Expanding Multilingual Learning as a Pathway to Equity during the COVID-19 Pandemic

A Geographical Analysis of a WHO Online Course in 45 Languages

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Abstract—Real-time learning in health emergencies is a critical mechanism to provide frontline health workers, responders, decision-makers, and the public with access to the latest knowledge to save lives, reduce disease transmission and protect the vulnerable. The World Health Organization (WHO) established the OpenWHO.org learning platform to meet this need. Courses are free, self-paced, accessible in low-bandwidth and offline formats, and available in national and local languages. Multilingual production was prioritized and expanded to meet the learning needs of the COVID-19 pandemic. Enrollment data from the introductory COVID-19 course, which has more than 1 million enrollments across 45 language versions, were examined according to language and geographical reach to assess how multilingual availability contributes to equity in learning. The analysis found that most language versions had uptake clustered in key countries where native speakers are concentrated, while use of some translations was more broadly dispersed. In nearly three-fourths of the available language versions of the course, more than one-third of enrollments were found in the top country of use. The findings suggest that multilingual courses served as entryways for learners who may not have otherwise been able to participate, even as enrollment numbers likely underestimate the impact. A production policy that prioritizes translation of open online courses into diverse languages contributes to equity in access to public health knowledge at the global and country levels during health emergencies.

Keywords—online learning, multilingual learning, MOOC, equity, pandemic

1 Introduction

The World Health Organization (WHO) launched the OpenWHO.org online learning platform in 2017 to facilitate the transfer of public health knowledge for emergencies on a massive scale in anticipation of the next pandemic. Grounded in the principles of open access and equity, courses are free, self-paced, accessible in low-bandwidth and offline formats, and available in national and local languages [1]. The platform builds on the massive open online course (MOOC) model which aims to make education accessible

for all learners, including vulnerable communities, learners with low education levels, non-English speakers, and learners with disabilities [2]. Although the model has yet to achieve its full potential, open programs have also been found to meet their aims of enabling student equity and social inclusion based on program outcomes [2–4].

After serving frontline responders in regionalized outbreaks from Ebola to plague, OpenWHO dramatically scaled up course production for the COVID-19 pandemic, making life-saving information from WHO experts available online at a time when lockdowns and social distancing limited the ability to physically come together to learn [1]. The platform offers courses on 46 different COVID-19 topics, as well as 120 courses on additional health topics. Courses are available across 65 languages, including the most-spoken languages worldwide and the official languages of 44 out of 46 of the least-developed countries.

OpenWHO has prioritized the expansion of its language offerings because language is a well-documented barrier for patients accessing health care services or seeking health-related information; in particular, non-native speakers or people with limited language proficiency, migrants, refugees, people with hearing or visual impairments, or people with limited literacy, including digital literacy, might face this barrier [5–11]. For example, it was shown that utilization of a native vs. non-native language impacts critical decisions about personal health, as language might alter consequential judgments about preventative care by serving not only as a mechanism to carry information, but also by modeling how health-related information is processed and perceived [12]. Literature also shines a light on language inequalities and how language impacts health outcomes, as well as the efficacy of strategies to overcome these barriers, including the involvement of interpreters and communication strategies to facilitate access to health care services and health-related information [13–16]. Nwokediuko et al. called for global recognition of native languages in e-learning to enhance knowledge transfer across various communities [6].

Prioritizing access to sidestep common barriers to learning, including cost and language, has enabled OpenWHO to have tremendous reach in line with WHO's mission to promote health, keep the world safe, and serve the vulnerable. Demand has surged during the COVID-19 emergency, with course enrollments increasing from 160,000 in January 2020 to 7 million in August 2022. OpenWHO has served as a growing source of knowledge for demographics that are typically underserved online, including women and people aged 70 and older as they actively sought information about COVID-19 [17]. Learning reach has also extended beyond the use of the online platform as countries and communities have adapted materials to local contexts and offline demands to bypass technological and connectivity barriers, creating a multiplier effect that further advances equity in learning [18, 19].

