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Are We There Yet?

The Long Road to Eliminating Undernutrition in Rural China's Schools

REAP Brief #118





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Are We There Yet?

The Long Road to Eliminating Undernutrition in Rural China's Schools



The Long Road to Eliminating Undernutrition in Rural China's Schools

It's lunchtime at Yu Wang Primary School in rural Shaanxi Province, and crowds of students clasp bowls of plain noodles, garnished with the occasional pickled vegetable. This is their diet, day in and day out. None of the bowls contain even trace amounts of meat, a crucial part of the diet that most rural families regularly ignore. Scanning the courtyard, full of skinny, pale, and listless children, it is not hard to see why rural students are struggling. As education problems go, this is as basic as they get: How can kids learn if they aren't healthy?



A typical student diet consists almost entirely of starches.

Due to their poor diets, children in rural China often suffer from iron deficiency anemia (IDA), one of the world's (and China's) most prevalent public health problems. Affecting hundreds of millions of people worldwide, children in developing countries are most at risk. In children with anemia, hemoglobin production



Children in rural China often suffer from iron deficiency anemia due to their poor diets.

slows and limits the amount of oxygen that red blood cells carry to their bodies and brain. This can lead to fatigue and can stunt physical development. Even more worrisome, studies link anemia with irreversible cognitive impairment and altered brain function. Hence, anemia is doubly dangerous because it can seriously damage both the body and the mind.

If children in rural China are to take full advantage of the already-limited educational opportunities they are offered, their ability to attend school and to learn must not be further disrupted by poor health. While there are thousands of government entities, private organizations, and research institutions in China and around the world that are dedicated to solving problems for vulnerable populations, none have conducted extensive experiment-based research on anemia in rural China. In light of this knowledge gap and the consequences of letting the problem of student undernutrition go untreated, REAP launched a massive effort to:

- 1) Understand the severity and pervasiveness of anemia in rural China;
- 2) Determine whether a link exists between student nutrition and academic performance;
- 3) Identify policy-relevant solutions for combating poor student nutrition, and
- 4) Communicate our proven solutions and objective study results directly to policymakers.

REAP: First on the Scene

Location	Year	Anemia Rates
Shaanxi	2008	38.3%
Shaanxi	2009	26.2%
Ningxia	2009	16%
Qinghai	2009	40.9%
Gansu	2010	20.6%
Ningxia	2010	14.1%

Table 1: Anemia is a widespread epidemic in rural China.

We broke new ground in our quest to understand undernutrition in rural China and its impact on school performance in 2008 by studying nearly 4,000 primary school students in Shaanxi, one of China's poorest provinces. Our baseline survey revealed that nearly 39%—or nearly 4 out of every 10 students—in rural Shaanxi elementary

schools were anemic (Table 1). Furthermore, the pilot project revealed that anemic students scored significantly lower on standardized tests and were also more likely to be shorter than their non-anemic peers.

To show that anemia was not just an isolated problem, from 2008-2010 REAP went on to test an additional 14,000 primary school students across rural Shaanxi, Ningxia, Qinghai and Gansu. We found consistently high anemia rates across China, ranging from 14% to 41% (see Table 1). Despite its prevalence, anemia is not easily recognizable, so educators and policymakers alike have largely overlooked it. With over 20 million anemic children in China suffering from the disease and falling further behind their peers, we knew we had to act quickly.



Good Nutrition Leads to Good Academic Performance

After our initial baseline survey in Shaanxi, we began by randomly assigning schools to treatment and control groups. In one group, we developed and distributed parental training materials to teach parents about the anemia problem. In another, we distributed daily multivitamins to students in the classroom. Another group of students received neither training nor vitamins, and served as a control group. By comparing the improvement of each intervention group relative to the control, we would be able to see if either strategy would be effective in reducing anemia and improving student performance.

The final evaluation survey in 2009 revealed that providing parental training had no impact on student health or grades, but that multivitamins containing iron are very powerful weapons against anemia. Giving students daily vitamins not only reduced their anemia rates but also raised their scores on a standardized test by almost six points.

These results were so compelling that we immediately began designing subsequent research projects so we could further understand the anemia problem and develop effective policy recommendations to help eradicate the condition.

Identifying Policy-Relevant Solutions: Five Lessons Learned

Over the past four years, REAP has tested various interventions in an attempt to help policymakers more effectively address the problem of undernutrition and anemia in China's rural schools. Each intervention was carefully designed to be easily scaled-up and implemented by government leaders if proven effective. Thus far, the results of our extensive project work have shed much light on which interventions hold the most promise.

