Improving Child Health through the Accredited Drug Dispensing Outlet Program: Baseline Survey from Five Districts in Tanzania, September 2006

September 2007

Center for Pharmaceutical Management
Management Sciences for Health
N. Fairfax Drive, Suite 400
Arlington, VA 22203 USA
Telephone: 703-524-6575
Fax: 703-524-7898
E-mail: rpmplus@msh.org

The report was made possible through support provided by the U.S. Agency for International Development, under the terms of cooperative agreement number HRN-A-00-00-0016-00 and contract number GHA-1-00-04-00002-00 for BASICS. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the U.S. Agency for International Development.

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RPM Plus works in more than 20 developing and transitional countries to provide technical assistance to strengthen pharmaceutical and health commodity management systems. The program offers technical guidance and assists in strategy development and program implementation both in improving the availability of health commodities—pharmaceuticals, vaccines, supplies, and basic medical equipment—of assured quality for maternal and child health, HIV/AIDS, infectious diseases, and family planning and in promoting the appropriate use of health commodities in the public and private sectors.

About CEEMI
CEEMI is a semi-autonomous institution under the National Institute for Medical Research, Tanzania. It works with the Ministry of Health and Social Welfare and collaborates with several other local and international partners with the aim of promoting the application of effective and appropriate malaria and other health related interventions through advocacy, strengthening and maintaining sufficient capacities at district, national and regional levels, to an extent that malaria is no longer a major public health problem hindering social economic development.

About BASICS
BASICS works with ministries of health and their partners worldwide to increase the use of proven child health and nutrition interventions by families, communities, and health systems to achieve population-level impact; strengthen health systems to improve the quality of care and address inequalities in coverage; expand the reach and effectiveness of health services through community-based and private sector approaches; and operationalize new interventions for improved newborn and child health, based on scientific evidence and best practices for health programming.

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Rational Pharmaceutical Management (RPM) Plus Program, Centre for Enhancement of Effective Malaria Interventions (CEEMI) and Basic Support for Institutionalizing Child Survival (BASICS). 2007. *Improving Child Health through the Accredited Drug Dispensing Outlet Program: Baseline from Five Districts in Tanzania, September 2006.* Submitted to the U.S. Agency for International Development by BASICS and RPM Plus/MSH: Arlington, VA.

Key Words
Accredited Drug Dispensing Outlets, child survival, community, Tanzania

RPM Plus Program
Center for Pharmaceutical Management
Management Sciences for Health
4301 North Fairfax Drive, Suite 400
Arlington, VA 22203 USA
Phone: 703-524-6575
Fax: 703-524-7898
E-mail: rpmplus@msh.org
Web: www.msh.org/rpmplus.org

BASICS
4245 N. Fairfax Drive, Suite 850
Arlington, VA 22203
Phone: 703-312-6800
Fax:703-312-6900
E-mail: basics@basics.org
Web: www.basics.org

CEEMI
Ocean Road
P.O.Box 9653
Dar es Salaam, Tanzania
Phone: 255-22-2126531/2
Fax: 255-22-2126530
E-mail: ceemi@nimr.or.tz

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ACRONYMS AND ABBREVIATIONS

ACT	artemisinin-based combination therapy
ADDO	Accredited Drug Dispensing Outlet (in Swahili, branded as *Duka la Dawa Muhimu*)
ADR	adverse drug reaction
AQ	amodiaquine
ARI	acute respiratory infection
BASICS	Basic Support for Institutionalizing Child Survival
BCC	behavior change communication
CEEMI	Centre for Enhancement of Effective Malaria Interventions
CHMT	Council Health Management Team
DLDB	*duka la dawa baridi* ("cold" drug shop; Swahili)
IEC	information, education, and communication
IMCI	Integrated Management of Childhood Illnesses
ITN	insecticide-treated net
KAP	knowledge, attitudes, and practices
MOHSW	Ministry of Health and Social Welfare
MSH	Management Sciences for Health
NMCP	National Malaria Control Program
ORS	oral rehydration salts
RPM Plus	Rational Pharmaceutical Management Plus Program
SEAM	Strategies for Enhancing Access to Medicines Program
SP	sulfadoxine-pyrimethamine
TFDA	Tanzania Food and Drugs Authority
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
WHO	World Health Organization

ACKNOWLEDGMENTS

The Accredited Drug Dispensing Outlet (ADDO) baseline survey in Tanzania was supported with funds from the U.S. Agency for International Development (USAID) through the Basic Support for Institutionalizing Child Survival (BASICS) project in close collaboration with the Rational Pharmaceutical Management (RPM) Plus program.

