

# At a Crossroads: Family Medicine Education in China

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## Abstract

China is engaged in efforts to train 300,000 family doctors by 2020 to meet its population's health care needs. This Article discusses the family doctor shortage, compares family medicine training programs, examines the distributional challenges faced by these programs, and proposes directions for further experimentation. Despite an increasing number of family doctors, they represented only 5.6% of all doctors in 2013. Currently, three training programs run concurrently—the post-transfer training, residency training, and designated family medicine

undergraduate education programs. These programs face several challenges. First, the educational qualifications of primary care practitioners (PCPs) vary greatly between rural and urban regions. From 2005 to 2013, the percentage of PCPs with three or more years of medical training in urban areas was at least 20.0% higher than in rural areas. Second, regional disparities in the number of family doctors for every 10,000 people exist. The richer eastern part of China has a ratio of 1.51 family doctors for every 10,000 people, nearly double that of central (0.70) and western

China (0.86). Third, better-educated doctors are most likely going to prefer to work in hospitals, which offer a lucrative career path with higher pay and social status. Intervention packages that combine student selection policies that look at place of origin and career intent with other incentive strategies are worth implementing. Adequate clinical exposure and regular, rigorous evaluations are crucial for enhancing training quality. China should strike a balance in the distribution of family doctors between the richer and poorer areas to ensure equity.

*Editor's Note: This New Conversations contribution is part of the journal's ongoing conversation on global health professions education—how ideas, experiences, approaches, and even resources can be shared across borders and across cultures to advance health professions education around the globe.*

The global “Health for All” campaign, initiated by the World Health Organization (WHO) after the Declaration of Alma-Ata in 1978, was to a large extent inspired by China's then-successful primary care model—the barefoot doctor system. In this system, during the Cultural Revolution (1966–1976),

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farmers in China's rural areas with secondary education received three to six months of training in basic medical knowledge and skills, then served as primary care practitioners (PCPs) for the vast rural population. This fast-track training process succeeded in producing a large pool of PCPs within a short period. These PCPs provided immunizations, basic medical services, maternal and child health care, and health education and promotion to rural populations, making a huge contribution to the improvement of population health at low costs. As a result, between the early 1960s and 1981, life expectancy in China rose from 35 to 68, and the infant mortality rate dropped from 200 to 34.7 for every 1,000 live births.<sup>1,2</sup>

After the launch of economic reforms in the early 1980s, the central Chinese government reduced its budget on health care expenses. This resulted in a shift that placed an increased burden for subsidizing public health care facilities on local authorities with limited economic resources, especially during the early years of the economic reforms. In response, local governments changed their focus from primary care to hospital-based specialty care. During this time, total government funding for health care facilities accounted for less than 10.0% of their revenue.<sup>3</sup>

Health care facilities were allowed a 15.0% profit margin for drugs and diagnostic procedures to enable their survival.<sup>4</sup> Taken together, these resulted in a competition for patients (and thus revenue) between hospitals and primary care facilities. The barefoot doctor system almost vanished throughout China, while hospital-based services with better resources proliferated.<sup>5</sup> This led to an uneven distribution of quality health care resources (e.g., funding, workforce, medical equipment) among the different health care tiers (see below).

Over time, China has developed a three-tier health care system. In this system, primary care facilities include community health centers (CHCs) or community health stations (CHSs), which are satellite clinics affiliated with CHCs, in urban areas, and township health centers (THCs) and village clinics in rural areas. These facilities provide primary medical care and preventive services at the community level and are collectively called community health facilities. Secondary and tertiary care facilities are hospitals, which provide specialty care. In 2007, more than 85.0% of China's health care resources were allocated to these higher-level care facilities, whereas less than 15.0% were reserved for primary care facilities.<sup>6,7</sup>

In recent years, with the effective control of infectious diseases and an aging population, Chinese society has seen an increase in chronic diseases.<sup>8,9</sup> Among all deaths in 2010, 80.0% were caused by heart disease and stroke, chronic respiratory diseases, diabetes, or cancer.<sup>10</sup> A 2013 meta-analysis revealed that the nationwide pooled prevalence of hypertension was 21.5%.<sup>11</sup> Additionally, from 2008 to 2010, the prevalence of diabetes ranged from 9.7% to 11.6%, with even higher rates of prediabetes (15.5%–50.1%) reported.<sup>12,13</sup> Around 17.6% and 5.6% of respondents were found to be overweight and obese, respectively, in a 2002 national survey.<sup>14</sup> And in 2014, more than half (52.1%) of adult males were current cigarette smokers, compared with 2.3% of adult females.<sup>15</sup>

