

# Scaling up rectal artesunate in a community-based initiative in Zambia: Final results from MAM@Scale

The MAMaZ Against Malaria (MAM) and MAM@Scale projects aimed to reduce preventable deaths from severe malaria by introducing and expanding the availability of an innovative pre-referral intervention at community level in remote rural districts in Zambia over the period 2017-2021.

Quality assured 100 mg rectal artesunate (RAS), a cutting-edge pre-referral intervention for young children with suspected severe malaria, was first introduced in Zambia in a 2017 pilot project. Administered at community level by trained Community Health Volunteers (CHVs), RAS helps to stabilise patients who live some distance from a health facility, buying essential time while they are transferred to the facility for treatment.

The pilot was designed and supported by the MAMaZ Against Malaria project working in partnership with government. MAM@Scale, a successor project, supported the subsequent scale-up of RAS, ensuring that the roll-out was grounded in a solid evidence base. By 2021, RAS was available in ten districts and the National Malaria Elimination Centre (NMEC) had begun the process of scaling up the innovation to a further 26 districts.

By the end of the project, MAM@Scale's ten intervention districts showed a reduction in severe malaria case fatality rates among young children. This result provides evidence of the effectiveness of RAS administered at community level in a pre-referral context, including in the 'real world conditions' that characterised Zambia's initial scale-up to ten districts.



Two children who received RAS from trained CHVs and made a full recovery from severe malaria, Serenje District

## SUMMARY

- RAS was introduced in a single district of Zambia in 2017. By 2021 the product was available in ten districts, covering a population of 900,000, and due to be rolled out to a further 26 districts.
- MAM@Scale contributed to a reduction in reported severe malaria case fatality rates in 10 intervention districts.
- The intervention improved severe malaria case management by health workers and tackled underlying health systems challenges.
- It was grounded in a community-driven approach led by CHVs that addressed multiple barriers to accessing basic services, demonstrating a 'real world' public health intervention to combat severe malaria.

## Background and Context

Malaria is one of the most severe public health problems worldwide, with 627,000 people dying from the disease in 2020, 95% in Africa and 80% of these children.<sup>1</sup> Malaria is endemic in Zambia, with the country's entire population of 18.4 million people categorised as highly susceptible. An estimated 8,946 malaria deaths<sup>2</sup> were reported in 2020<sup>3</sup>, with many fatalities occurring among children whose lower immunity makes them particularly vulnerable to malaria. As in many other countries in the region, rural communities in Zambia face multiple barriers in accessing basic health services. Household and community delays in responding to the danger signs of malaria in children can result in cases quickly turning into severe malaria which can carry a high case fatality rate (8% in the Zambia RAS pilot).<sup>4</sup> Bringing health services closer to communities is important in this context.

A 2009 study in Ghana, Tanzania and Bangladesh<sup>5</sup> found that RAS significantly reduced mortality and

### BARRIERS TO TIMELY USE OF BASIC HEALTH SERVICES IN RURAL ZAMBIA

- Lack of reliable health information
- Long distances to health services
- Challenging terrain
- Lack of available and affordable transport services
- Financial constraints
- Low male involvement in family health decisions
- Limitations on women's capacity for independent decision-making
- Lack of social support for women, including gender-based violence (GBV)

permanent disability among children with severe malaria aged less than six years old who were very delayed in reaching a health facility. RAS was quality assured by the Global Fund in December 2016.<sup>6</sup> Recognising that the intervention had significant potential to accelerate health impact at scale, RAS was introduced in hard-to-reach

communities in Zambia under the MAM pilot in 2017. The target group for RAS is children aged two months to six years.

Over the last decade, Zambia's Ministry of Health (MOH) has trained Integrated Community Case Management (iCCM) volunteers to diagnose and treat simple malaria at community level. However, when uncomplicated malaria becomes severe, children cannot be treated orally, leaving a gap in service provision. RAS gives children a chance of survival while they are transferred to a health facility.

<sup>1</sup> World Health Organisation, 2021, **World Malaria Report 2020**, Geneva: WHO.

<sup>2</sup> This figure includes deaths occurring at community level out of sight of the formal health sector.

<sup>3</sup> World Health Organisation, 2021, **World Malaria Report 2020**, Geneva: WHO.

<sup>4</sup> Green, C, Quigley, Kureya, T., et al, 2019, 'Use of rectal artesunate for severe malaria at the community level, Zambia', **Bulletin of the World Health Organization**, 97: 810-817.