Key contributors to the writing of this document include the Centre for Enhancement of Effective Malaria Interventions (CEEMI) research team, Julius J. Massaga, Jema Ngwale, Cyprian Mpemba and Pasiens Mapunda; RPM Plus staff Katie Senauer, Jane Briggs, Grace Adeya, Jennifer Leopold and Sameh Saleeb; Management Sciences for Health (MSH) Dar es Salaam–based officers Dr. Suleiman Kimatta and Grace Mtawali; and BASICS staff Joan Schubert and Megan Sheperd-Banigan.

A special thanks goes to—

- All the ADDO dispensers and owners in the Ruvuma region and Ulanga district
- All the caregivers and community members who participated in the study in Ruvuma and Ulanga
- The regional, district, ward, and village authorities in Ruvuma and Ulanga
- The data collectors

Finally, the authors would like to extend their gratitude to the presenters and participants of the two dissemination workshops held in May 2007 in Dar es Salaam and Songea, highlighting the results from a qualitative study conducted in the ADDOs along with supporting data from the quantitative baseline.

EXECUTIVE SUMMARY

In Tanzania, diarrhea, malaria, and pneumonia are the main causes of morbidity and mortality in young children. Together, they account for more than 50 percent of all childhood mortality in the country.[1]

Integrated Management of Childhood Illness (IMCI), first introduced in Tanzania in 1997, is a strategy to improve child health and ultimately reduce child mortality by addressing these three key common childhood conditions. In more than 60 percent of the health districts in Tanzania health workers have been trained in IMCI, and preliminary results show that the strategy has been effective in improving treatment of sick children. However, because accessibility to public health facilities is limited and essential medicines are frequently out of stock at those facilities, many caregivers of sick children seek medicines outside the public sector, particularly in private pharmacies. The Ministry of Health and Social Welfare (MOHSW) of Tanzania, through the Tanzania Food and Drugs Authority (TFDA) and with support from the U.S. Agency for International Development (USAID) through the Rational Pharmaceutical Management (RPM) Plus Program of Management Sciences for Health (MSH) and with technical support from the Basic Support for Institutionalizing Child Survival (BASICS) project for behavior change communication (BCC), is developing a child health component to integrate into the expanding network of accredited *Duka la Dawa Muhimu* private drug outlets, also known as the Accredited Drug Dispensing Outlet (ADDO) program.

The ADDO program began as a pilot program to improve the quality of care provided in *duka la dawa baridi* (DLDBs), private drug shops. DLDBs were originally constituted by the TFDA to provide nonprescription medicines in the private sector. DLDBs currently constitute the largest network of licensed retail outlets for basic essential medicines in Tanzania, with more than 6,000 shops across all districts in the country.

However, based on evidence that DLDBs were not operating as intended,[2] in collaboration with the MSH Strategies for Enhancing Access to Medicines (SEAM) Program, with funding from the Bill & Melinda Gates Foundation, TFDA began the ADDO program. The program was designed to provide Tanzanians living in rural communities the opportunity to purchase quality-assured nonprescription and a limited number of prescription medicines from regulated, properly operated drug outlets staffed by trained dispensers, particularly in places where accessibility to public health facilities is limited or when there are stock-outs of essential medicines at public health facilities.

The ADDO program was initiated in the Ruvuma region in 2003, and as of late 2006, when the data for this baseline was collected, Ruvuma was the only region where the complete ADDO program had been implemented in all districts. Based upon the success of the pilot program, the Government of Tanzania initiated plans in 2005 to expand the ADDO program to all other

[1] National Health Information System, Ministry of Health, Tanzania, 2002.
[2] Center for Pharmaceutical Management. 2003. *Access to Essential Medicines: Tanzania, 2001*. Prepared for the Strategies for Enhancing Access to Medicines Program. Arlington, VA: Management Sciences for Health.

regions in the country, and as of mid-2007 the program is now functioning in two regions (Ruvuma and Morogoro).

