

ORS Case Study

Madagascar

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I. Context: Madagascar today

With over 20M inhabitants living on ~580,000 km of land, the francophone/Malagasy island nation of Madagascar is one of the more populous nations in sub-Saharan Africa (SSA). Its population is similar to that of the broader SSA region in that it is skewed young and has a moderately high fertility rate. With a life expectancy of 66.7 years, over 10 years higher than the SSA average of 54.4 years, Madagascar's population is surprisingly health despite significant geographical/ infrastructure barriers, poverty and waves of political unrest. Its PPP-adjusted GNI per capita of \$824 is less than half that of the average for SSA (\$1,966), suggesting that the country is both poorer and healthier than many of its African counterparts (UNDP, 2011). Madagascar's population is currently predominantly rural (70% in 2010), but the rate of urbanization is substantial at 3.9% rate of change per year from 2010-2015 (Central Intelligence Agency, 2012).

Table 1: Key contextual information about Madagascar

Statistic	Estimate for 2011	Source
Total population	21.3M	(UNPD, 2011)
U5 population	3.3M (2010)	(Liu, et al., 2012)
Fertility rate	4.5 (mean # kids/ woman)	(UNPD, 2011)
Median age	18.3 years	(UNPD, 2011)
U5 mortality rate	57.5 / 1,000 live births	(UNPD, 2011)
HDI ranking	151 st / 187 countries	(UNDP, 2011)
GNI per capita	\$824	(UNDP, 2011)
Life expectancy	66.7	(UNDP, 2011)

The country is divided into 6 provinces which in turn are divided into 22 regions, 111 districts and >1,500 communes. Health services are provided at each of these levels, with the majority of primary care occurring at the lowest level. Infrastructural challenges are some of the most acute in SSA- with a total area of ~590K km, Madagascar is nearly twice the size of Arizona but with <10K km of paved roads, making many rural populations relatively inaccessible (Central Intelligence Agency, 2012).

In the 1980's, to provide health services in remote regions of Madagascar, the national health program dispatched 1,500 health aides to remote sites to establish what are now called Primary Care Centers (*centre de santé de base*, or CSBs) that would provide basic health services to communities. By 2004, 3,000 CSB's with either a health aide or nurse were operating, each serving a population of 10,000 (World Bank, 2009). However, this network only reaches 60-70% of the population; many people continue to travel >10km to get treatment (IRIN, 2012). Given the frequency with which cyclones hit and destroy infrastructure, including health facilities, it would take concerted investment to enable the entire population to consistently have access to health facilities- in 2003 the World Bank estimated the Madagascar's communes received <15% of the funds they needed to deliver on their health services (\$0.8 out of \$6.9 per capita), even including donor commitments.

Since its independence in 1960, Madagascar's natural disasters and periodic political turmoil have had a severely negative impact on its health programming. Between 1980 and 2010 alone, Madagascar suffered through 35 cyclones and floods, five periods of severe droughts, five earthquakes, and the rise and fall of three republics (World Bank, GFDDR, ENV Climate Change Team, 2011). A select set of events

from the past ten years, and their impact, illustrate the major contextual challenges Madagascar faces in improving their health system:

- **Late 2000:** Madagascar was struck by three cyclones in a three-month period, severely damaging 315 health facilities in two of the six provinces. 300K people were in need of emergency relief, resulting in the reallocation of government and donor funds.
- **2002:** As a result of December 2001's highly contested Presidential elections (which resulted in an 8-month standoff), many public services were discontinued. This resulted in an increase in the poverty rate to 73% and the extreme poverty rate at 62% of the population. The availability of basic medicines in rural health centers fell from 91% to 69%, and health service utilization declined from 50% to 36% countrywide (World Bank, 2005).
- **2009-present:** Protests over increasing restrictions on opposition press and activities resulted in Ravalomanana stepping down and the presidency was conferred to the mayor of Antananarivo, Andry Rajoelina. Numerous attempts have since been made by regional and international organizations to resolve the subsequent political gridlock by forming a power-sharing government. In the meantime, the US government refuses to recognize the new regime and cut off all foreign aid to the public sector. This resulted in the cancellation of numerous projects meant to address deficiencies in service delivery in the public sector. The country currently appears to be moving towards new elections in 2012 which may improve the situation going forward (Central Intelligence Agency, 2012). To date, this political crisis has hampered both economic progress and the ability of the public sector to provide services for its people. In 2010, health expenditure fell by 30% compared to 2009, and 214 community health centers shut down in January 2011. In 2012, health expenditure fell by another 50% (IRIN, 2012).

