Ministério da Saúde Direcção Nacional de Saúde Pública
E
Ministério da Administração do Território e Reforma do Estado Fundo de Apoio Social

The Cost and Impact of Implementing Integrated Community Case Management of Malaria, Pneumonia, and Diarrhea in Angola

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Introduction

In 2014, the Government of Angola introduced a national community development and health worker program to address challenges affecting the poor. The Ministry of Local Government (Ministério da Administração do Território [MAT]) and the Ministry of Health (Ministério de Saúde [MINSA]) established the program to reduce high mortality rates in the country and improve community development. The community development and health agents, or agentes de desenvolvimiento comunitário e sanitário (ADECOS), are contracted annually by municipal governments and paid by the Fundo de Apoio Social (Social Support Fund; FAS), both of which are under MAT.

With support from donors, this program was expanded to include treating children under 5 years old for malaria, diarrhea, and pneumonia, which are common and contribute to high mortality. The US Agency for International Development (USAID), through its Health for All Project, engaged Management Sciences for Health (MSH) to conduct a study of the costs and impact of implementing the expanded program.

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Methodology

This analysis built upon previous community health services costing and investment case analyses conducted in Malawi, Sierra Leone, Madagascar, and South Sudan for UNICEF. The Community Health Planning and Costing Tool (developed by MSH for UNICEF) was used to do the modeling. A bottom-up or "ingredient-based" approach was used to calculate costs. The data were largely normative and intended to reflect the cost of providing good quality services. The cost of each intervention was based on service delivery protocols and standard costs and was then multiplied by the number of interventions, thus providing the total standard cost of each intervention. Indirect costs, such as supervision and management, were allocated to all interventions based on the total time required by the ADECOS for each intervention. The total direct and indirect costs for each intervention were then aggregated to provide the total cost of the intervention package. The numbers of services and related costs were projected over ten years (2018–2028). The Lives Saved Tool (LiST) was used to estimate the potential impact of the interventions. Stakeholders identified current and potential future constraints to scaling up.

Data from the Angolan Demographic and Health Survey 2015–16 (Inquérito de Indicatores Múltiplos e de Saúde [IIMS]) and other documents were analyzed and compiled to provide a picture of the incidence of fevers, acute respiratory infections (ARIs), and diarrhea in children under 5 years old. If Angola data were not available, international data were used. To validate Angolan data and provide additional data where needed, an expert panel meeting was held with representatives from organizations involved in the design and piloting of the current ADECOS program. Provisional findings were presented to key stakeholders, who provided valuable feedback.

Program assumptions

The package of services used for modeling the costs is as follows:

- For curative services for children under 5 years old:
  - The three integrated community case management (iCCM) services of malaria, pneumonia, and diarrhea
  - The treatment of non-malaria fevers and non-pneumonia ARIs
- For curative services for people of all ages, TB directly observed therapy, short course (DOTS) (requested by the MINSA TB Program)
- For health promotion services for the whole family:
  - Routine and special visits to each household (combined with the community development visits)
  - Routine visits to community meetings for community health projects
- For community development services for the whole family:
  - Routine visits to each household (combined with the household health visits)
  - Routine visits to community meetings for community development projects

Incidence rates were used to determine the number of services needed by the population. The rates for Angola and for Malanje Province were largely based on the IIMS and are summarized in table 1.

Based on guidance from stakeholders, the expected utilization rates for fever, malaria, non-malaria fever, and pneumonia were set at 80%, assuming that 20% of people would seek care from another provider, such as a health facility or pharmacist. The expected utilization rate was set lower for ARI diagnosis (50%) because many people will self-treat a cough or cold. We assumed that the utilization rate for diarrhea would start at 80% and would remain at that level because studies have shown that home-based family care has challenges in many countries. For TB DOTS, we assumed 80% because other patients would use a health facility or another DOTS observer. The additional services of ARI/pneumonia, diarrhea, and TB were assumed to commence at the start of 2019 for modeling purposes. Household and community services were assumed to be fully provided with 100% utilization.

The program structure described in the policy document is to have an initial number of 60 micro-areas of 100 households in each municipality. Each micro-area would be covered by 1 ADECOS and each municipality would have 2 supervisors (30 ADECOS per supervisor) (table 2). FAS believes that this is feasible for urban areas where population density is high. However, based on the initial ADECOS projects, this does not seem feasible for rural areas where population density is lower. For rural areas, the current expectation is to have an initial number of 30 micro-areas per municipality and 50 households per micro-area. Each municipality would have 2 supervisors (15 ADECOS per supervisor).