This paper analyzes enrollment trends in the introductory COVID-19 course[1], which has more than 1 million enrollments across 45 different language versions and is the most popular course on the OpenWHO platform. It presents findings on language and geographical reach to examine how multilingual availability contributes to equity and inclusion in learning.

[1] Course available at: https://openwho.org/courses/introduction-to-ncov

2 Methods

Enrollment data were drawn from OpenWHO's built-in reporting system, which tracks learners' enrollments, completion rates, demographics, and other key course-related metrics. Platform data have been collected from the launch of OpenWHO in 2017 up until December 2021 and aggregated in the R environment.

For the purposes of this paper, data for the Introduction to COVID-19 course, from its launch in English on January 26, 2020, to December 31, 2021, were segregated to examine enrollment trends, including the distribution of learners by language version and country. Descriptive statistics were calculated using the Microsoft® Power BI tool. Key outcome variables of interest were learners' locations and language of learning, as well as self-reported data on gender, age, and affiliation.

3 Results

3.1 General demographics

Overall, the Introduction to COVID-19 course was slightly more popular among female learners (53.15%) than males (46.68%). Learners ages 20–29 were the most represented age bracket (42.14%), followed by learners ages 30–39 (23.41%), younger than 20 (13.08%), 40–49 (11.04%), 50–59 (4.76%), 70 and older (4.54%), and 60–69 (1.06%). Students were the most represented learners in the course (42.32%), followed by "other" affiliations (21.27%) and health care professionals (16.38%). The countries with the most course enrollments were India (26.70%), Mexico (10.70%), Ecuador (8.74%), the United States of America (6.68%) and Colombia (5.27%).

3.2 Language distribution

Of the 45 languages available for the introductory course, 6 represented the official languages of the United Nations (UN) (Arabic, Chinese, English, French, Russian, and Spanish) and the remaining 39 were national and local languages spoken across the globe. Almost half (48.82%) of course enrollments were in English, 29.12% were in Spanish, 7.31% were in another UN language, and 14.75% were in another national or local language, for a total of 512,095 enrollments in language versions other than English.

Languages published later naturally had fewer enrollments, except for languages whose popularity outweighed the impact of the publication date. The Spanish language version published on February 10, 2020, (291,399 enrollments) has been 33 times more popular than the Chinese version (8763 enrollments) released 1 day before and has had about 10 times the uptake of the French version released 3 days before. Similarly, with the exception of the Spanish version, the Indian Sign Language translation (488,460 enrollments) has met greater popularity compared to the 9 other languages that preceded its publication after the original English course (see Table 1).

In nearly three-fourths (32/45) of the available language versions of the introductory course, more than one-third of enrollments were found in the top country of use. In fact, 19 out of 45 languages had more than half of their enrollments in the top user country.

Table 1. Top 10 language versions of the multilingual OpenWHO COVID-19 introductory course as of December 31, 2021

Language	Start Date	Total Enrollments
English	January 26, 2020	488,460
Spanish	February 13, 2020	291,399
Indian Sign	March 23, 2020	54,623
Hindi	March 18, 2020	41,714
Arabic	February 28, 2020	30,968
French	February 10, 2020	29,892
Portuguese	February 27, 2020	21,051
Chinese	February 12, 2020	8,763
Bengali	April 24, 2020	5,443
Turkish	March 10, 2020	4,677

3.3 UN languages

An analysis of the UN language versions of the course found multilingual availability attracted learners from key geographical demographics. For example, the Arabic language course was most used in Iraq, with 20.25% (5,269) of Arabic course enrollments located in that country. The Arabic course was also the most popular language version in Iraq overall, representing 55.09% of Iraq's course learners. In addition, Arabic was notably popular in Saudi Arabia (18.49%, 4,812) and Egypt (17.29%, 4,499). The Spanish language course was most used in Mexico, representing 28.65% (70,992) of Spanish course enrollments, and comprised 78.94% of course enrollments from learners in Mexico.