Given both the frequency and magnitude of these challenges, Madagascar is unlikely to improve on key development indicators in the very near term even with sizable investment. The World Bank invested >\$10M dollars to strengthen health facilities from 1999-2006, and because of the political turmoil and natural disasters, health access was worse at the end of that period instead of better (World Bank, 2008)

Despite poor access to health services and political unrest, over the last decade Madagascar benefited from a dramatic decline in its U5 mortality rate, from 176.2 per thousand live births in 1978 to 62.1 in 2001 (World Bank, 2012). We do not have sufficient data to definitively know whether diarrheal mortality declined, but a 2008 government survey noted that diarrhea, was the second leading cause for consultation at health centers.

II. Approach to the scale-up of ORS: NCDDP (1980s-early 1990s)

Madagascar's primary health care policy was established in 1978, with health aides in CSBs as the backbone of the public health system. Health aides receive less training than nurses but a sufficient amount to provide basic health care to the local population. In the mid-1990s, health aides slowly began to be replaced by nurses. Between 1980 and 1995, the number of physicians per 1000 population more than doubled from 0.099 to 0.272 (World Bank, 2012).

The private sector played a much smaller role in offering health services than it does today. Even as late as 1992, Madagascar had <200 pharmacies, the majority of which were private and in major urban centers in regions like Antananarivo (Saade & Blyth, 1992). Depots, small drugstores run by minimally trained personnel and authorized by the MoH, were established to address the country-wide shortage in pharmacies. By 1992, ~1,500-2,000 depots were operating, often close to health centers.

Within this health system and at the national level, diarrhea treatment was not at the forefront of the political agenda. By 1992, more than 10 years after the first primary health centers were established, the government lacked a National Policy for diarrhea to address the 12M under-five cases reported per year (Prins & Heise, 1992). The National Control of Diarrheal Diseases Program (NCDDP) had only four members. A large portion of the financing and implementation of diarrheal disease interventions was due to engagement from external donors. Included in this were radio campaigns and home visits promoting the local ORS product- ODIVA- and oral rehydration therapy prepared in the home, with many campaigns in the 80s and 90s. This promotion, the lack of cash that mothers had to purchase ORS and the poor availability of ORS sachets contributed to the high rates of home remedies being used today.

UNICEF was the primary external funder that supported efforts related to improving diarrhea treatment and care, though the majority of its funding went towards ORS supply. This helped meet a critical need- Madagascar had no ORS until 1988- when UNICEF helped fund a local manufacturer to produce ORS (branded as ODIVA)¹. UNICEF supplied free raw materials for 2M sachets, and the local manufacturer had a production capacity of 500K sachets per year, or <15% of the sachets required to meet the local need (Saade & Blyth, 1992). In addition to UNICEF's support on the supply side, WHO "sporadically" contributed funds, technical assistance and training materials, but not reliably enough to build critical knowledge and infrastructure on the ground (Prins & Heise, 1992).