Because of the resulting soaring need for health care provisions, the quality of primary care has become a major concern. In 2010, effective control of hypertension was achieved in only 9.3% of all cases,<sup>16</sup> and effective control of diabetes was achieved in less than 20.0% of all cases.<sup>17</sup> Among the 230,800 prescriptions from primary care facilities written between 2007 and 2009, the average number of drugs prescribed per encounter was 2.6 (the WHO recommends a range of 1.6–1.8), with nearly half of the prescriptions being for antibiotics and one-third for injections.<sup>18</sup> In addition, no integrated or theme-specific policies or action plans to target cardiovascular diseases, diabetes, chronic respiratory diseases, or tobacco use are currently in use.<sup>19</sup> An effective primary care system is urgently needed to tackle these health issues.

Medical education plays a key role in improving the quality of care. China has a complicated medical educational system. Various medical education programs (most of which are set up in tertiary education institutions; see below) are in place to educate and train medical practitioners to meet the increasing health demands of the nation's sizable population.<sup>20,21</sup> Three-year (postsecondary diploma, which is similar to a degree from a vocational technical college) and five-year (university bachelor's) programs are the most common programs for clinical medicine students. These two programs admit students directly from high school. The

former aims to train licensed assistant doctors, mainly for rural health services, and the latter to produce licensed doctors for the country. In addition, there are six-, seven-, and eight-year programs at top-ranking medical schools that provide students with bachelor's, master's, and doctoral degrees, respectively. A stepwise system, aimed at producing medical research experts, also exists—students with bachelor's degrees can progress to master's programs (three years) and then to doctoral programs (three years). China's current family medicine education system is based on this overall structure.

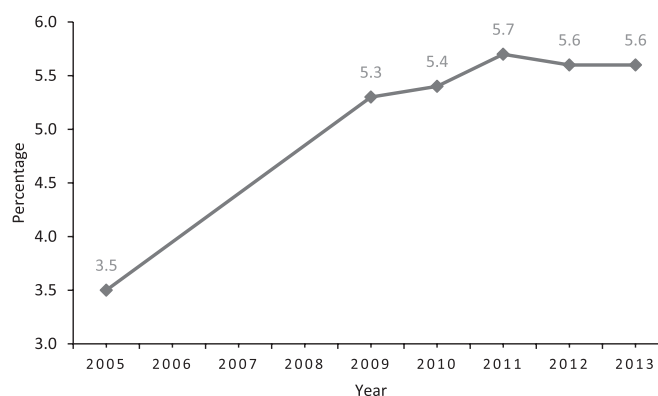
The central Chinese government has been trying to reinstate the development of a strong primary care system by training family doctors since 2006.<sup>22</sup> (In China, the terms “general practitioner” and “family doctor” are used interchangeably. In this Article, we use “family doctor” for consistency.) PCPs include practitioners with varying levels of medical education, such as village practitioners who used to be barefoot doctors and those who have been medically educated through three- and five-year programs. Family doctors, on the other hand, are PCPs who have obtained three-year postsecondary or five-year university education and are certified in family medicine through family medicine training programs. Because family doctors are expected to provide higher-quality primary care than other PCPs, the central government announced the goal of providing two to three family doctors for every 10,000 people by 2020.<sup>23</sup> To meet this goal, the country will need around 300,000 family doctors. Currently, there are three major family medicine training programs

running; through these programs, PCPs and medical students can become family doctors. These programs are the post-transfer training, residency training, and designated family medicine undergraduate education programs. Even with these three programs, the challenge of producing an adequate number of qualified family doctors to meet the goal for 2020 remains a significant challenge.

In this Article, we first discuss the shortage of and changing trends related to family doctors in China. Then we compare the three training programs, examine the distributional challenges faced by these programs, and propose directions for further experimentation in the country. As educating and retaining doctors in primary care, particularly in underserved areas, is a challenge for most countries regardless of economic status, we hope that studying the Chinese situation can provide useful insights for those tackling this challenge in other parts of the world.