Table 1. Incidence rates for ADECOS services (2018)

Service	Cases/patient/year		Age group	Intervention	Incidence source
	National	Malanje			
Fever	3.8	6.5	13-59 months	RDT[a]	IIMS 2015-16
Simple malaria	2.24	3.84	13-59 months	Treat with ACT	59% of fever cases
Non-malaria fever	1.56	2.66	13-59 months	Treat with paracetamol	Balance of fever cases
ARI	0.86	1.35	2-59 months	Test for pneumonia	IIMS 2015-16
Pneumonia	0.158	0.25	2-59 months	Treat with antibiotic	McAllister 2019[1]
Non-pneumonia ARI	0.70	1.10	2-59 months	Treat with paracetamol	ARI minus pneumonia cases
Diarrhea	4.06	5.46	2-59 months	Diagnose/treat	IIMS 2015-16
TB DOTS	0.47	0.47	All ages	Observation	WHO Global TB Report 2017
Household health encounters[b]	11	11	All ages	Health promotion	Assumed 100%
Household development encounters	1	1	All ages	Development promotion	Assumed 100%
Community health encounters	11	11	All ages	Health promotion	Assumed 100%
Community development encounters	1	1	All ages	Development promotion	Assumed 100%

[a]RDT, rapid diagnostic test

[b]Household health and development encounters are combined and are shown separately only to identify costs; same for community encounters.

Table 2. ADECOS, initial program structure

	Policy	Rural low density	Urban high density
Micro-areas per municipality	60	30	60
Households per micro-area	100	50	100
Persons per micro-area[c]	600	300	600
ADECOS per micro-area	1	1	1
Supervisors (full time)	2	2	2
Number of ADECOS	60	30	60
ADECOS per supervisor FTE[d]	30	15	30
ADECOS household visits per month	1	1	1
Supervisor visits to ADECOS per month	1	1	1
ADECOS hours per month	40	40	40

[c]The average number of persons per household nationally is 4.8 (Instituto Nacional de Estatistica [INE] and IIMS 2017. FAS believes the figure should be higher and is using an average of 6 persons for its estimates.

[d]FTE, full time equivalent

Because a plan has not yet been developed for the roll-out of ADECOS/iCCM nationwide, scenarios were based on the policy and piloting experiences provided by stakeholders. To calculate the numbers of people who need services under each scenario, the urban/rural population breakdown and population without access to health facilities were estimated by applying the 2010 urban and rural percentages of people with access[2] to the 2018 national estimate of 53% of people with access. The resulting estimate is that 27.4% and 68.6% of people in urban and rural areas, respectively, did not have access to a health facility in 2018, for a total of 5,049,987 urban population and 7,437,123 rural population (table 3). It is important to note that these figures represent access to facilities and not to all service elements. For example, shortages of medicines and qualified staff mean that, in some cases, services are not available in facilities.

[1] McAllister D. Lancet Global Health. 2019; 7:e47-57
[2] INE 20113

Table 3. Urban and rural facility access estimates (2018)

	Rate	Number
Total national population		29,250,009
Total urban population	62.9%	18,409,937
Total rural population	37.1%	10,840,072
National access to public health facilities 2018 (within 5 km)[a]	53.0%	15,502,505
National without access to public health facilities 2018	47.0%	13,747,504
National access estimate 2010 (within 5 km)[b]	65.0%	
Urban access estimate 2010 (within 5 km)[b]	89.0%	
Rural access estimate 2010 (within 5 km)[b]	38.5%	
Urban access estimate 2018 (within 5 km)	72.6%	13,359,950
Urban without access 2018 (over 5 km)	27.4%	5,049,987
Rural access estimate 2018 (within 5 km)	31.4%	3,402,949
Rural without access 2018 (over 5 km)	68.6%	7,437,123

[a]PMI plan 2018 based on information from National Malaria Control Program; 45% per National Health Development Plan, 2013

[b]2011 Integrated Survey on the Welfare of Population, Volume 1

Study findings

The coverage assumptions used in the national and Malanje models for 2019 and 2025 are shown in table 4. In each case, the models only cover provision of services to people who do not have access to functioning health facilities. In the national rural model, the populations to be covered are based in all provinces and municipalities, whereas in the national urban model, the populations to be covered are only those in 32 municipalities; in the Malanje provincial model, the populations are based in all 14 municipalities. It is assumed that populations without access to health facilities can be grouped into micro-areas; the number of micro-areas is calculated by dividing the population without access by 300 people (50 households) per micro-area. This gives a number of micro-areas that is much higher than the initial figure of 30 micro-areas per municipality stated in the policy.