In 1991, members of the government began to focus more on diarrheal disease, but as part of an integrated program. The NCDDP was incorporated into the Division of Maternal and Child Health and Family Planning (MCH/FP), whose Coordinator had an explicit goal to integrate case management programs across diseases (Prins & Heise, 1992) Because of the understaffing at national level, the head of the division also supported the decentralization of responsibilities. This gave districts more decision-making power in theory, but in practice made their lives harder because the funding flows were not decentralized along with the accountability (e.g. the taxes are collected by a more central agent and not always efficiently redistributed). For example, the Circonscription Medicale, Merina East, a facility that served 1M in the Antananarivo urban area, requested budget for 200K sachets of ORS but was never able to place the order because the funding didn't come through (Saade & Blyth, 1992). A smaller, urban dispensary in Merina East could only afford 200 sachets/month and so rationed their use and urged mothers to use sugar-salt solution (SSS) at home.

Another downside to the decentralization was the inconsistency in quality and content of training. Despite limited government funding and resources, by the 1990s, the national CDD program trained several hundred (<10% of total) health workers on theoretical diarrhea case management and prevention, while a much smaller number also received practical training (Prins & Heise, 1992). ORT corners, centers within health facilities with an explicit diarrhea focus, were set up in ~200 locations with assistance from UNICEF. Diarrhea training units were also established in nine hospitals. However, even at these diarrhea-focused ORT corners, an independent assessment revealed that health facilities rarely had the proper training materials on site (Saade & Blyth, 1992). Also, these gains were not to scale for the country, and as a result, most healthcare providers prescribed anti-diarrheals in addition to ORS (Prins & Heise, 1992).

¹ There is some debate on whether UNICEF's involvement was actually helpful for the local market, as their heavy subsidization made it hard for potential local manufacturers to compete.

ORS was technically supposed to be free in the public sector, but in actuality customers may have been charged procurement costs with a slight margin. The slight margin could potentially explain why health centers struggled to procure ORS- without funding and relying on slight margins, they may have had difficulty pre-buying the product to maintain stock. In the private sector in the capital, the cost was ~240-300 FMG (~\$0.12-\$0.16 based on 1991 midpoint exchange rate between USD-MGA).

III. Approach to scale-up of ORS: IMCI (1995-2000s)

In 1995, Madagascar became the first francophone country to adopt Integrated Management of Childhood Illness (IMCI). While difficult to disentangle government funding for this project versus others, and specific allocations to diarrhea-related activities, there are only a limited number of data points on financing. For example, while IMCI was rolling out, the World Bank began assisting Madagascar with its strategy for decentralizing health services delivery at the district and community levels in the early 2000s. Its total investment of \$13.6M in this specific area provided financial support for districts (43%), commodities (31%) and technical assistance (26%).

In terms of political engagement, a cholera epidemic in 2000 put diarrheal disease at the forefront of the political agenda and MoH made diarrhea treatment and prevention a priority.

Districts were responsible for training health facility staff in IMCI, and the central level IMCI focal point arranged for technical support if requested. By April 2005, ~60% of health workers had been trained in IMCI, a pre-service training program had been implemented and a curriculum for community health promotion was nationally approved (USAID, 2006). However, an external assessment team found that IMCI standards were inconsistently applied; for example, Cotrimoxazole was often used to treat simple diarrhea (USAID, 2006). In general, district-level managers were not properly supervising health facility IMCI activities, and had no guidance on how to monitor health workers at the primary health centers- or CSBs (USAID, 2006). The quality of IMCI implementation varied widely across districts in part because decentralization of finances resulted in financial inequities across districts.

Madagascar was innovative in its use of Behavior Change Communication (BCC) strategies to promote life-saving interventions to the public. For example, PSI hired graphic designers and layout specialists to design communications materials promoting point-of-use water treatment solution and long-lasting insecticide treated nets (LLINs) as part of social marketing campaigns for the aforementioned commodities. PSI did not receive funding for consumer-focused BCC or mobilization diarrhea treatment, and other efforts were primarily focused on communication materials for providers.