Notably, 4 of the 6 official UN languages were among the language versions with the least observed geographical concentration of learners, with less than 1/3 of enrollments in the top country of use: Russian (18.47%, Ukraine), Arabic (20.25%, Iraq), Spanish (28.65%, Mexico), and English (30.74%, India). French ranked in the 19th position with 39.06% of its users localized in India, while Chinese ranked 33rd out of 45, with 61.54% of its users localized in China. Although almost two-fifths of the French version's enrollments were collected from India, additional key countries of note were France, Democratic Republic of the Congo (DRC) and Mexico, totaling 14.35% of French enrollments (Figure 1).

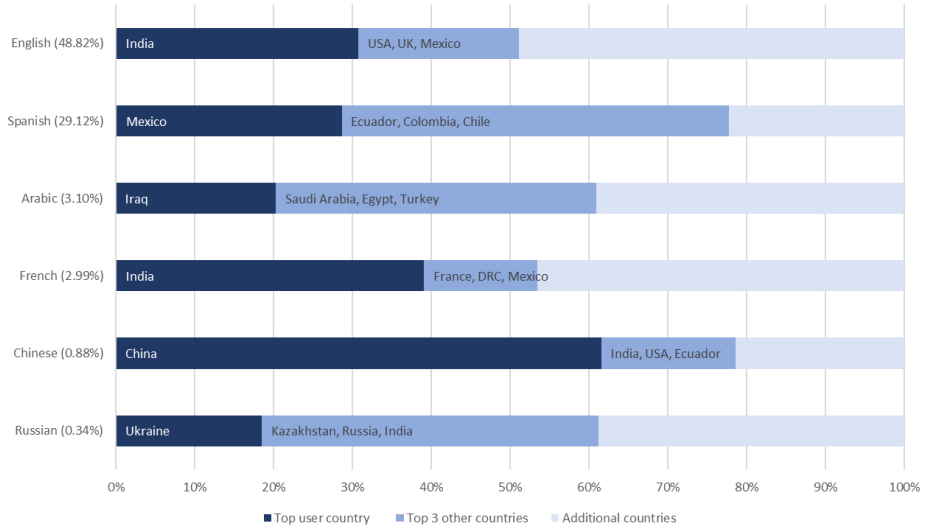

Fig. 1. Geographical distribution of OpenWHO COVID-19 introductory course in UN languages. The percentage of overall course enrollments in each language is noted on the left

3.4 National and local languages

Further analysis found that learners from key countries participated in online courses published in their national or local languages. The Macedonian language course was most used in North Macedonia, for example, with 80.85% (650) of Macedonian course learners located in the country. The Macedonian version of the course was also the most utilized language version in North Macedonia overall, accounting for 84.75% of North Macedonia's learners. Similarly, the Portuguese language course was most used in Brazil, representing 39.76% (5,932) of enrollments in the Portuguese course and comprising 74.01% of Brazil's learners.

In other contexts, multilingual availability attracted additional learners in countries where a UN language version remained the most-utilized course. For example, the Vietnamese course was most used in Vietnam, which provided 73.46% (537) of Vietnamese course enrollments, even as 38.58% of Vietnam's learners used the Vietnamese course and 48.56% used the English version. Similarly, the Indonesian course was most used in Indonesia, which contributed 71.40% (2,007) of Indonesian course enrollments, while 32.04% of Indonesia's learners used the Indonesian course and 64.72% used the English version. The Turkish course was most utilized in Turkey, with 30.85% (1,006) of Turkish language enrollments centralized there, yet 36.91% of Turkey's learners were enrolled in the Arabic course, 29.49% in the English and 29.20% in the Turkish version (Figure 2).

