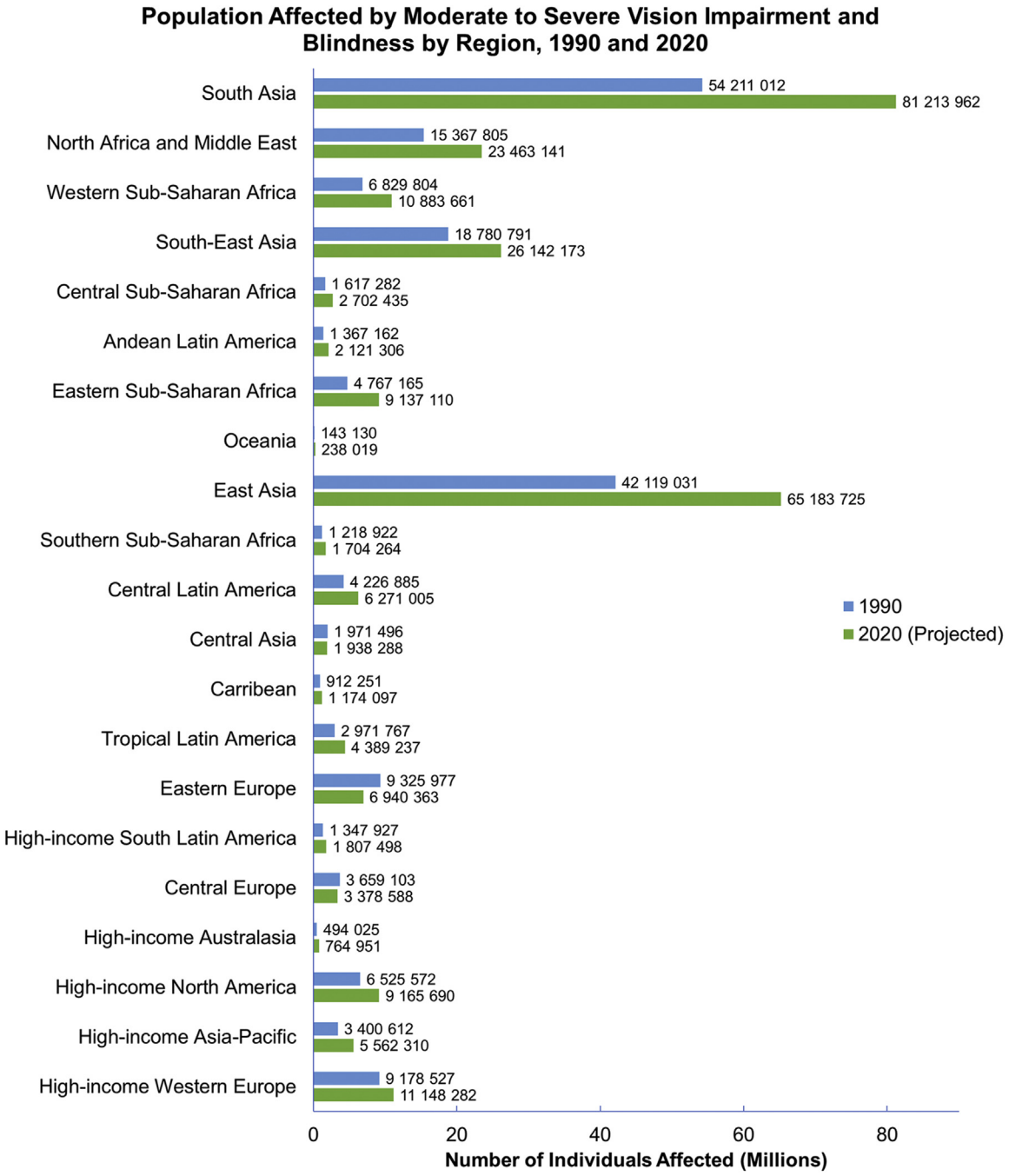
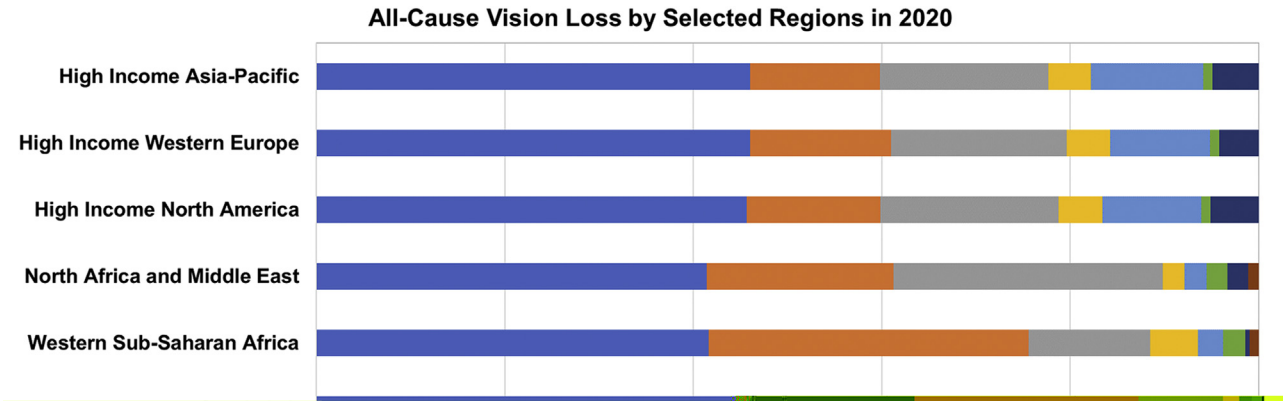