The successful ADDO program provides a platform to maintain and further improve upon the gains produced, with a special focus on child health. As part of the expanded rollout, a child health package has been integrated into ADDO services. The child health package includes a module for the ADDO training designed to build ADDOs' capacity and improve quality of care for child health. The child health package also includes mechanisms to strengthen the areas of community demand creation, oversight, regulation, and monitoring and evaluation. In Tanzania, the child health component is known as "IMCI in the ADDOs." In May 2007, the TFDA initiated the ADDO training component (including the integrated child health module) in two additional regions (Rukwa and Mtwara).

This study was designed by RPM Plus, in collaboration with BASICS, to inform the planned integration of the child health component into the ADDO program by (1) obtaining information on the knowledge and practices of dispensers in recognizing and treating common childhood illnesses; (2) determining the availability of key medicines and other pharmaceutical supplies for childhood illness at ADDOs; and (3) understanding caretakers' practices and beliefs about care and treatment of sick children, as well as factors influencing care-seeking behavior, medicines use, and recognition of signs and symptoms. This study serves as a baseline measure; a follow-up survey is planned for subsequent evaluation to compare indicators and determine the impact of enriching the ADDO program with the child health component.

Five districts—four (Songea Urban, Songea Rural, Mbinga, and Namtumbo) from the Ruvuma region and one (Ulanga district) from the Morogoro region—were included in the study. The study target populations were randomly selected ADDO dispensers and caretakers of children under five years of age who had been sick and had recovered from pneumonia, cough, malaria, or diarrhea within two weeks preceding the survey. Face-to-face interviews, review of ADDO patient registers, and simulated client scenarios were used to collect information on the management of childhood illness. A complementary qualitative assessment was also carried out at the time of this baseline survey; the findings of that assessment are included in a separate report entitled *Improving Child Health through the Accredited Drug Dispensing Outlet Program: Qualitative Research from Four Districts in Tanzania, September 2006.*

The baseline findings support the supposition that the integration of the child health component into the ADDO program is likely to improve accessibility to essential medicines for treatment of malaria, acute respiratory infection (ARI), and diarrhea for children under five. ADDOs were found to provide essential services and medicines to caretakers of sick children under the age of five. As expected, most caretakers' first contact for seeking advice, treatment, or medicine for a sick child was with government health facilities. ADDOs are intended to fill the gap of providing quality-assured basic essential medicines and services when medicines are out of stock at government health facilities or when government health facilities are far away and not easily accessible. Another key role of ADDOs will be referrals. Finally, with increased education and communication provided to communities about the services available through ADDOs, it is possible that an increasing number of children will have access to quality, essential services

through this network of private providers, with its formalized links to the public sector through the referral system.

However, dispensing practices need to be improved at ADDOs to properly manage childhood illness, as defined in the IMCI guidelines for Tanzania. Although the ADDO accreditation training stipulates that dispensers receive standard training in basic pharmaceutical management and recognition of common illnesses, including malaria, ARI, and diarrhea, inappropriate dispensing practices with repercussions for child health still occur. At times, the ADDO dispensers prescribe medicine that is not in line with national policy. At other times, the dispensers fill prescriptions, also out of compliance with national guidelines, that originate from other sources of child health services. For example, inappropriate use of antibiotics for simple diarrhea was commonly observed. Oral rehydration salts (ORS), the recommended first-line treatment for simple diarrhea, were rarely recommended. Co-trimoxazole, the recommended first-line treatment for pneumonia and bloody diarrhea, was not the most frequently dispensed antibiotic for these illnesses. Additionally, sulfadoxine-pyrimethamine (SP) the first-line treatment for uncomplicated malaria, was not the most frequently dispensed for that condition. According to the record review, just over 42 percent of malaria cases diagnosed by ADDO dispensers were correctly sold SP tablets. Only 14 percent of malaria cases referred to ADDOs with a prescription were treated with SP, a finding that shows that practice has not yet caught up with changing national guidelines for malaria treatment. With a new malaria policy in place (since January 2007), this problem will need to be monitored, as it has implications for the introduction of artemisinin-based combination therapies (ACTs), which will be available through the ADDO network.

ADDO dispensers also need to provide more information to caretakers about monitoring signs of worsening conditions as well as about taking measures to prevent future illness. Despite most ADDO dispensers' awareness of recommended malaria-preventive measures, very few advised caretakers to use insecticide-treated nets (ITNs).

Based on the study findings, the following actions are recommended—

1. Provide ADDO dispensers and, as appropriate, other health providers frequently used by communities, with a comprehensive training package or targeted refresher training to improve rational prescribing and dispensing as outlined in the national IMCI guidelines, including recognizing symptoms and making appropriate referrals for sick children.