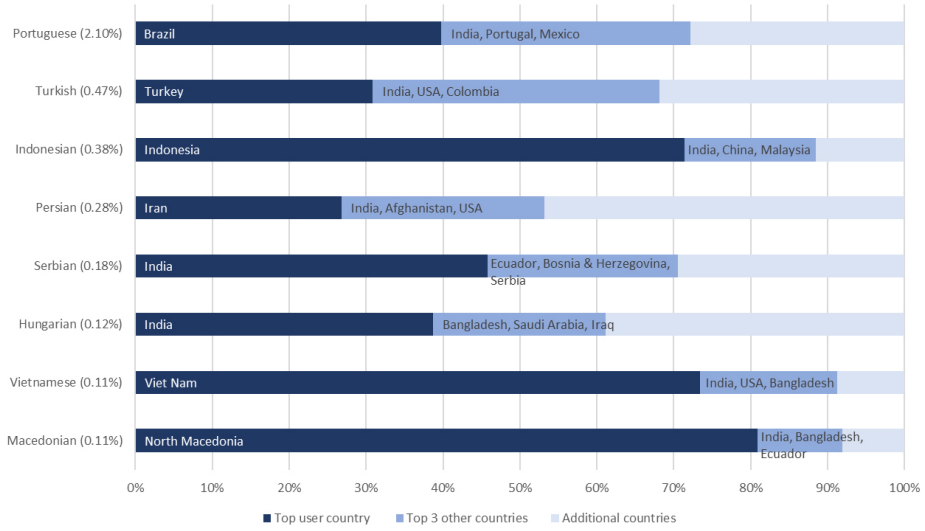

Fig. 2. Geographical distribution of OpenWHO COVID-19 introductory course in popular national and local language versions (more than 1,000 enrollments)

3.5 African languages

OpenWHO has prioritized the production of the introductory course in African languages, which are often underserved [20, 21]. The course is available in 10 languages local to the African continent, with modest levels of participation; the most popular African language course is Swahili, which has 538 total enrollments, representing 0.05% of total course enrollments. Two of the African language courses were excluded from the analysis because they had less than 50 enrollments (Fulah and Shona). Of the remaining 8 languages, Ethiopia was found to be the top country of use for 2 languages widely spoken in the country: 71.03% (255) of Amharic enrollments were localized in Ethiopia, as well as 33.87% (21) of enrollments in the Oromo course.

An interesting pattern was observed for the other 6 African languages analyzed: India was the top country of use for each, representing at least one-third of course enrollments. India also emerged as the top country for many additional language versions of the COVID-19 course, as more than one-fourth of course enrollments stemmed from India. At the same time, the second-highest country of use for each of the six African languages corresponded with countries where each language was widely spoken: Tanzania for Swahili, Somalia for Somali, South Africa for Zulu, and Nigeria for Hausa, Yoruba, and Igbo (Figure 3).

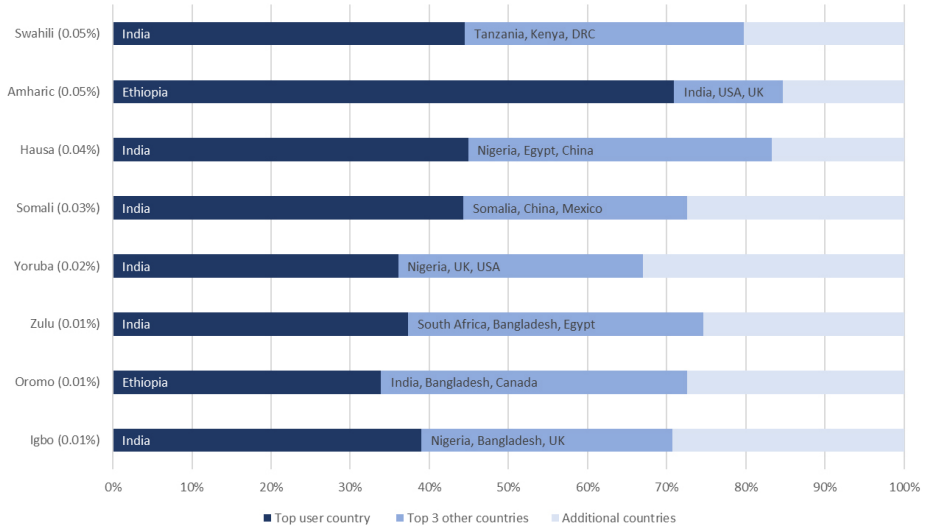

Fig. 3. Geographical distribution of OpenWHO COVID-19 introductory course in African language versions with more at least 0.01% of course enrollments

3.6 Indian languages

With such a high use case, an analysis of multilingual enrollments in India presented a unique country-level snapshot. The introductory COVID-19 course was available in 8 of the 22 languages included in the Eighth Schedule of the Indian constitution [22], as well as Indian Sign Language.