Table 4. Summary of assumptions for 2019 and 2025 for rural, urban, and Malanje coverage

	Rural		Urban		Malanje	
	2019	2025	2019	2025	2019	2025
Total population of area to be covered	11,221,643	13,810,265	19,057,967	23,454,282	1,147,275	1,411,930
Target population without access for ADECOS program	7,698,910	9,474,904	3,522,733	4,335,361	787,119	968,692
Population without access covered by ADECOS program	1,464,781	9,474,904	646,080	4,335,361	289,820	968,692
Percentage target population coverage	19%	100%	18%	100%	37%	100%
Provinces covered	18	18	18	18	1	1
Municipalities covered	132	132	32	32	14	14
Micro-areas covered	4,883	31,583	1,077	7,226	967	3,229
Micro-areas per municipality	37	239	34	226	69	230
Households covered	244,130	1,579,151	107,680	722,560	48,303	161,449
Number of ADECOS	4,883	31,583	1,077	7,226	967	3,229
Number of households per ADECOS	50	50	100	100	50	50
Number of persons per household	6.0	6.0	6.0	6.0	6.0	6.0
Number of supervisors	264	264	64	64	28	28
Number of supervisors per municipality	2.0	2.0	2.0	2.0	2.0	2.0
Number of ADECOS per supervisor	18	120	17	113	35	115

The projected numbers were based on the catchment populations, and incidence and expected utilization rates for the first and last years of scale-up are shown in table 5. For example, in the first and last year of scaling up the rural model, 6 million and 39 million services, respectively, would be provided. The urban model would provide 2 million services in the first year of scale-up and 13 million services in the last year (also 2025). The Malanje model assumes that scale-up could be faster—finishing with 4.2 million services in 2021 after starting with 1.4 million in 2019, and resulting in 4.9 million in 2025. After services have been scaled up, the numbers of services would only change with population growth. Key points are as follows.

- The models assume that scaling up means expanding geographical coverage and not increasing utilization within areas already covered. Thus, the average number of services per capita is the same in the first and last years.
- Based on the incidence and prevalence rates reported in the IIMS, 2015-16, in every year in the national rural and urban models, each under-5 child would have an average of:
  - 3.8 episodes of fever of which 2.24 would be malaria
  - 0.8 episodes of ARIs of which 0.15 would be pneumonia
  - 4.0 episodes of diarrhea
- The reported incidence and prevalence for Malanje is much higher than the national average, and the rates used in the model for each under-5 child were:
  - 6.5 episodes of fever of which 3.8 would be malaria
  - 1.3 episodes of ARIs of which 0.25 would be pneumonia
  - 5.4 episodes of diarrhea
- In all models, promotive health provided through routine household and community visits represents most services. Among iCCM services, RDT and diarrhea services were the highest, and community TB DOTS services would also be significant.
- The number of services per capita is highest in the Malanje model because the incidence rates of the three iCCM diseases are the highest.
- The number of services per capita is lowest in the urban model because the number of household visits is 6 per year instead of 12.
- In the rural model, the ADECOS are using only 86% of their time, which means that it is possible to add to the package. In the urban and Malanje models, the ADECOS time would be more or less fully occupied with the proposed package.

Table 5. Summary of service numbers for the first and last years of scale-up for rural, urban, and Malanje

	Rural		Urban		Malanje	
	2019	2025	2019	2025	2019	2025
Number of community health services	6,058,822	39,191,374	2,013,404	13,510,432	1,484,575	4,951,974
Promotive health	2,739,140	17,718,070	604,085	4,053,563	541,974	1,811,454
Under-5 fevers tested with RDT for malaria	810,759	5,244,381	357,607	2,399,631	274,685	918,107
Under-5 malaria cases treated	478,348	3,094,184	210,988	1,415,782	162,064	541,683
Under-5 diarrhea cases diagnosed and treated	866,290	5,603,585	382,101	2,563,989	230,735	771,210
Under-5 ARI cases diagnosed	183,254	1,185,374	80,829	542,382	57,134	190,966
Under-5 ARI cases treated	149,508	967,088	65,944	442,503	46,613	155,800
Under-5 pneumonia cases treated	33,746	218,286	14,885	99,879	10,521	35,166
Community development	249,013	1,610,734	54,917	368,506	49,270	164,678
TB community DOTS	548,765	3,549,673	242,047	1,624,197	108,578	362,910
Number of routine household visits per year	12.00	12.00	6	6	12	12
Number of services per year per person covered	4	4	3	3	5	5
Number of services per week per ADECOS	24	24	37	37	29	29
Percentage of available ADECOS time needed	86	86	93	93	100	100