2. Introduce visual supports, or job aids, that will help dispensers choose and prescribe appropriate medicines for children under five years of age, and to advise caretakers on how to give medicines and home-based care.

3. Emphasize the importance of counseling caretakers on how to administer medicines and providing complementary advice (i.e., ITN use, nutrition, and hygiene) when dispensing medicines

4. Provide continued and supportive supervision using a standard checklist, to be revised in collaboration with Council Health Management Team (CHMT) members as appropriate.

Included in supervision should be recommendations for improving the way information on child health is shared between dispensers and clients and the type of advice given.

5. Improve the ADDO referral system by introducing simple referral forms and/or updating patient registers to include a column for referral.

6. Work with the National Malaria Control Program (NMCP) and the IMCI program to improve the availability of ITNs and ORS at ADDOs.

7. Improve adverse event reporting by increasing availability and use of TFDA adverse drug reaction (ADR) forms.

8. Introduce community mobilization initiatives that support healthier care-seeking behaviors, including the use of ADDO services for advice and treatment, particularly in areas where public health facilities are difficult to access.

BACKGROUND

Integrated Management of Childhood Illness in Tanzania

In Tanzania, diarrhea, malaria, and pneumonia are the main causes of morbidity and mortality in young children. Together, they account for more than 50 percent of all cases of childhood mortality.[3]

IMCI, first introduced in Tanzania in 1997, is a strategy to improve child health and ultimately reduce child mortality in Tanzania. It involves seeing the sick child (under five years of age) holistically and not just categorizing the sickness as one diagnosis. It also includes preventive measures such as vaccination and nutritional advice. Implementation of IMCI has three components: (1) training health workers; (2) strengthening health systems; and (3) improving family and community practices. The use of medicines is an essential part of all three components.

IMCI continues to be extended gradually across the country by the MOHSW. Because more than 60 percent of the health districts in Tanzania have been trained, most of the public sector is implementing the strategy. Preliminary results show that IMCI has been effective in improving treatment of sick children. However, many caregivers seek medicines outside the public sector, particularly in private pharmacies. To effectively reach all children, the MOHSW has now officially recognized the network of ADDOs as partners in the promotion and application of the IMCI strategy.

Accredited Drug Dispensing Outlet Program in Tanzania

Duka la dawa baridi (DLDBs) (private drug shops) were constituted by the TFDA to provide nonprescription medicines in the private sector, as opposed to pharmacies, which sell both prescription and nonprescription medicines. DLDBs form the largest network of licensed retail outlets for basic essential medicines in Tanzania. It is estimated that there are more than 6,000 DLDBs across all districts in the country; over 50 percent more than all public health facilities and 11 percent higher than all public, voluntary, and religious facilities combined.

Although they provide an essential service, evidence shows that DLDBs do not operate as intended. Prescription medicines prohibited for sale by the TFDA are invariably available, quality cannot be assured, and the majority of DLDBs' dispensing staff lack basic qualification, training, and business skills.

To address these problems, the MOHSW and TFDA, in collaboration with MSH/SEAM, with funding from the Bill & Melinda Gates Foundation, developed a pilot program (2002–2005) establishing a network of Accredited Drug Dispensing Outlets (ADDOs), also known in Swahili as *Duka la Dawa Muhimu*, to provide Tanzanians the opportunity to purchase quality-assured nonprescription and a limited number of prescription medicines from regulated, properly

[3] National Health Information System, Ministry of Health, 2002

operated outlets staffed by trained dispensers. The approach, which began in five districts of the Ruvuma region (2003), included training in basic pharmaceutical management and recognition of common illnesses, provision of education, incentives, regulatory oversight, and an effort to increase client demand for/expectation of quality products and services.

Integrating a Child Health Component into the ADDO Program

Based on the experience and success in the Ruvuma region and with support from donors such as USAID, the Government of Tanzania initiated plans in 2005 to expand the ADDO program to all other regions of the country. By the end of 2007, it is expected that the program will be implemented in three additional regions: Morogoro, Rukwa, and Mtwara. The child health component has been officially approved by the MOHSW for inclusion in all future ADDO trainings.

The child health component consists of a package of key interventions: (1) training dispensers in rational use of medicines for the key common childhood conditions (malaria, ARI, and diarrhea); (2) creating community demand through mobilization activities; and (3) supervision, together with monitoring and evaluation.