### Shortage of Family Doctors and Changing Trends

In China, there has been a significant increase in the proportion of family doctors among all types of licensed doctors and assistant doctors (i.e., those who have passed the national license examination), from 3.5% in 2005 to 5.6% in 2013 ( $P < .01$ ) (Figure 1).<sup>24–26</sup> This is admittedly a step forward in the training of family doctors. However, despite this increase, there is still a large number of PCPs who possess only a secondary education or less (23.0% in urban CHCs and CHSs and 95.0% in rural village clinics in 2013).<sup>25</sup>



**Figure 1** Percentage of family doctors among all types of licensed doctors and assistant doctors in China from 2005 to 2013. Data from 2006 to 2008 are not available. Sources: China Health Statistics Yearbooks for 2012 to 2014.<sup>24–26</sup>

In addition, although family doctors are being produced in China at an incredibly fast pace, the proportion remains unsatisfactory. Although the country had an absolute number of 145,511 family doctors in 2013, the proportion of family doctors to all types of licensed doctors and assistant doctors (5.6%) is far from optimal.<sup>25</sup> Based on public data, the country produced 35,717 family doctors between 2012 and 2013.<sup>24–26</sup> If we take an average annual production of 25,000 family doctors as a conservative estimate, the country is likely to produce 175,000 more family doctors by 2020. That would bring the total number to 320,511, exceeding the 300,000 goal. Even so, the proportion of family doctors to all types of licensed doctors would not exceed 11.0%. Meanwhile, the flight of experienced doctors from THCs is another significant challenge.<sup>27</sup> In the Guangxi province, 5,514 certified doctors left THCs between 2009 and 2011. This problem is further compounded by an increase in the average age of village clinic practitioners, which is over 50 for 300 village clinic practitioners in one county in the Yunnan province.<sup>28</sup>

## The Three Family Medicine Training Programs

### Post-transfer training program

Post-transfer training is a kind of retraining. It is applicable to those licensed doctors or assistant doctors who are already working at community health facilities, but are not trained in family medicine and hence not certified as family doctors. Trainees in this program spend one or two years—either full- or part-time—training in family medicine. This has been China's main approach to producing family doctors in a relatively short period. Problems encountered during the training process include time conflicts (between the time required for training and the trainee's own work duties at the home facility) and a significant reduction in remuneration while attending the program (by over 60.0% in some places).<sup>29–32</sup> These factors can impede the morale and motivation of trainees.

### Residency training program

After completing a five-year undergraduate program, graduates with bachelor's degrees in medicine are eligible to apply for residency training in family medicine. This is a full-time three-year program aimed at producing specialized family doc-

tors. It requires trainees to take theoretical courses, participate in clinical rotations at accredited teaching hospitals, and practice in community health facilities. Trainees who pass the summative assessment at the end of the program receive certificates in family medicine. Currently, there are residency training programs in different places, including Beijing, Shanghai, Zhejiang, Fujian, Jiangsu, and Guangdong. All of these programs face difficulties in recruiting trainees due to the low pay and relatively high living expenses of big cities, where teaching hospitals are usually located.<sup>33</sup>

### Designated family medicine undergraduate education program

The aim of the national designated family medicine undergraduate education program is to produce qualified family doctors for rural areas. The program began in 2010; it recruits high school graduates to enroll in free university-level medical education programs. The government provides these students with free living accommodations and a stipend for daily expenses. In return, students agree to practice in designated rural towns for at least six years (if students violate this

agreement, heavy penalties are imposed). The program's full-time, five-year curriculum emphasizes family medicine, unlike the standard five-year university program. As of 2014, there were around 20,000 recruited students in 68 medical schools nationwide.<sup>34</sup> The majority of these students come from poorer, rural backgrounds. Survey data revealed that up to 70.0% were not willing to work in primary care settings,<sup>35</sup> and 80.0% would consider breaching the agreement.<sup>36</sup> A quarter felt discriminated against as students in a designated program, and nearly two-thirds regarded the agreement as a contract of servitude.<sup>36</sup> Before China expands this program nationwide, we strongly recommend further research into the causes of trainees' poor commitment to family medicine.

More details on and differences between the three programs are summarized in Table 1.