1. Eggs Alone Don't Work

Partly in response to REAP's research on undernutrition and anemia, some school districts in rural China have begun to



Eggs, although nutritious, are ineffective against anemia because they contain almost no iron.

provide every student with one egg (or a glass of milk) a day with the goal of boosting both health and educational performance. To test the effectiveness of this strategy, we surveyed 976 primary school students in Gansu province. We supplemented the diets of a randomly selected group of children with a single hard-boiled egg at school each day. Another group of children did not receive any eggs, and served as our control group. By the end of the study, we found that students who received the daily egg were no better off in terms of school performance or anemia status relative to students in the control schools. How could this be? Despite being nutritious foods, eggs and milk contain almost no iron, and are thus ineffective against anemia. We were quick to report our findings to top government officials in an effort to redirect resources away from eggs towards more effective strategies like vitamins.

2. Parental Training Doesn't Work

As part of our initial 2008-2009 study of students in Shaanxi, we sent a group of students home with a letter to their parents describing anemia, its harmful effects, and ways in which anemia can be prevented or treated. Another group of children did not receive any information about anemia, and served as the control group. At the end of the school year, children whose



parents received letters still had the same rates of anemia and the same level of school performance as before. It turns out some parents did not recall receiving the letter, had forgotten about its contents, or did not understand the letter.

To overcome these issues, we tried summoning parents to a mandatory meeting with health professionals who verbally delivered a carefully scripted set of information about anemia. This 2009-2010 study of 1,579 primary school students in Shaanxi produced the same result—simply training parents had no impact on anemia and school performance. Increasing the number of parental training meetings in a third study of 929 primary school students in Ningxia also had no impact. Perhaps the meetings are too short for parents to internalize the information. Or it might be that the “opportunity cost” of attending was too high. In fact, we observed that around 40% of parents in Shaanxi chose not to attend the meetings, later telling us that they were “Too busy!” Whatever the reason, we are convinced that parental training is not the key to helping children with anemia.



A handful of parents in rural Shaanxi gather to learn about anemia.

3. School Lunch Subsidies Don't Work

Besides reaching out to parents, we also tried distributing food subsidies to principals as part of our effort to combat anemia. This strategy has been proven successful in other settings, including Peru and South Africa. Would food subsidies also work

in rural China? We aimed to find out. In a 2009-2010 study of 3,553 primary school students in Ningxia and Qinghai, one group of school principals was given training about the causes, dangers, and treatments for childhood anemia, as well as a subsidy to be used for overcoming anemia among students at the school. Another group of school principals was not given any training or subsidy. At the end of the school year, principals in the information and subsidy schools fared no better at improving student test performance or anemia rates in their schools than did principals in the control schools.



Food subsidies have little effect on reducing anemia in rural schools.



While the exact reasons behind the failure of food subsidies are unclear, possible reasons may include insufficient funding and poor facilities. Children need to eat a little over half a pound of lean meat every day to prevent anemia. This can be expensive, especially for resource-constrained families and schools in rural areas. Aside from the cost of the meat itself, families and schools must have a refrigerator in which to safely store the meat. Even with a refrigerator, the cost of maintenance can be expensive.

There is one other possible reason why school lunch subsidies may not be working: the difficulty of monitoring how funds are being used in remote rural schools. It could be that not all funds allocated for nutritious meals end up being used for that purpose. Diversion of funds combined with principals' general apathy or lack of understanding towards student nutrition could seriously undermine the effectiveness of subsidies for school lunches.

4. Incentives to Principals Work

We took a more creative approach to enlisting the help of principals that met with more success. As part of our 2009-2010 study in Ningxia and Qinghai, one group of principals was given both a cash subsidy to be used for overcoming anemia among the student body, and also an incentive (in the form of a significant financial reward) at the end of the school year if he was able to reduce anemia by that time. Another group of principals was not given any subsidy or incentives and acted as the control group. At the end of the school year, principals who received incentives had reduced student anemia rates in their schools significantly more than did principals in the control schools. While results can vary from school to school as principals seek out the most effective strategies, our findings nevertheless provide evidence that rewarding principals for improving student health and academic performance is effective and should be incorporated into the national dialogue on China's health care and education reform policies.

5. Vitamins Work Best: Our Golden Rule

Since its inception, REAP has been worried about children in rural China falling behind in school and the implications for



Vitamins costing only 4 US cents per day are the best solution to the anemia epidemic in rural China.

China's sustained development. We have been looking for the key to enhancing the physical and cognitive development of over 20 million children in China who struggle with undernutrition—and we think we have found it. The secret is encapsulated in multivitamins costing only 4 US cents per day.

To date, we have run no fewer than three large-scale, in-the-field randomized controlled trials in elementary schools across poor rural areas of Western China. The goal of these studies was to isolate and analyze the effect of providing multivitamins containing iron on student health and test scores. In all three trials, we found significant increases in hemoglobin levels (indicating better nutrition); in student health (in the form of lower anemia prevalence); and in student academic performance (in the form of scores on standardized tests) (Fig. 1)

Our evidence consistently shows that multivitamins are the best weapon against anemia. They are easy to monitor (teachers, principals, and/or parents can easily observe whether children are actually taking their daily vitamin), deliver a variety of essential vitamins and minerals (which can be difficult to obtain naturally through food in areas where diets are constrained by local markets and seasonal availability of produce), and there is little chance of resources being diverted as schools can directly receive and dispense vitamins rather than handle cash. Did we mention multivitamins only cost 4 cents a day?