To inform the planned integration of the child health component into the ADDO program, both a baseline (quantitative) assessment and formative (qualitative) research were conducted. The tools and methodology for these studies were developed by RPM Plus and BASICS; CEEMI conducted the surveys. This report presents the baseline quantitative assessment results, which provide comparison data for evaluating the impact and benefits of integrating the child health component into the ADDO package. A separate report on the formative (qualitative) research results will contribute to the design of a community mobilization strategy to promote the child health component, as well as the development of training materials and job aids needed for ADDO dispensers, training modules, and continuing education plans.

Study Objectives

The objectives of the baseline assessment were to—

1. Determine the knowledge and practices of dispensers about recognition, care, and treatment of common childhood illnesses

2. Determine availability of key medicines and pharmaceutical supplies at the ADDOs

3. Assess the knowledge, practices, and beliefs about the care and treatment of sick children among caretakers, as well as factors influencing care-seeking behaviors, use of medicines, and recognition of signs and symptoms

METHODOLOGY

The study was conducted during August and September 2006 in four districts in the Ruvuma region (Songea Urban, Songea Rural, Mbinga, and Namtumbo) and one district in the Morogoro region (Ulanga). ADDOs were accredited and received the standard ADDO training course in the Ruvuma region in 2003 to 2004, whereas ADDOs in Ulanga district, Morogoro region, have been accredited since only August 2006 and were more recently trained compared with ADDO dispensers in Ruvuma.

Study Design

The study design included four components: an ADDO dispenser questionnaire, ADDO record review, simulated client scenarios at ADDOs, and a household survey. For each component, MSH/RPM Plus and BASICS developed the indicators and instruments for data collection.

The study instruments were piloted in Kilombero district August 10–12, 2006, covering Ifakara and Kiberege administrative wards, representing urban and rural settings; the study instruments were then revised according to the findings from the pilot. The tools were translated into Swahili and translated back into English to ensure authentic translation. Interviews were conducted in Swahili and took place at the homes of caretakers and at ADDOs for dispensers.

ADDO Dispenser Questionnaire

An ADDO dispenser questionnaire was used to interview dispensers from a random sample of ADDOs to assess their knowledge as well as the availability of medicines. Seventy-five ADDO dispensers were targeted for interviews; fifteen from each district.

The ADDO dispenser questionnaire contained questions on knowledge of symptoms and treatments as well as dispensing practices. Availability of medicines was also assessed, using a predefined tracer list of medicines and pharmaceutical supplies that should be available at the ADDOs, according to the list defined by TFDA.

Record Review

A retrospective record review was conducted at the randomly selected ADDOs to assess sales practices of the dispensers. Ten cases of each target condition in children under five from the preceding six months were randomly selected from the patient register at each shop.

The record review focused on collecting information on quality of record-keeping; diagnosis and management of target diseases (malaria, diarrhea, ARI) in terms of recognition of the illness and seriousness; type of medicine prescribed; dosage; and referral.

Simulated Client Scenarios

Simulated client visits occurred at randomly selected ADDOs. For each of the three illnesses (malaria, ARI, and diarrhea), a data collector simulated a caretaker with a sick two-year-old child at each shop. The data obtained helped to assess the practices and quality of dispensing provided by ADDO dispensers, including provision of further instructions on administration (dosage, duration) and referral to a health facility for further management for a child with persistent or serious illness.

Household Survey

The household survey assessed community perceptions about care of sick children as well as care seeking and medicine use practices within families. The questionnaire targeted 600 caretakers with recently sick children to collect data through in-depth interviews from a random sample of households. Fifteen caregivers with recently sick (in the last two weeks but now recovered) children (under five years old) with ARI, malaria, or diarrhea were targeted for interviews in each of the 40 clusters. Five clusters were taken from each of the four districts in the Ruvuma and Morogoro regions, while all 20 clusters were taken from Ulanga district.

The household questionnaire focused on collecting information on care-seeking behavior for sick children suffering from malaria, ARI, and diarrhea; recognition of clinical symptoms of targeted diseases; source of medicines; and preventive measures used against the diseases. Information on medicine use practices was also collected.