Table 6. Summary of costs for 2019 and 2025 for the rural, urban, and Malanje models (AOA)

	Rural		Urban		Malanje	
	2019	2025	2019	2025	2019	2025
Total cost (billion)	7.8	31.6	2.0	7.5	1.6	3.2
Non-recurrent costs (billion)	4.6	12.4	1.2	2.8	0.9	1.2
Recurrent costs (billion)	3.2	19.2	0.8	4.7	0.7	2.0
Average total cost per service	1,282	807	992	562	1,053	654
Average recurrent cost per service	529	757	383	350	443	419
Average total cost per person covered	5,305	3,340	3,092	1,751	5,385	3,342
Average recurrent cost per person covered	2,188	2,031	2,497	1,647	2,263	2,140

The total cost of scaling up and maintaining the ADECOS program to cover the areas without access to functional health facilities would be as follows:

- Rural areas: Scaling up from 2019 through 2025 would cost AOA 135 billion[3] (USD 537 million[4]) and maintaining services after 2025 would cost AOA 32 billion (USD 129 million) each year
- Urban areas: Scaling up from 2019 through 2025 would cost AOA 32 billion (USD 129 million) and maintaining services after 2025 would cost AOA 7.8 billion (USD 31 million) each year
- Malanje Province: Scaling up from 2019 through 2021 would cost AOA 7 billion (USD 28 million) and maintaining services after 2025 would cost AOA 3.2 billion (USD 12 million) each year

The average recurrent cost per capita for the total population covered in rural areas and the Malanje model is just over AOA 2,000 (about USD 8). The average cost per capita is less in the urban area model.

For rural coverage, the total non-recurrent costs (equipment; information, education, and communication [IEC] materials; and initial training) would be AOA 4.6 billion in 2019 and AOA 12.4 billion in 2025 (the last year of scale-up; table 6) and would remain high in the years after the program is fully scaled up, with AOA 11.9 billion in 2026, for example. Recurrent costs (salaries, medicines, supervision visits, etc.) for rural coverage would total AOA 3.2 billion in 2019, AOA 19.2 billion in 2025, and AOA 19.4 billion in 2026. Recurrent costs would be less than the non-recurrent costs in the early years of scale-up but would be higher in later years.

A major non-recurrent cost driver is equipment costs, which are incurred every year, during the scale-up period as new ADECOS and supervisors are engaged and periodically as equipment is replaced (e.g., smart phones every five years). The major equipment cost is for boxes for biological disposal, one of which is required every week for every ADECOS at a cost of AOA 3,643 per box[5] (including 20% mark-up). In 2026, this item alone will cost AOA 6.1 billion, 65% of all equipment costs. The next highest equipment costs in 2026 are for smart phones (AOA 759 million) and IEC materials (AOA 607 million).

The other major non-recurrent cost driver is the initial (start-up) training costs, which are also incurred every year during the scale-up period as new ADECOS and supervisors are engaged and every year after the first year when replacement ADECOS must be trained. These start-up training costs are high at AOA 343,306 per ADECOS, which includes AOA 28,000 per day for accommodation and food for 15 days.

The major recurrent cost drivers are the salaries of the ADECOS (AOA 8.5 billion in 2026) and refresher training for the ADECOS (AOA 7.8 billion in 2026). The refresher training cost appears high at AOA 241,141 per ADECOS, which includes AOA 50,600 per day for accommodation and food for 3 days.

In all three models, the highest cost service is for malaria diagnosis and treatment, followed by promotive health. Promotive health represents the health share of the household and community visits, assumed to be 11/12 of the total visit time or the equivalent of 11 months out of 12. The community development costs represent 1/12 of their time, and cost of that service is relatively small, for example, AOA 868 million for rural coverage in 2026.

[3] One billion is one thousand million.
[4] Based on a conversion rate of AOA 253 = USD 1; AOA, Angolan Kwanza
[5] Data from PSI budget.