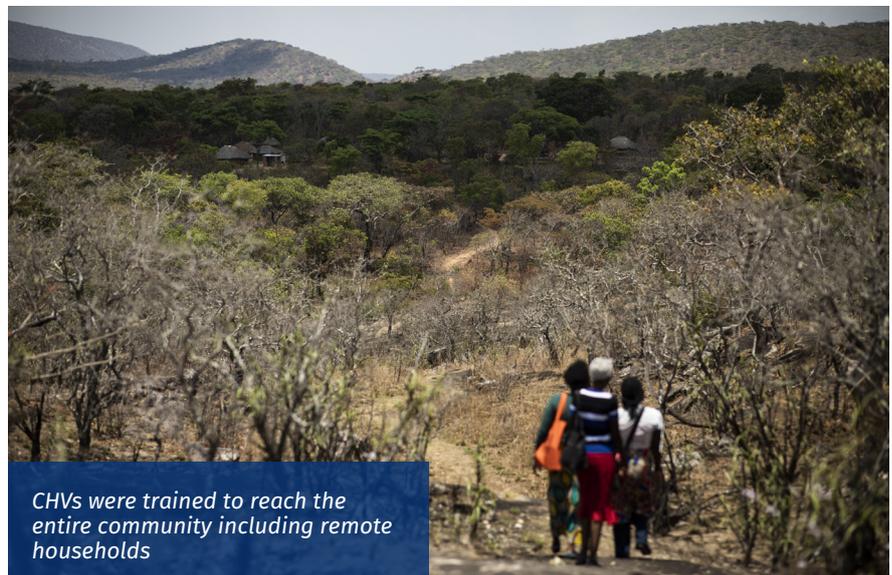
<sup>5</sup> Gomes, M.F., et al, 2009, 'Pre-referral rectal artesunate to prevent death and disability in severe malaria: a placebo-controlled trial', **Lancet**, 14;373 (9663):557-66.

<sup>6</sup> 100 mg RAS was pre-qualified by WHO in February 2018.

## Approach

In the pilot project, the reported case fatality rate from severe malaria among children fell from 8% to 0.25%<sup>7</sup>. Building on this evidence base, the intervention was scaled up in late 2018. Two districts, both in Central Province, were selected as demonstration districts and served as learning sites, hosting visits from government and development partners. These districts had benefitted from ten years of prior engagement by the MAM@Scale consortium and both had a large group of well-trained and motivated CHVs who were targeted for RAS training. The site of the pilot (Serenje) and Chitambo district were included. In eight scale-up districts, RAS training was delivered as part of the national roll-out of iCCM training. The idea was to sustain the severe malaria innovation by integrating it into a well-funded, national CHV training programme.

In the demonstration districts, the majority of intervention sites were categorised as 'high intensity' sites: CHV to population ratios were lower (i.e. 1:250), CHVs received a 4-day training



*CHVs were trained to reach the entire community including remote households*

and a phased programme of coaching and mentoring support was provided backed up by routine supportive supervision from the local health facility. In the eight scale-up districts intervention sites were supported with inputs that were closer to 'real world' implementation conditions. In these 'low intensity' sites CHV to population ratios were higher (i.e. 1: 500 upwards), CHVs

participated in a shorter duration RAS training and supportive supervision was provided primarily by local health facility staff based on their existing routines.

*"In the pilot, the reported case fatality rate from severe malaria among children aged six years and under fell by 96%."*

## RAS PRE-REFERRAL PROTOCOL FOR CHVS

- Trained CHVs check a child for severe malaria danger signs
- A rapid diagnostic test (RDT) for malaria is undertaken simultaneously
- Children in hard-to-reach communities observed to have severe malaria danger signs are given RAS
- Child is transferred promptly to the nearest health facility
- The RDT result is carried with the patient to the health facility along with a referral form
- At the health facility, the referral form and RDT result are reviewed by a health worker
- Patient is checked for co-morbidities and malaria complications
- Patient is given a course of treatment for severe malaria (ideally injectable artesunate)
- This is followed by a course of oral artemisinin-based combination therapy (ACTs)
- Child is followed up in the community by a CHV at least three times and checked for side-effects

Working in partnership with district health teams, MAM and MAM@Scale trained CHVs to mobilise their communities, administer RAS to children in the target group and refer severe malaria cases to the health facility for further treatment. Training

was also given on the identification and referral of other life-threatening conditions affecting children (e.g. severe diarrhoea and acute respiratory infection) and, from April 2020, COVID-19.