Sample Size and Sampling Strategy

Each study district in the Ruvuma region was stratified into urban and periurban settings before random selection of wards from each stratum. From each district a list of wards was obtained from the district authority, and five wards were randomly selected. Each ward served as a cluster; therefore, a total of 20 clusters was selected in Ruvuma. In the district of Ulanga, 20 clusters (wards) were selected after the district was stratified into urban and periurban strata. In each ward, one village was randomly selected for the study. The sample sizes for specific target study populations are elaborated below.

Sampling of ADDO Dispensers

In each district, the ADDO coordinator or district pharmacist was asked to provide a list of ADDOs, from which a random sample was chosen. (The target sample was a total of 75; 60 from the Ruvuma region and 15 from Ulanga district.) If at any ADDO the dispenser was not available over two consecutive visits by an interviewer, the data collection team would proceed to a different ADDO. In most wards, however, the number of shops was not enough to meet the proposed sample size, and in this case all ADDOs in the ward were included.

At each ADDO, the patient register was reviewed to assess sales practices of dispensers. Five cases for four conditions (malaria, diarrhea, pneumonia, and ARI non-pneumonia [cough/cold]) in children under five were randomly selected from the patient register covering the previous six

months (April to September 2006). However, some cluster's shops in Ulanga district had only recently started to operate, and so fewer than five cases per condition could be reviewed.

Simulated Clients

One simulated case of malaria, ARI, or diarrhea was conducted in three to five randomly selected ADDOs per cluster (administrative ward). In each district, a woman aged 20 to 32 years who was able to follow instructions was recruited to conduct a simulated client scenario. These recruited women were trained how to present at the ADDO describing a child with symptoms of malaria, diarrhea, or cough/cold (each condition at a different ADDO). After leaving the shop, the recruited data collector reported to a research scientist from the assessment team, and a standardized checklist was completed.

Sampling of Caretakers (Household Survey)

A total of 15 households was targeted from each cluster in the Ruvuma and Morogoro regions and were randomly selected for the study. In each selected village, caretakers with recently sick children under five years (sick in the previous two weeks but now recovered) were interviewed.

Ethical Considerations

Regional and district administrative and health authorities were officially consulted in writing, and on arrival of the assessment team, a meeting was convened to discuss the aim, conduct, and expected outcome of the study. During these sessions, consent to conduct the study in the respective districts was given. After these discussions, the team consulted the leadership of the selected communities on issues similar to those discussed with regional/district authorities. As part of the interview process with ADDO dispensers and caretakers, oral consent was obtained from each individual included in the survey by reading a statement before interviewing. Each participant was interviewed separately, and information was kept confidential.

Data Collection Team

The team of field assistants was selected based on experience and qualifications to ensure the quality of data. The team was comprised of four field assistants, a medical doctor (responsible for ADDO dispenser interviews), a fourth-year medical student (responsible for record reviews), a secondary-school teacher (responsible for household interviews) and an adult with basic education and literacy level (responsible for conducting the simulated client scenarios and then reporting the information for recording purposes to another team member).

Data Entry and Analysis

All quantitative data were double entered and validated using Epi Info, version 6.04b. Any discrepancies were resolved by cross checking against the original questionnaire. Quantitative data were analyzed using Statistical Software Package (SPSS) version 11.5 and frequencies were calculated. Because of nonresponses to some questions, the samples size (n) varied accordingly.

FINDINGS: ADDO QUESTIONNAIRE

Sample of ADDO Dispensers

The target sample size of 75 ADDOs dispensers was not achieved because of the limited number of shops in the randomly selected areas. A total of 58 ADDO dispensers were interviewed. Due to nonresponses to some questions, the denominator changes slightly for different areas of investigation. As a result, "n" is defined for each indicator throughout the analysis. In addition, it is important to note that the ADDO dispensers in Ulanga district had been trained more recently (2006) than had the ADDO dispensers in the Ruvuma region (2003 to 2004).

Of the 58 ADDO dispensers interviewed, 66 percent worked in the Ruvuma region and 35 percent worked in Ulanga district. Most (62 percent) ADDOs visited were located in periurban areas, with 38 percent located in urban areas, as shown in Table 1.

Table 1. Distribution of ADDOs Studied

Setting of ADDO	Ruvuma n=38	Ulanga n=20	Overall n=58
Periurban	20 (53%)	16 (80%)	36 (62%)
Urban	18 (47%)	4 (20%)	22 (38%)

As shown in Table 2, 50 percent of ADDOs visited were located less than 1 kilometer from the nearest health facility. Only 16 percent were more than 5 kilometers from the nearest health facility.