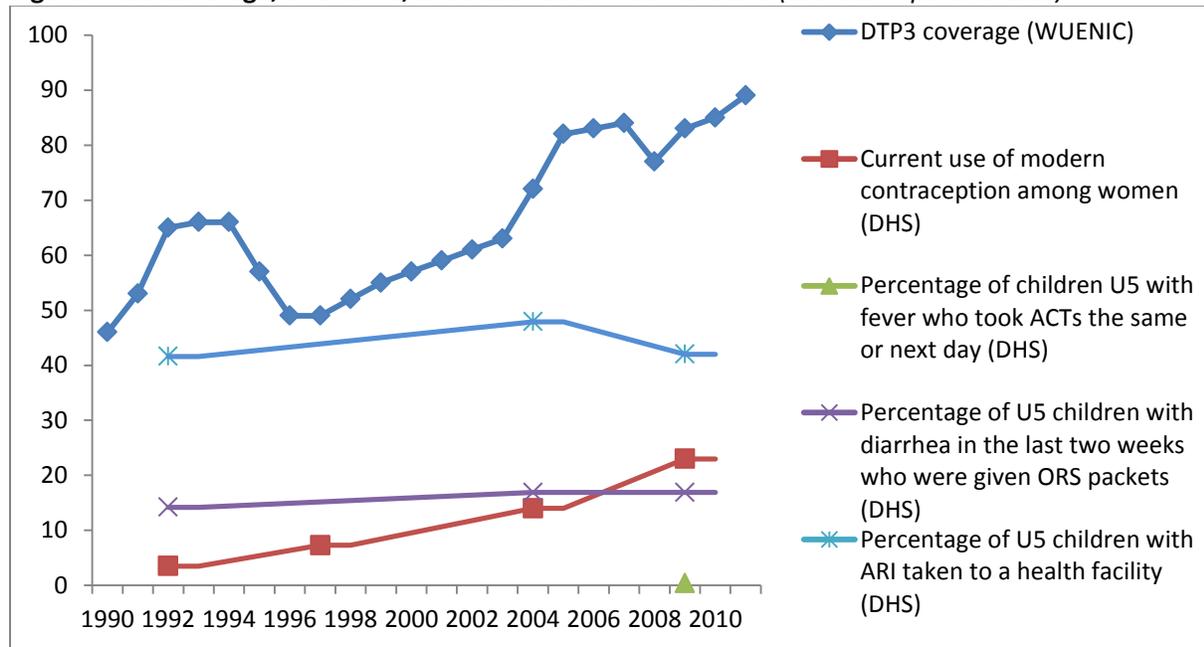
A large part of the financing of external partners was for commodity procurement. According to the original agreement between UNICEF and the Government of Madagascar, the Ministry of Health was supposed to assume funding of the ODIVA-producing local manufacturer by year 3, but the government struggled to meet this agreement due to severe budgeting constraints. ODIVA production eventually shut down and UNICEF procured low-osmolarity ORS from international sources. The international procurement functioned well in that sufficient supply could be obtained, but created supply issues when Madagascar entered into political conflict and foreign shipments became less reliable, as it did in 2009/10.

One would expect Madagascar's dramatic decline in U5 mortality would be associated with the scale-up of numerous commodities, but Figure 1 indicates an interesting bifurcation among a small

subset of health interventions. Specifically, taking a long-term view and ignoring the impact of the recent conflict, immunization (DTP3) and family planning products are increasing in coverage whereas treatment interventions are stable (with the exception of ACTs- where we don't have enough information). Family planning in particular has doubled its coverage in five years based on an approach that included the following key factors (UNFPA Africa, 2011):

- Promoting country ownership of goals and outcomes
- Improving logistics systems
- Deploying user-friendly software to manage commodities
- Integrating contraceptives with other commodities for integrated management
- Having a partner willing to fund procurement of contraceptives in crisis years (UNFPA)
- Developing a tailored strategy for the hard-to-reach and underserved populations (including outreach and community-based distribution)
- Increasing demand for contraception via media and other campaigns