The project was grounded in a systematic community engagement approach which included a major focus on gender empowerment and social inclusion. CHVs were trained to involve their entire communities in mobilisation activities and to reach out to women who lacked social support, including those affected by GBV. Community-managed safety nets (e.g. food banks, emergency savings schemes and emergency transport systems (ETS) comprising bicycle ambulances) were established to tackle financial and other practical barriers and delays to use of health services.

*“CHVs were trained to reach out to women who lacked social support.”*

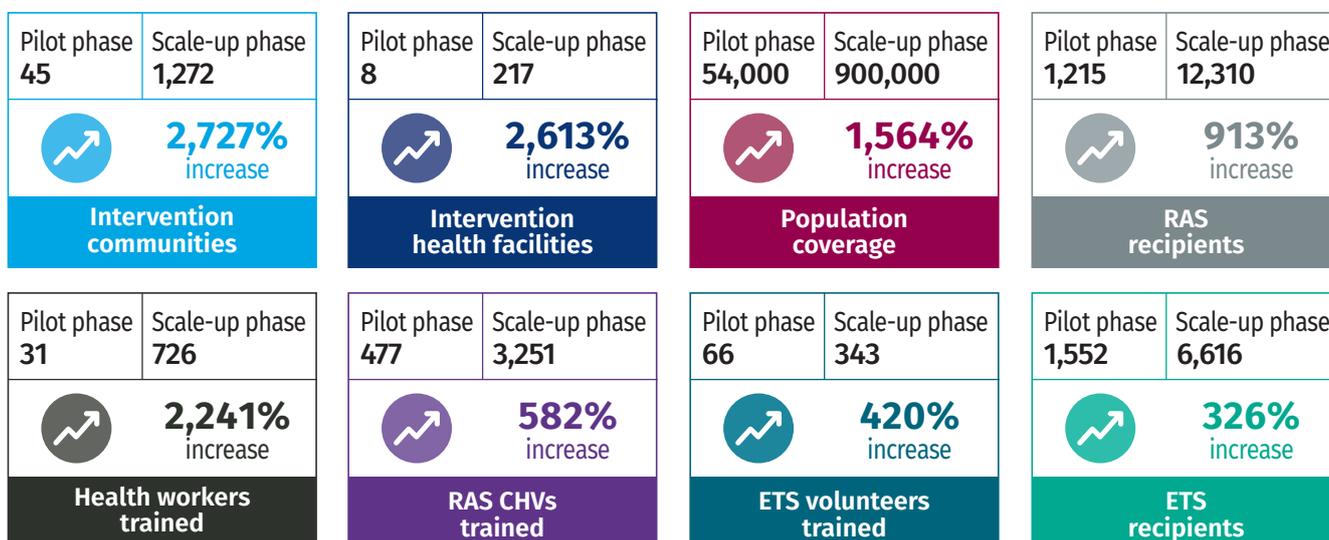
Front-line health providers were provided refresher training in severe malaria case management and assigned to support and supervise CHVs and ETS riders. Members of the district health team led the planning for, and were involved in the implementation of, project activities and were consistently supported to embed the initiative in their routine activities and to address health system bottlenecks. For example, district WhatsApp groups were established to provide early warning of upcoming shortages of key malaria drugs and commodities so that supplies could be moved to where they were needed

the most. This built local capacity to sustain the intervention beyond the end of the project. A community monitoring system and baseline, midline and end line quantitative surveys carried out in February 2019, July 2020 and September 2021 respectively measured progress, outcomes and impact.

## Results

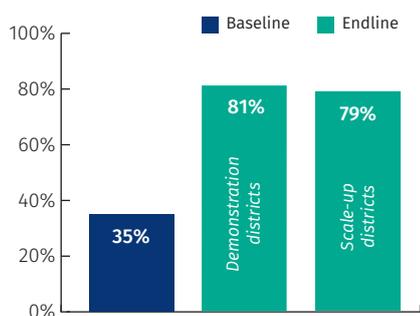
**Scale-up:** RAS was introduced on a pilot basis in a single district and covered a population of 54,000. During an initial scale-up phase, the intervention was rolled out to ten districts in seven provinces, reaching a population of 900,000. By mid-2021, NMEC had begun the process of scaling up RAS to a further 26 districts with a high malaria incidence, putting the government on course to reach approximately 22% of the country’s population. In the ten districts supported by MAM@Scale, a major expansion in the project’s training activities took place as part of the scale-up: 726 health workers were trained in severe malaria case management, 3,251 CHVs were trained to mobilise their communities and administer RAS and 343 community volunteers were trained to operate and manage bicycle ambulances. These outputs represented a major amplification of the activities supported during the pilot.