Table 2. Distance of ADDOs to the Nearest Health Facility

Distance to Health Facility	*Ruvuma n=38*	*Ulanga n=20*	*Overall n=58*
Under 1 km	16 (42%)	13 (65%)	29 (50%)
Between 1 and 5 km	17 (45%)	3 (15%)	20 (35%)
More than 5 kms	5 (13%)	4 (20%)	9 (16%)

General Danger Signs in Children Under Five Years of Age

Knowledge of ADDO Dispensers of General Danger Signs

According to IMCI guidelines in Tanzania, primary health care workers are responsible for recognizing the danger signs of life-threatening illnesses that they are unable to treat properly and referring these patients to a higher level of care. For children younger than two months, the general danger signs include inability to breast-feed, fast breathing, convulsion, severe chest in-drawing, fever (37.5°C or more, or feels hot), skin pustules, excessive sleepiness (lethargy) or unconsciousness, and grunting. For a child of two months to five years of age, dangers signs include inability to drink or breast-feed, vomiting everything, convulsion, excessive sleepiness, or unconsciousness.

ADDO dispensers were found to differ in their awareness of general danger signs in children below five years, as presented in Table 3, with convulsions being the most frequently mentioned sign (67 percent), followed by high temperature (53 percent), vomiting (52 percent), and lethargy (47 percent). Because most dispensers mentioned more than one danger sign, totals per region or district do not add up to 100 percent.

Table 3. ADDO Dispensers' Awareness of General Danger Signs in Children Under Five Years of Age, by Location

Sign	*Ruvuma n=38*	*Ulanga n=20*	*Overall n=58*
Convulsions	21 (55%)	18 (90%)	39 (67%)
High temperature	20 (53%)	11 (55%)	31 (53%)
Vomiting	23 (61%)	7 (35%)	30 (52%)
Lethargy	20 (53%)	7 (35%)	27 (47%)
Anemia	4 (11%)	8 (40%)	12 (21%)
Fast/difficult breathing	7 (18%)	3 (15%)	10 (17%)
Diarrhea	8 (21%)	1 (5%)	9 (16%)
Refusing to eat	4 (11%)	1 (5%)	5 (9%)

Action Taken for a Child with Danger Signs

According to standard guidelines, the ADDO dispensers are to refer immediately to a nearby health facility all cases with danger signs for a life-threatening illness, without providing any first aid. As seen in Table 4, the majority of dispensers (97 percent) stated that they refer children with danger signs to health facilities. Only 3 percent of ADDO dispensers inappropriately said that they would provide first-aid care before referring a child with dangers signs. In all 58 ADDOs visited, dispensers stated that they refer cases verbally with no system of written referral notes. This was expected because, although referral is highly emphasized in the ADDO training course, there is no defined referral protocol for recording or writing referrals within the ADDOs.

Table 4. ADDO Dispensers' Awareness of Standard Referral Practices for a Child with Danger Signs, by Location

Referral Practice	*Ruvuma n=38*	*Ulanga n=20*	*Overall n=58*
Refer children with danger signs	36 (95%)	20 (100%)	56 (97%)
Provide first aid-care before referral	2 (5%)	0	2 (3%)
Refer verbally with no referral note	38 (100%)	20 (100%)	58 (100%)

Non-pneumonia ARI

Awareness of Signs/Symptoms of Non-pneumonia ARI in a Child

According to IMCI guidelines in Tanzania, signs and symptoms for a cough/cold, when no pneumonia is present, include runny nose, sneezing, sore throat, headache, cough, and possible fever.

As shown in Table 5, 95 percent of ADDO dispensers were aware that blocked or runny nose was a sign of a child suffering from common cold. The second-most commonly reported sign was fever or hot body (66 percent), followed by cough (35 percent) and sneezing (28 percent). Fast/difficult breathing was incorrectly mentioned by 14 percent of ADDO dispensers as a sign of a common cold. Because most ADDO dispensers mentioned more than one symptom, totals per region or district do not add up to 100 percent.