Figure 1: U5 coverage, over time, of select health interventions (sources in parentheses)



Note: A two-period moving average trendline was applied to the DHS data

In 2009, the ORS coverage in Madagascar was less than half the global average at 16.9% according to DHS (though a 2008 PSI survey revealed a rate of only 8%). At that point, the stock-out rate had improved though was by no means sufficiently low- apart from supply chain interruptions during times of political conflict, ORS was available at 80% of sites (USAID, 2006). The two principle barriers to using ORS + Zn were a) 59% of caregivers not visiting any health facility when the child had diarrhea- neither public nor private, and b) among caregivers that sought treatment at public or private health facilities, few received ORS from health facilities (USAID, 2006). Lack of provider knowledge was somewhat of a contributor- by 2006, only 60% of healthworkers had been trained in IMCI despite the fact that it had been introduced in 101/111 districts (USAID, 2006). Clearly the product was suffering from poor demand both from caregivers and from healthworkers. According to the DHS 2008 survey, ~40% of episodes of

diarrhea are treated with home-based fluids or RHF, which may explain why some children never made it to the health facility and why mothers demanded a different kind of treatment when they arrived at the facility. However, limited data are available to track whether families prepare and use these interventions correctly, either in Madagascar or more broadly, so we cannot be certain of their effectiveness.

IV. ORS scale-up alongside zinc: POUZN (2008-2010)

The Point-of-use Water Disinfectant and Zinc Treatment project (POUZN) was initiated in Madagascar to introduce and scale up zinc usage from 2008-2010. Given the consistently low utilization of ORS, significant efforts to scale up ORS were required at the same time. The zinc scale up program had three primary funders: USAID through POUZN (\$1.5M), UNICEF (a portion of its ~\$4.9M annual budget went to procurement of unflavored low-osmolarity ORS and a taste-masked, dispersible zinc tablet for public sector) and the Madagascar government (\$\$ unknown).

POUZN worked to develop two improved ORS + Zn products for a 2009 launch: *ViaSûr* and *HydraZinc*:

- ***ViaSûr*** is a subsidized diarrhea treatment kit (DTK) that contains ten 20mg tablets of zinc sulfate, two sachets of orange-flavored ORS, and pictorial/ Malagasy instructions for low-literacy target populations. This kit was made available exclusively through rural community-based sales agents, supervised by NGOs, for the subsidized price of 500 ariary (US\$0.25) for poor, rural areas at the request of USAID. *ViaSûr* was initially available in 225 communes across 45 districts where diarrhea incidence was known to be high.
- ***HydraZinc*** contains the same ten 20mg zinc sulfate tablets, strawberry-flavored ORS, and pictorial/ French instructions. It is distributed nationwide through the commercial pharmaceutical system and at rural drug counters known as *depôts de médicaments (dépôts)* at a cost recovery price of 2,000–2,500 ariary (US\$1.00–1.25), per an agreement with USAID not to subsidize the product. *HydraZinc* was positioned as a more up-scale, premium product. It was made available in all 111 districts, via PSI Madagascar’s established private sector distribution network.

The development of two different products with tailored pricing and instructions reflected some awareness to different consumer segments within Madagascar, based on consumer research on willingness-to-pay and flavor preferences. However, it is unclear whether any evidence was collected to validate whether other product features (e.g. symptom relief, amount of ORS per packet) were evaluated for their ability to help increase uptake and generate demand. Additionally, these products were targeted to private sector distribution, where <1/3 of caregivers seek care (USAID, POUZN, 2010) (USAID, 2006). The public sector received unimproved ORS + Zn product from UNICEF, which was distributed across 90/111 districts.