The most used language version of the course in India was the English course, serving 57.43% of India's learners. Even so, the following language versions also had the highest levels of popularity in India, making the course accessible to additional demographics within the country: Hindi (97.84% of enrollments came from India), Indian Sign Language (88.07%), Oriya (93.46%), Marathi (91.16%), Punjabi (82.58%), Telugu (75.00%), and Tamil (54.29%).

The two remaining languages were most popular in neighboring countries where they served as official national languages, with India contributing the second-highest number of enrollments. The Urdu course was most used in Pakistan, which comprised 71.16% (1,051) of Urdu course enrollments, even as English served as the most popular language version in the country with 80.28% of Pakistan's learners enrolled compared to 9.39% for Urdu. Similarly, the Bengali course was most utilized in Bangladesh, which provided 56.36% (2,415) of Bengali course enrollments. Overall, English served as the most popular course in Bangladesh with 69.17% of the country's learners enrolled compared to 19.31% for Bengali (Figure 4).

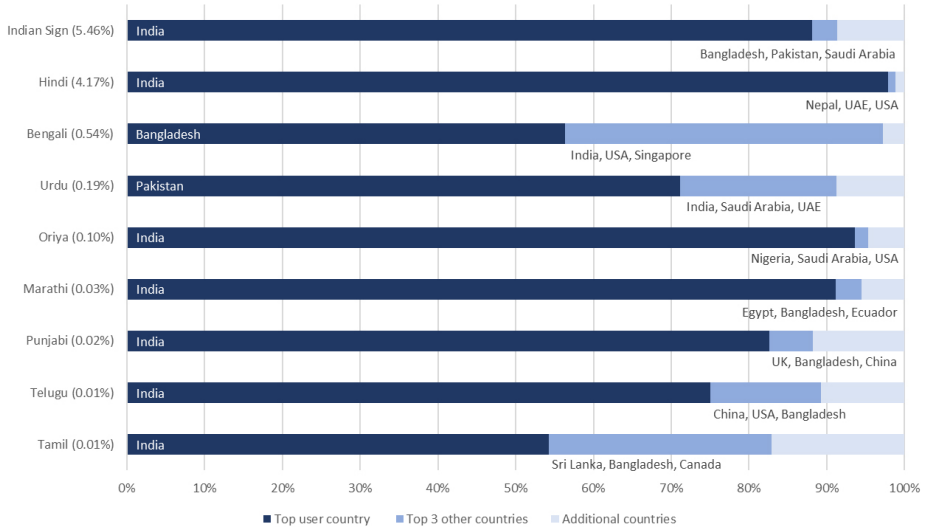

Fig. 4. Geographical distribution of OpenWHO COVID-19 introductory course in Indian language versions with more at least 0.01% of course enrollments

4 Discussion

The findings suggest that multilingual production of the introductory COVID-19 course has enabled additional learners to access and understand critical public health learning materials, advancing equity at the global and country levels. In some cases, like in Iraq and Mexico, a UN language course other than English was the most popular course in the country and brought thousands of learners to the course. In other cases, like North Macedonia and Brazil, a national language course was the most popular as it served as the entryway for learners. In other cases, still, the English language course was the most popular in the country overall, but UN and other language courses brought additional learners within the country that may not have otherwise been able to participate in the learning.

Overall, the geographical distribution of enrollments shows that nearly three-fourths of language versions had centralized uptake in key countries, while use of the remaining language versions was more widely dispersed. Such clustering was often centered in countries where native speakers are concentrated, while enrollments in languages that are spoken across a wider swath of countries like many UN languages tended to follow the pattern of those languages. Additional factors such as the presence of course publicity and differences in Internet access could have also impacted the number of enrollments in specific countries.