<sup>7</sup> Green, C, Quigley, Kureya, T., et al, 2019, ‘Use of rectal artesunate for severe malaria at the community level, Zambia’, *Bulletin of the World Health Organization*, 97: 810-817.



**Drug supply:** Malaria drug supply in intervention health facilities improved over the timeframe of the intervention (Fig 1). District health teams reported that the daily monitoring of drug supplies and early notification of impending shortages using WhatsApp had helped to improve drug and commodity supplies within their districts.

**Fig 1: Health facilities with four main malaria drugs in stock**



**RAS recipients:** By late 2021, 12,310 children with suspected severe malaria had been given RAS by trained CHVs. A 2020 verification study assessed whether CHVs had followed RAS protocols when managing suspected severe malaria cases. The study, which was based on a sample of 100 RAS recipients, found that 95% of RAS recipients went on to be diagnosed with severe malaria at the health facility indicating that the majority of cases had been managed correctly.

**Referral support:** Over the course of the RAS pilot and the subsequent scale-up in ten districts, community managed bicycle ambulances helped to reduce referral delays by offering carers and their children a convenient and comfortable form of transport in which to travel to the health facility in the event of a health emergency. The ETS halved travel times and was available to the community 24/7 at no cost.

**Safety nets:** Community-managed food banks and emergency savings schemes provided ‘safety nets’ for community members who faced particular hardship in the event of a child health emergency. The schemes were well-utilised, each supporting approximately a third of the families of children with suspected severe malaria.

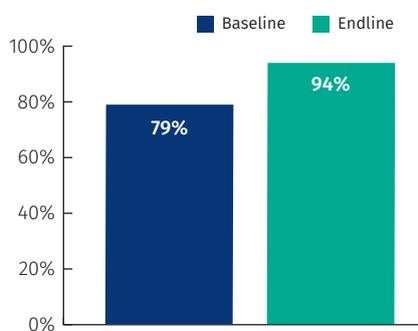
**CHV knowledge and confidence:**

The proportion of CHVs who knew all the severe malaria danger signs increased from 8.7% at baseline to 73% at end line. At end line more than 95% of CHVs indicated that they were confident to administer RAS.

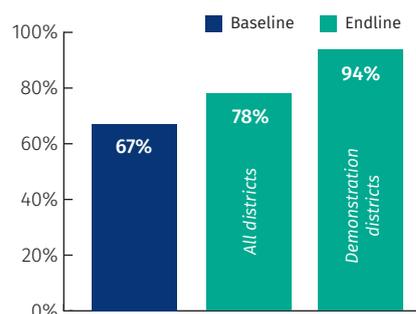
**CHV case management:**

Between baseline and end line there was evidence of an increase in the proportion of CHVs who were managing suspected severe malaria cases (Fig 2). The surveys also looked at a specific aspect of severe malaria case management – whether CHVs were following up patients upon their return from the health facility and found an improvement, but with the demonstration districts performing better than the scale-up districts (Fig 3).

**Fig 2: CHVs who had ever managed a case of severe malaria**



**Fig 3: CHVs who followed up severe malaria cases in the community**



**Gender empowerment:** By the end of the initial scale-up phase, there was evidence of gender empowerment gains in the intervention sites. In the end line survey 95% of female CHVs reported that they had a strong voice at community level due to their RAS training. Moreover, 95% of CHVs (both male and female) reported that female community members had more independence to make health and other decisions. A high proportion (84%) of CHVs (88% of female and 83% of male CHVs) reported that GBV had reduced a lot or disappeared over the last few years.

**Social inclusion:** Ninety percent of CHVs indicated that they had taken actions to support the least-supported women in their community and 89% reported that they had visited the least-supported women in their homes. The types of actions taken to support vulnerable women included providing encouragement and friendship, sharing health information, or providing practical support such as help with transport, childcare, soap, food or money.

**Reduction in mortality:** Reported case fatality rates from severe malaria fell in intervention sites. Based on a conservative estimate 496 children’s lives saved and 8,025 lives improved are attributable to the MAM@Scale project.