### Distributional Challenges

Family medicine education programs in China face three major distributional challenges. First, the educational

Table 1  
Differences Between the Three Major Family Medicine Training Programs in China

Characteristic	Program		
	Post-transfer training	Residency training	Designated family medicine undergraduate education
Prospective trainees	Licensed doctors or assistant doctors who are currently working at community health facilities	5-year undergraduate program graduates with bachelor's degrees in medicine	High school graduates who are going for higher education
Duration of training	1–2 years, full- or part-time	3 years, full-time	5 years, full-time
Training curriculum	At least 1 month of theoretical learning, 10 months of clinical training <sup>a</sup> in secondary or tertiary care hospitals, and 1 month of practice in community health facilities	3 months of theoretical learning, 2 years of clinical training <sup>a</sup> at tertiary care hospitals, and 6 months of practice in community health facilities	3.5 years of theoretical learning, 1 year of clinical training <sup>a</sup> in a tertiary care hospital, 2 months of clinical rotation in a secondary care hospital, and 2 months of practice in community health facilities
After training	The majority return to their previous posts and may become trainers at their community health facilities	Some become family doctors, and some become specialists in other fields	At least 6 years of practice in designated rural towns (or 3 years of follow-up residency training which count toward the agreed-on 6 years of practice)

<sup>a</sup>The clinical training usually includes rotations in internal medicine, general surgery, obstetrics–gynecology, pediatrics, first aid or emergency medicine, and/or geriatrics. However, as there are no nationally standardized curricula, syllabi vary greatly across different provinces or schools, even within the same program.

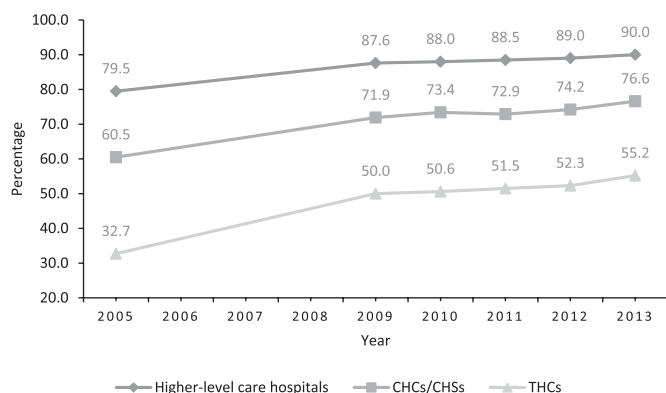
qualifications of PCPs vary greatly between rural (THCs and village clinics) and urban (CHCs and CHSs) regions. Figure 2 shows the changing percentage of licensed doctors and assistant doctors with three or more years of medical education across all tiers of health care facilities. From 2005 to 2013, although there was a significant increase at urban CHCs and CHSs (from 60.5 to 76.6,  $P < .01$ ) and rural THCs (from 32.7 to 55.2,  $P < .01$ ), the percentage of licensed doctors and assistant doctors in urban areas has remained higher than that in rural areas by at least 20.0% each year, and in both urban and rural primary care facilities, this percentage remains far below that of licensed doctors and assistant doctors in hospitals.<sup>24–26</sup>

As shown in Figure 3, in 2013, among the village practitioners who worked in rural village clinics, less than 5.0% had three or more years of medical education.<sup>24–26</sup> Despite an overall growing trend of qualified practitioners (see Figure 2), poorer, rural areas are generally lagging behind urban regions. The higher average age of village practitioners (see above) along with a decreasing number of young practitioners joining the workforce exacerbates this issue.<sup>28</sup>

Second, apart from the general lack of qualified family doctors throughout the country, notable disparities in the number of family doctors for every 10,000 people exist among different regions. China has three geographical regions—eastern, central, and western. Eastern China covers the rich coastal

provinces; western China abounds in poorer, interior cities; and central China is a mix of both. In 2013, the eastern region achieved a ratio of 1.51 family doctors for every 10,000 people, which is nearly double that of the central and western regions (0.70 and 0.86, respectively) (Table 2).<sup>25</sup> This regional disparity in the ratio of qualified practitioners partially contributes to the health inequities between the richer and poorer areas.<sup>37</sup>