Both models of multilingual uptake serve to advance equity because the ability to learn in one's preferred language has been proven to increase understanding [5–16, 23]. This can perhaps be most directly observed for learning materials targeting populations with special needs. For example, enrollments in the Indian Sign Language course compose 18.10% of total introductory course enrollments from India, reaching a

targeted demographic that would otherwise not be served. The course may particularly benefit poorer and marginalized communities, as research from India suggests that the poor have higher prevalence of disability, including hearing impairment [24]. People with hearing impairment also face barriers accessing health care services and information, which may be higher in low-resource settings [25, 26]. OpenWHO's focus on multilingualism supports inclusiveness so that learners feel like valued members of the learning community, alongside platform features like multi-format and low-bandwidth options designed to meet learners' diverse needs. OpenWHO's tagline of "open to all, anytime, anywhere" embodies this commitment to inclusion.

A particularity of the OpenWHO production process is that the English language version of a course is generally launched first based on the relevant technical guidance and then translated and published in additional languages. English production is prioritized for courses of global interest because the language is shared by many native and non-native speakers around the world and is the most widely used working language of the UN system. In fact, it is one of the language versions of the introductory course with the least geographical centralization.

As a result of the prioritization of English materials, some learners may have enrolled in the English version to have immediate access to the course knowledge even though they would have otherwise enrolled in another language if that version was concurrently available. This suggests that analysis of OpenWHO enrollment figures may underestimate the demand for multilingual courses. It also serves as a reminder of the challenges of relying on enrollment trends to define the relevance and need for multilingual production that caters to all audiences through a policy of equity. Production of courses in neglected and underserved languages, including some of the African languages included in the analysis, may appear to be less effective when measured exclusively by enrollments for a number of reasons, from having smaller numbers of overall speakers, to being spoken by populations who with dominant oral or visual cultures who are less likely to take an online course en masse. Empowering one community or even a single individual with knowledge in their language can have a critical impact as these learners take their knowledge forward to support and educate others, yielding benefits for equity that are challenging to quantify. Additional research could systematically explore how multilingualism contributes to this multiplier effect, both in terms of offline and adapted use of learning materials, and how knowledge gained is implemented at the individual and local levels.

The India use case presents a powerful argument for multilingual learning from an alternative perspective. In a country of more than 1 billion people, 43.6% speak Hindi as a primary language, but more than half of country's population speaks another primary language, with each serving millions of people [27, 28]. Translation into additional languages spoken across India's diverse states thus enabled critical public health knowledge to be accessed by these unique linguistic communities. Separately, the observed trend of India serving as the top source of enrollments for a variety of languages that are not native to the country, including African languages, represents an opportunity for future research. Whether India's unexpected participation in these language materials is due to the use of Virtual Private Networks or another factor remains unclear.

Beyond the language analysis, course data on gender, age, and affiliation also illustrate OpenWHO's progress in promoting equitable access to knowledge. The course reaches a higher proportion of women (53.15%) than the overall platform average, which shifted from having 40.39% female learners before the pandemic to 51.80% at the end of 2021. This gender trend contributes to equity, as OpenWHO survey results have found that women are more likely than men to find time and cost to hinder their access to learning, echoing broader gender-equality concerns [1, 29, 30]. The presence of both older and younger users in the introductory course also shows progress towards more inclusive learning, as learners aged 70 and older were statistically unrepresented on the platform prior to the pandemic compared to 4.54% in this course, and learners under age 20 were only 3.22% of platform enrollments compared to 13.11% here. Finally, the large numbers of learners who are students and whose affiliations do not align with one of the health, government or international organization categories that are traditional constituencies of the OpenWHO platform suggest that the course's introductory nature serves a general audience, increasing equity and access to critical knowledge during the pandemic.

5 Conclusion

Since 2020, WHO's OpenWHO learning platform has heightened its focus on multilingualism to support effective uptake of critical learning resources for COVID-19. The geographical distribution of learners in the 45 language versions of the introductory COVID-19 course suggests that language availability makes learning accessible to learners concentrated in key countries, as well as populations dispersed across many countries and regions. Overall, the analysis finds that prioritization of translation into national and local languages contributes to equity in access to public health knowledge at the global and country levels, attracting learners who may not have otherwise been able to participate in open online learning.

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