**DURING THE PILOT AND SUBSEQUENT SCALE-UP OF THE INTERVENTION:**

**6,616** children were transferred by ETS in 4 intervention districts

**4,063** families with sick children were supported by emergency savings schemes

**50%** of ETS transfers were severe malaria cases; **50%** other child health emergencies

**3,758** families with sick children were supported by food banks

**SEVERE MALARIA CASE FATALITY RATE**

**Demonstration districts** **97%** reduction  
From: 3.1% To: 0.1%

**Scale-up districts** **87%** reduction  
From: 10.7% To: 1.4%

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**496** estimated lives saved attributable to project

Estimated lives improved attributable to project: **8,025**



ETS rider in Serenje district

## Policy Implications

MAM and MAM@Scale demonstrated that RAS administered at community level by trained CHVs in combination with a range of supportive community-managed interventions can make an effective contribution to national efforts to combat malaria in Zambia. The reduction in case fatality rates seen in both the demonstration and scale-up districts suggest that RAS can be used effectively in 'real world' conditions. The Zambia results make an important contribution to the evidence base and can be considered alongside those of the Community Access to Rectal Artesunate for Malaria (CARAMAL) project (2018-2021), an observational study implemented in Nigeria, Uganda and the Democratic Republic of Congo.

Key policy implications based on MAM and MAM@Scale's experiences include:

- **Bringing services closer to home:** Zambia is building the capacity of lower level health facilities (e.g. Health Posts and Health Centres) to effectively detect, manage and refer as needed severe malaria cases. In view of the logistical, financial and other practical challenges faced by many rural families when confronted with a

health emergency, it is vital that lower level primary health care facilities located close to communities have the capacity to provide follow-on treatment for severe malaria and other common conditions in other countries in the region. This helps to reduce travel times and costs for rural communities and improve access to effective care.

- **Implementing RAS in a real world context:** Effective implementation of a community-based RAS intervention requires an emphasis on identifying and tackling health systems bottlenecks such as localised drugs and commodity shortages, inadequate supervision of CHVs, and weak referral systems. It also requires attention to other barriers that contribute to low demand for and poor access to health services. In Zambia, community systems such as food banks and emergency savings schemes helped to give communities greater control over decision-making and reduced referral delays. A focus on social inclusion helped to ensure that under-supported individuals, including those subjected to GBV, were specifically targeted and included in project activities. The latter approach increased access to and demand for the services of CHVs in Zambia and helped to improve health outcomes.

- **Improving patient referral systems:** In the MAM@Scale intervention sites bicycle ambulances halved travel times and provided a convenient and comfortable form of transport to the health facility. Community-managed ETS can encourage prompt referral of very sick children. ETS should be seen as an integral part of an effective community health intervention – and be fully funded.
- **Scaling up via the iCCM platform:** RAS was scaled up in Zambia through the iCCM platform. The latter needs to include a deeper emphasis on CHVs' community mobilisation role alongside the current principal focus on case management. This will help to ensure that rural communities have the capacity to improve their health knowledge and translate it into action. It also provides a strong foundation for addressing other core health needs of communities.
- **Strengthening Health Management Information System:** As of late 2021, severe malaria indicators were not yet included in Zambia's health management information system (HMIS). It will be important to be able to routinely and directly measure the outcomes and impact of the country's severe malaria investments rather than rely on proxy indicators. This should involve the inclusion of community data generated by CHVs.

## Conclusion

The MAM@Scale project showed the value of investing in communities. When interventions are implemented in a manner that generates community ownership from the start and ensures that the health system is responsive and supportive to community needs, the benefits are far-reaching and sustainable. This approach changes the way the health system operates to become truly people-centred as envisioned in the Sustainable Development Goals. It is the ideal way forward to achieving better health for all.



The one-year RAS pilot project implemented between 2017-2018 was funded by Medicines for Malaria Venture (MMV) and Transaid. The three-year successor project, MAM@Scale, implemented between December 2018 and December 2021, was funded by Grand Challenges Canada, MMV, FIA Foundation and Transaid. Both projects were implemented by a consortium comprising Transaid, Development Data, Disacare and DAI Global Health. The pilot was led by Transaid and MAM@Scale by Development Data. MAM@Scale worked in partnership with the Churches Health Association of Zambia (CHAZ) and the Program for Advancement of Malaria Outcomes (PAMO) in three districts.

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