In the private sector, POUZN promoted *ViaSûr* via NGOs, leveraging their networks of community-based distributors (CBDs) who both promoted use and sold a “basket” of child health products to households within their own rural communities. This community-based distribution program was centered in 225 communes with high rates of diarrheal disease located in 45 (out of 111) districts that are active in the USAID’s bilateral SantéNet2 “Champion Community” program (see Figure 2). In the SantéNet2 program, 11,000 healthworkers and their communities set health goals and are rewarded when those goals are reached. POUZN’s community-based program also included a number of other NGOs outside of the SantéNet2 partners in order to extend the reach of the product as far as possible into other rural communities. This distribution system ensured that the program reached the poorest

Among the private sector providers serving a wealthier clientele, PSI's team of nine medical doctors (detailers) visited pharmacists and dépôts to supply product samples and provide point-of-purchase promotional and educational materials. As of 2010, the distribution network for *HydraZinc* included 893 registered pharmacies and dépôts and 377 private dispensaries, each of which stocked PSI products. Using these nationwide pharmaceutical wholesale and retailer networks, *HydraZinc* was made widely available in urban areas of Madagascar, reaching 95 percent of the country's pharmacies. Unfortunately, neither of the promotional efforts within the private sector translated into a dramatic increase in ORS or zinc use.

The marketing campaign was generally thorough and thoughtful, but delayed relative to the other interventions and only just beginning when the program evaluation commenced. Thus preliminary results were as dismal as the provider promotion outcomes, though future data may suggest greater success. Based on formative research on care-seeking behavior, communication efforts targeted both caregivers of children under five and the providers who recommend child health products (pharmacists, doctors, and community-based distributors or CBDs). In order to meet the communication objectives, two separate messages and sets of IEC materials were developed: one to educate providers about the new protocol and convince them that ORS + Zn was as effective as the antibiotics or anti-diarrheals that they had previously recommended, and the second to introduce the new treatment to caregivers and suggest that they visit their provider for more information and/or treatment.

In rural poor areas, interpersonal communication by CBDs was one of the primary communication vehicles. The POUZN team developed a counseling card/treatment guide (algorithms for treating diarrhea, respiratory infections, and malaria) to assist in this process. In addition, four mobile video unit teams circulated through rural areas with messages focused on water treatment, improved hygiene practices and diarrhea treatment.

For the wealthier urban populations, *HydraZinc* was initially promoted via mini-launches with regional units of the Madagascar Medical Association. This was a 'stop-gap' solution to solve for the fact that political instability resulted in major barriers to launching media campaigns. Several months after *HydraZinc* became available, a mass media campaign finally commenced in April 2010 with both radio and television spots broadcast on four government-owned national and regional television and radio channels as well as three private television channels in Antananarivo and four privately owned regional radio and television channels. No formal training of providers or pharmacists took place.

The delays in marketing had a dramatic impact on the reach of the campaign. The POUZN-funded household survey showed that only 23 percent of caregivers of children under five years had heard any message on diarrhea treatment over the past three months and only 8 percent had heard about ORS in the past three months. While the delays in the marketing campaign likely played a role in this low impact, the rural zones were likely most drastically affected due to 1) Delays in ViaSûr rollout, and 2) the limited reach of news radio which is accessible to only ~50% of rural families.

V. Conclusion

The disappointing result of this scale-up effort- an increase in ORS usage from 16.9% to 21% over 2 years is not entirely unexpected given some major flaws in the scale-up plan. However, these results may be understating the impact in later years because the evaluation of the most recent scale-up occurred during, not after, implementation of select components. That said, there are some key conclusions to draw from Madagascar's scale-up, in particular:

- Context played an incredibly large role in determining the degree of success or failure to scale. Madagascar's 2009 conflict resulted in reduced funding, supply chain interruptions and marketing delays. In addition, the poor infrastructure of the health system provided a 'ceiling' from the start of what was achievable, simply because large swaths of the population were inaccessible to the health system.
- Supply and demand-side interventions were frequently out of sync with each other due to delays on both sides. Though delays were frequently attributable to the above contextual factors, both the chosen 'mass media' marketing strategies and the lack of local product sourcing reduced the amount of flexibility in the scale-up program and made it less resilient against contextual complications
- Caregiver preferences were ignored until the most recent POUZN scale-up attempt—data from the 2009 DHS survey indicating that 59% of episodes do not reach a facility were indicative of how critical demand-side interventions are, yet this has been an area of neglect until very recently