Third, after nearly three decades of a hospital-driven system, better-educated doctors are most likely going to prefer to work in hospitals, which offer a lucrative career path with higher pay and social status than community health facilities.<sup>38–40</sup> For example, the percentage of hospital doctors who had three or more years of medical education was nearly 90.0% in 2013, as compared with 76.6% and 55.2% of licensed doctors and assistant doctors, respectively, in urban- and rural-area primary care facilities.<sup>25</sup> In China's commercialized health care system, hospitals (which have more resources) compete with primary care facilities (which have fewer resources) not only for patients but also for qualified medical professionals. This results in a cycle where health resources are diverted to the hospitals, which then are able to attract more qualified medical professionals and patients. And frequently, family medicine trainees will leave their training programs and go to work in a hospital and become specialists in other fields.



**Figure 2** Percentage of licensed doctors and assistant doctors with three or more years of medical education across all tiers of health care facilities in China from 2005 to 2013. Data from 2006 to 2008 are not available. See main text for more information on higher-level (i.e., secondary or tertiary) care hospitals, community health centers (CHCs), community health stations (CHSs), and township health centers (THCs).

Sources: China Health Statistics Yearbooks for 2012 to 2014.<sup>24–26</sup>

## Looking Forward: Recommendations for Future Experimentation

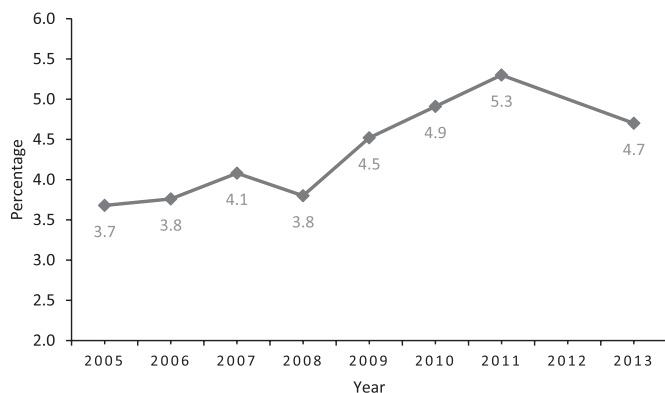
### Distributional imbalances and workforce shortages

Distributional imbalances and shortages in the health workforce are global problems, faced by many countries including developed ones.<sup>41</sup> In the United States and Canada, 20.0% of Americans and 24.0% of Canadians living in rural and remote areas are served by only 9.0% and 9.3%, respectively, of the physician workforce.<sup>42,43</sup> Bridging the gap between richer and poorer regions and attracting practitioners to join family medicine are crucial measures for addressing this disparity. Traditional approaches for addressing this disparity have focused primarily on increasing training capacity and retraining current practitioners. A different approach involves providing attractive incentives that encourage practitioners to work in primary care, and more desirably, to work in remote, rural areas. It is also important to use a combination of intervention strategies (rather than a single one) that addresses factors that influence doctors' career choices, which requires multisector collaboration, as recommended by the WHO.<sup>41</sup>

Additionally, evidence from Australia, Indonesia, and Thailand has shown that health care providers with a rural background are more likely to practice in rural areas, as compared with their urban counterparts.<sup>41</sup> Adopting a student selection policy that considers the student's place of origin and career intent may help to recruit potential candidates who plan to serve in remote areas. Alternatives to this would involve establishing more medical schools or satellite campuses in rural areas and/or providing opportunities for more students to have a rotation in a rural practice.<sup>44</sup> Although the designated family medicine undergraduate education program in China has adopted similar strategies, further incentives are required to maintain and strengthen trainees' commitment and improve the retention rate in underserved areas. Raising remuneration, improving living conditions, clarifying terms of promotion, and promoting community recognition and respect are effective starting measures.<sup>41,44</sup>

It is worth noting that effective incentives are highly context dependent. Before