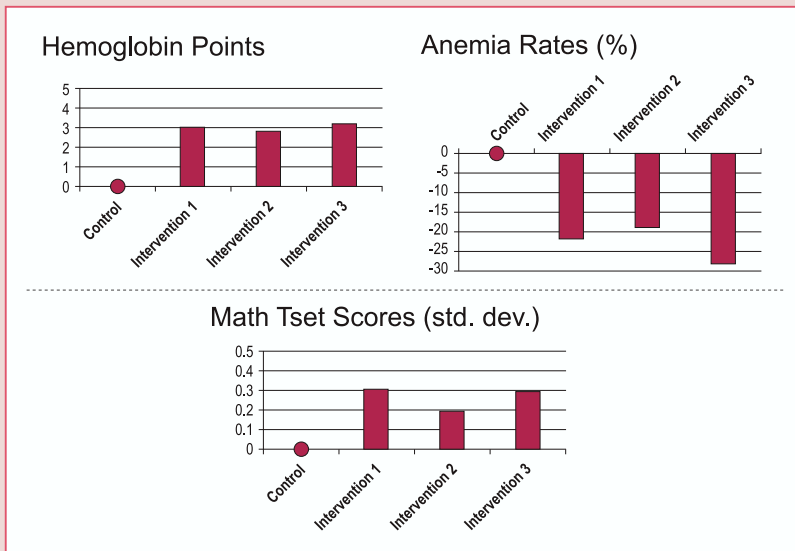


Figure 1: Taking vitamins increases hemoglobin levels; decreases anemia rates; and increases standardized test scores.

From Research to Policy Action

Given that policy relevance has always been a cornerstone of REAP's work, we were eager to share our key findings with policymakers. Through our collaborators at the Chinese Academy of Sciences, REAP sent its first official policy brief on undernutrition in schools to the State Council in December 2009. After learning about the stunningly high prevalence of anemia among China's rural school children, the government immediately responded with a policy directive urging local officials to pay more attention to student nutrition. In our second policy brief, submitted in January 2011, we reported the continuing severity of the anemia problem in China's rural areas, and also described the interventions we took to address the problem as well as their overall impact on student health and educational performance. Again, the government responded immediately, this time with a policy directive urging more concrete action in the area of student nutrition. In short, when provided with research-based evidence on the negative effects of anemia, China's top leadership moved to incorporate corrective measures into national policy.



Rural students lining up for a hot meal at school.

China's Rural School Nutritious Lunch Program serves as a prime example of the type of decisive action that can arise as a result of new and compelling research. Informed, in part, by the research REAP conducted and presented to Chinese officials, the government recently launched a new policy formally committing \$22.5 billion in funding to be used to improve the nutritional content of school meals between now and 2020. This is the equivalent of doubling the current school meal subsidy, raising it from 2.5 yuan per student per day to 5 yuan (or 79 US cents) per student per day.

Bearing in mind that vitamins only cost 4 US cents a day, this generous budget would theoretically allow for every rural schoolchild to receive a daily multivitamin, while still leaving plenty of resources for additional reforms. Following this logic, REAP recently wrote and submitted a third policy brief suggesting that the new funds be used for a daily vitamin+egg+milk program for rural students. This rich supplementation to their diet would go a long way to filling their bellies and giving them all of the micronutrients needed for a complete and balanced diet. The beauty of this program is that it is affordable (it costs less than 3 yuan, or 50 cents, per day) and it can be easily monitored by having each child sign for their egg, milk and vitamin.

Conclusions

Iron deficiency anemia is a severe and prevalent problem, stunting the growth and academic gains of children all over rural China. Indeed, REAP has successfully shown that when iron deficiency anemia is reduced among school age students, their nutrition, health and educational performance rises. While our interventions have shown that an egg a day, parental training, and school lunch subsidies have little effect on anemia, incentives to principals and, especially, multivitamins lead to improved health and significant increases in student test scores. Perhaps driven by China's growing demand for human capital, policymakers have been receptive to official REAP policy briefs and are exploring new strategies for improving nutrition among rural school-aged children. This is encouraging news. However, in their latest policy directive, they left the potential of multivitamins untapped in favor of less effective school lunch subsidies.

Four years after our pilot project, there is still more work to be done. The way we see it, solving China's anemia problem does not need to be a long and arduous process. With the right alignment of funding and investment strategies, many rural youth can easily be set free to take advantage of China's dynamic growth.



For more information about our many other projects to address rural education problems please visit:

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