In sum, this case study supports our hypothesis that successful scale-up relies on strong, concurrent interventions across critical demand and supply-side factors. While Madagascar has made enormous progress over the years in assuring supply of ORS and in training providers, these successes alone are insufficient to demonstrably change coverage. Madagascar's failure to successfully implement interventions across all the key scale-up components resulted in disappointing, incremental gains.

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Appendix 1: Evaluation of scale-up efforts across six key components in Madagascar

Component	Degree of success (H/M/L)			Drivers of success/failure
	NCDDP	IMCI	POUZN	
Development of improved product (including pricing)	L	L	M	<ul style="list-style-type: none"> • Until 2007, product was unimproved ORS • Pricing of treatment kits cited as barrier to use, particularly for the poor • POUZN conducted basic consumer segmentation, yielding two products with flavor improvements, co-packaging, tailored instructions and price points • Did not conduct consumer research to validate assumption that flavoring, co-packaging, instructions and price points were major drivers of uptake (rather than symptom relief, dosage, etc.) • Even after improved products introduced via private sector in 2007, the >2/3 of population that use the public sector continued to receive unimproved ORS
Marketing campaign	L	L	L	<ul style="list-style-type: none"> • Marketing prior to 2000's focused on both ORS and ORT • During POUZN scale-up, delays in mass media campaign compromised efforts to reach caregivers
Improving private provider knowledge	L	L	L	<ul style="list-style-type: none"> • Modest distribution of ORS sachets in private sector in early 90s, but unclear whether there was any explicit campaign • POUZN provided targeted training for CBDs in 225 poor, rural communes and doctors/pharmacists in higher-end communities • POUZN did not have time to conduct provider research to assess major reasons why ORS + Zn not usually recommended • Despite training, a 2010 'mystery shopper' survey found <5% recommended ORS + Zn when confronted with case of uncomplicated diarrhea- suggesting that training failed to address major barriers to recommending ORS + Zn
Improving public provider	L	M	M	<ul style="list-style-type: none"> • No national policy until mid-1990s • Lack of central coordinated IEC function led to inconsistent quality of public provider training

knowledge and increasing supportive supervision				<p>until mid-1990s</p> <ul style="list-style-type: none"> • After almost 10 years of training, by 2005 only 60% of health workers were trained in IMCI • Application of standards inconsistent due to decentralization of health system responsibilities • Understaffing led to poor supervision • Ongoing decentralization resulted in poor role clarity among local supervisors • Providers still more comfortable/prefer antibiotics even after education on ORS + Zn, but no systematic provider research conducted to understand why
Increasing availability of supply	L	M	M	<ul style="list-style-type: none"> • No local supply until 1988- required external donor to fund • Local supplier under-delivered relative to local demand (only meeting 15% of need) • Local supplier shut down in early 2000s, but major progress in getting sufficient supply to health facilities (20% stockouts in facilities surveyed in 2005) • Unable to source locally in last 10 years, resulting in delays and unfavorable pricing
Financing of scale-up	L	L	L	<ul style="list-style-type: none"> • Overreliance on external donors to drive the diarrhea prevention and treatment program • Local facilities did not have budget to purchase ORS through the 1990s- forced to ration or recommend alternatives to caregivers • Natural disasters and political conflict resulted in repurposing of funds to rebuild destroyed health infrastructure—contextual factors make even maintaining a baseline expensive • POUZN’s project implementation phase (2009-2010) too short for realistic impact, and had insufficient investment from external and government funders • Financing sometimes specifically tied to procurement or private sector, compromising flexibility of scale-up strategy