**Figure 3** Percentage of village practitioners who worked in rural village clinics with three or more years of medical education in China from 2005 to 2013. Data from 2012 are not available. Sources: China Health Statistics Yearbooks for 2012 to 2014.<sup>24–26</sup>

implementing further policy changes, it is advisable to carefully study and collect evidence on the effectiveness of potential intervention packages. To do this, the WHO recommends a technique called the discrete choice experiment (DCE), which has been extensively applied in health care research.<sup>41</sup> The DCE can evaluate doctors' preferences and determine the factors that influence their decisions about whether to work in primary care or rural areas. The DCE helps researchers and policy makers get a better understanding of doctors' career choices, which is useful for the design of effective recruitment and retention interventions. Based on previous DCE studies, successful interventions usually incorporate financial, educational, and organizational incentives, and addressing doctors' needs and expectations is key to an intervention's success.<sup>41</sup> The World Bank provides a detailed guide on how to conduct a DCE study, and we recommend using this technique in future experimentation.<sup>45</sup>

### Content and quality of training

To meet the emerging health care needs of a big nation, China is eager to increase its pace in training a sufficient number

of family doctors on a nationwide scale. Apart from the vast number of family doctors required, the content and quality of their training are of great concern. Enrolling trainees into family medicine training programs with primarily subspecialty-driven and disease-centered curricula is problematic for current practitioners, medical graduates, and university students in the designated family medicine undergraduate education program, as excessive exposure to complicated cases in hospital wards results in a lack of understanding or misinterpretation of family medicine among trainees.<sup>46</sup> These misguided ideas—for example, the perception that family medicine is just a combination of different subspecialties or the notion that traditional Chinese medicine could replace family medicine—further complicate the situation.<sup>47</sup>

By 2010, of the 128 tertiary education institutions that offered a clinical medicine program, only 63 (49.2%) had an "Introduction to Family Medicine" course, with 49 of those (77.8%) offering it as an elective.<sup>47</sup> Furthermore, only 12 (19.0%) of these 63 included clinical practice opportunities in their curricula.

Although there has been an increase in the number of designated university training programs for rural areas, these programs have been criticized for being ineffective in fostering students' willingness to take up long-term primary care posts.<sup>35,36</sup> More community-based, primary-care-oriented curricula need to be developed to enhance the quality and effectiveness of training programs. Evidence shows that more exposure to primary care practice and role models in the field would have a positive impact on students' willingness to go into primary care, as well as on the recruitment and retention of qualified personnel in primary care.<sup>48,49</sup> Further, socioeconomic conditions and disease patterns vary greatly across different regions. Education and training programs should be tailored to fit local contexts, and regular and rigorous evaluations of these programs should be in place.

Finally, medical education is a lifelong learning process, and self-motivated learning is critical to staying abreast of medical knowledge. Trainees should be made to understand the significance of self-motivated learning, and assistance should be in place for them to tackle obstacles to self-motivated learning, including language barriers. We recommend providing long-term access to up-to-date learning materials for family doctors and preparing these materials in a user-friendly way.

### Conclusions

In China, the progress the country has made toward establishing a family-medicine-led primary care system is promising, but many challenges still remain. Geographical imbalances in the supply of licensed doctors and assistant doctors persist nationwide. Among medical graduates, the common preference for working in hospitals, which provide specialty care, also poses a challenge. Intervention packages that combine student selection policies that look at place of origin and career intent with other incentive strategies are worth implementing. For family medicine education and training, more community-based, primary-care-oriented curricula are needed to ensure good-quality programs and prevent a distorted understanding of family medicine. Adequate clinical exposure and regular,

Table 2

### Regional Differences in the Ratio of Family Doctors for Every 10,000 People in 2013

Group or ratio	Eastern China	Central China	Western China
Population <sup>a</sup>	55,850	42,511	36,428
Family doctors	84,464	29,674	31,373
Ratio of family doctors for every 10,000 people	1.51	0.70	0.86

Source: China Health Statistics Yearbook 2014.<sup>25</sup>

<sup>a</sup>Population is given in units of 10,000 people (i.e., 55,850 = 558,500,000 people).

rigorous evaluations are other key elements required to enhance the quality of training.

Now at a critical crossroads in its efforts to provide family doctors to its citizens, China should strike a balance in the distribution of family doctors between the richer and poorer areas to ensure equity. Post-transfer training programs should be further refined to upgrade experienced PCPs who have received less formal education. Residency training programs may be more applicable in developed regions where inhabitants are likely to have a higher demand for quality care. For all three programs, clinic-based teaching, quality of training, and measures to retain these doctors in primary care, especially in rural areas, should be given much more emphasis. Nevertheless, flexibility should be allowed to tailor programs to fit local contexts.

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