The cost of diagnosing and treating malaria, ARIs/pneumonia, and diarrhea for rural populations would be AOA 63.5 billion, AOA 3.8 billion, and AOA 9.6 billion, respectively, over the years 2019–2025. However, only AOA 302 million for ARI medicines, AOA 80 million for pneumonia medicines, and AOA 1.6 billion for diarrhea medicines would be the additional cost, because the other costs are already covered. After scaling up is completed, the medicines and supplies with the greatest cost would be malaria RDTs.

The marginal cost of adding ARI/pneumonia and diarrhea treatment to the package is relatively small because it only reflects the cost of medicines and supplies since the other costs (e.g., training, equipment, and salaries) are already covered. The marginal cost of adding TB DOTS is also low, just reflecting a small additional amount of ADECOS time.

Impact

Based on the analysis using the LiST software, it is clear that the increased coverage of iCCM services would result in significant numbers of under-5 child deaths averted over the ten years to 2028. The rural program would result in an estimated 37,631 lives saved, the urban program 17,180 lives saved, and the Malanje program 4,653 lives saved (table 7).

The promotive and preventive elements of the work of the ADECOS should save the health system money by reducing the need for curative services. In addition, treatment of malaria, diarrhea, and ARIs/pneumonia is likely to be cheaper when provided by ADECOS than by health facilities. Treating these diseases early should also reduce the incidence of complicated or severe cases, thereby further reducing the need for health center and hospital services. The estimated cost of diagnosing and treating a case of non-severe malaria in rural areas by an ADECOS is AOA 1,407 (USD 5.56), which is much less than the estimated cost of treating non-severe malaria (USD 28.03) and severe malaria (USD 65.95) in health facilities. Families also benefit from cost savings from successful prevention interventions and from early and rapid provision of iCCM.

Community health services can have a positive impact on equity in terms of both service providers and recipients. For example, female community health workers can improve their status within the community and, if paid, can improve their economic situation. According to the policy, women are supposed to be prioritized when recruiting ADECOS. Unfortunately, the majority of ADECOS are men because many women do not qualify because of their education level. It is important to conduct research in the future on the use of female ADECOS and their performance compared with male counterparts.

The positive health and morbidity impact of community health services is more likely to benefit the poor, who have less access to health facilities. Community health services are also more likely to benefit women who normally look after sick children and who are likely to save time by having easier, faster, and cheaper access to services. Both of these equity benefits are likely to exist with the ADECOS program and future research will be important to measure the extent of these benefits.

Constraints to scaling up

There are several potential bottlenecks to the implementation and scale-up of the ADECOS program:

- A lack of clear national-level government leadership and capacity for the iCCM component of the ADECOS program and the lack of a strategic plan for the implementation and scale-up of the ADECOS program, including the role of nongovernmental organizations currently providing community health services
- A lack of female ADECOS, which may hamper the acceptance of certain services
- Use of supervisors who are not medically trained, which may result in poor quality iCCM and other health services
- Lack of functional, integrated government procurement and distribution systems for medicines and supplies and high equipment and training costs

Table 7. Estimated number of lives saved (1-59 months) for each program by year

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Total
Rural	0	894	1,680	2,430	3,146	3,833	4,491	5,124	5,232	5,344	5,457	37,631
Urban	0	396	759	1,105	1,434	1,751	2,054	2,345	2,394	2,445	2,497	17,180
Malanje	0	176	334	481	490	501	511	523	534	546	557	4,653

Limitations

A number of limitations were identified before and during the course of the analysis, which are described in the full report.[6] These are not expected to have a material influence on the figures provided here.

Conclusions

Expanding the ADECOS package to include the treatment of pneumonia and diarrhea and extending it to cover all areas of the country that do not have access to functioning health facilities can go a long way to reducing the high mortality and morbidity rates for children under 5 years old and to addressing other urgent public health needs. In addition, routine household visits provide the opportunity to monitor child growth and development and to screen for and refer other common ailments, such as eye infections and TB, although the impact of such expansion will depend on the effectiveness of the referral system and the quality of the facility-based primary health care system.

This study provides estimates of the costs of this strategy for different scenarios and should be used as a basis for planning implementation of the program and to advocate for funding.

[6] Collins D, Bolanos L. The Cost and Impact of Implementing Integrated Community Case Management of Malaria, Pneumonia, and Diarrhea in Angola. 2018. USAID's Health for All Project. Management Sciences for Health, Luanda, Angola.

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