FIGURE 2. Estimated total number of individuals affected by combined moderate-to-severe vision impairment and blindness, 1990 and 2020. Note the projected absolute number of affected individuals in 2020 despite an overall trend toward decreased age-standardized prevalence. The 2020 figures have been projected from 2015 data. Regions are those captured by the Global Burden of Disease Study. Data source: Vision Loss Expert Group and Global Vision Database, 2017.[9,10]

clinics and elective procedures resume, institutions must find solutions for service bottlenecks that also account for previously deferred care. Finally, we should not underestimate the impact of COVID-19 travel and work restrictions on worldwide research productivity (including suspensions of clinical trials), cross-institutional collaboration and networking, and clinical teaching (eg, reduced surgical volume among trainees).[30] These are all vital in building the required workforce and expertise to fulfil the goals of VISION 2020 and beyond.

As COVID-19 escalates, it has become abundantly clear that the hard-fought gains of many global public health programs are at risk. Unfortunately, VISION 2020 is no exception. Recovery from COVID-19 will require



	South Asia	Western Sub-Saharan Africa	North Africa and Middle East	High Income North America	High Income Western Europe	High Income Asia-Pacific
Uncorrected refractive error (%)	62.9	41.6	41.4	45.7	46.0	46.0
Cataract (%)	23.8	34.0	19.8	14.2	15.0	13.8
Other (%)	8.9	12.9	28.6	18.9	18.7	17.9
Glaucoma (%)	1.8	5.1	2.3	4.7	4.6	4.5
AMD (%)	1.3	2.7	2.3	10.5	10.6	11.9
Corneal Opacity (%)	1.1	2.4	2.2	1.0	1.0	0.9
Diabetic Retinopathy (%)	0.2	0.5	2.2	5.1	4.2	4.9
Trachoma (%)	0.0	0.9	1.1	0.0	0.0	0.0

FIGURE 3. Etiology of vision loss by selected region according to 2015 figures from the Global Vision Database. The regions with the highest (South Asia, Western Sub-Saharan Africa, and North Africa and the Middle East) and lowest (North America, Western Europe, and High-Income Asia-Pacific) prevalence of moderate-to-severe vision impairment and blindness are shown. Note the relatively larger proportions of vision loss caused by age-related macular degeneration (AMD), glaucoma, and diabetic retinopathy in high-income regions, and the higher proportions of trachoma and corneal opacity in lower-to middle-income regions. Source: Vision Loss Expert Group and Global Vision Database, 2017.[9,10]

mobilizing the social and financial resources necessary for continued eye health advocacy and program implementation on the international stage.[31] Global eye health must be integrated into culturally and socially appropriate frameworks of healthcare delivery that view vision as a fundamental human right, and are sustainable over the long term. The success of such programs may lie in finding and implementing synergies between eye health and services that target broader social issues such as poverty, food security, transportation, gender inequality, and discrimination. Interorganizational partnerships, including those responsible for MDA, must be strengthened to sustain NTD programs in endemic regions. We must approach our clinical care and vision research, including the basic, clinical, and public health sciences, with fortitude and resilience. The successes of VISION 2020 have shown us that a world without avoidable blindness is ultimately achievable with renewed focus and our collective effort.

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