Table 5. ADDO Dispensers' Awareness of Symptoms of Cold/Cough in a Child, by Location

Sign/Symptom	*Ruvuma n=38*	*Ulanga n=20*	*Overall n=58*
Blocked or runny nose	36 (95%)	19 (95%)	55 (95%)
Fever (hot body)	27 (71%)	11 (55%)	38 (66%)
Cough	12 (32%)	8 (40%)	20 (34%)
Sneezing	8 (21%)	8 (40%)	16 (28%)
Refusing to eat	6 (16%)	3 (15%)	9 (16%)
Fast/difficult breathing	6 (16%)	2 (10%)	8 (14%)
Headache	2 (5%)	2 (10%)	4 (7%)
Lethargy	2 (5%)	0	2 (3%)
Sore throat	0	1 (5%)	1 (2%)

Awareness of Recommended Medicine to Treat a Child with Cough/Cold

The appropriate treatment for simple cases of cough/cold (non-pneumonia ARI) is paracetamol for fever and headache and an inoffensive remedy to soothe the cough, such as lemon and honey for children over six months, or breast milk for infants. That is all that is needed. Antibiotics are not useful in treating non-pneumonia ARI (cough/cold), and neither are cough syrups (expectorants or suppressants) or mucolytics, because, in general, they are ineffective, as well as costly.

More than one-half (57 percent) of ADDO dispensers incorrectly reported cough syrups as a recommended medicine for cough/cold in children under five, 24 percent reported Coldril,[4] and 10 percent inappropriately reported antibiotics. No ADDO dispenser identified the recommended treatment.

Visual Aids on Cough/Cold

Only one ADDO shop, in the Ruvuma region, had visual aids on treatment of non-pneumonia ARI, which were obtained from the MOHSW.

[4] Coldril is a brand of capsule and syrup that contains pseudoephedrine hydrochloride B.P, chlorpheniramine maleate B.P, and paracetamol B.P

Pneumonia

Awareness of Key Signs/Symptoms of Pneumonia in a Child

According to IMCI guidelines in Tanzania, standard classification of pneumonia is based on the presence of fast breathing and/or chest-in-drawing, and not on the presence of cough.

Ninety-three percent of ADDO dispensers correctly identified fast/difficult breathing as indicating that a child was suffering from pneumonia. However, only 42 percent of dispensers mentioned chest in-drawing as a sign of pneumonia. Over one-half (54 percent) of ADDO dispensers identified cough as a sign of pneumonia. Other signs mentioned are shown in Table 6. Because most ADDO dispensers mentioned more than one symptom, totals per region or district do not add up to 100 percent.

Table 6. ADDO Dispensers' Awareness of Symptoms of Pneumonia in a Child, by Location*

Sign/Symptom	*Ruvuma n=37*	*Ulanga n=20*	*Overall n=57*
Fast/difficult breathing	33 (89%)	20 (100%)	53 (93%)
Fever (hot body)	26 (70%)	17 (85%)	43 (75%)
Cough	23 (62%)	8 (40%)	31 (54%)
Chest in-drawing	10 (27%)	14 (70%)	24 (42%)
Nasal flaring	10 (27%)	1 (5%)	11 (19%)
Refusing to eat	7 (19%)	1 (5%)	8 (14%)
Lethargy	5 (14%)	2 (10%)	7 (12%)
Sore throat	0	1 (5%)	1 (2%)

***** Reduction of total number of ADDOs is due to nonresponse by 1 ADDO dispenser.

Awareness of Key Signs That Differentiate Pneumonia from Cough/Cold (Non-pneumonia ARI)

ADDO dispensers were asked about the key sign for distinguishing a case of childhood pneumonia from that of cough/cold (non-pneumonia ARI). This is important: appropriate treatment depends on this distinction. If rapid breathing is present, an antibiotic is urgently needed to treat pneumonia. Ninety-three percent of ADDO dispensers correctly identified fast or difficult breathing as a key sign for differentiating a case of pneumonia from cough/cold in a child under five. Less than one-half (37 percent) of dispensers, however, correctly identified chest-in-drawing as a key sign, and the majority incorrectly mentioned cough (58 percent) or fever/hot body (75 percent), accounting for an overuse of antibiotics—as demonstrated elsewhere in the survey findings.

Awareness of Recommended Medicine to Treat a Child with Pneumonia

According to national IMCI guidelines, co-trimoxazole is the first-line antibiotic used to treat pneumonia. Amoxicillin is the recommended second-line antibiotic for treatment.

Overall, more than one-half (54 percent) of ADDO dispensers reported amoxicillin as the recommended treatment for pneumonia, whereas only 11 percent reported the recommended first-line antibiotic, co-trimoxazole (Figure 1). Due to some missing responses, the total for Ruvuma does not equal 100 percent.

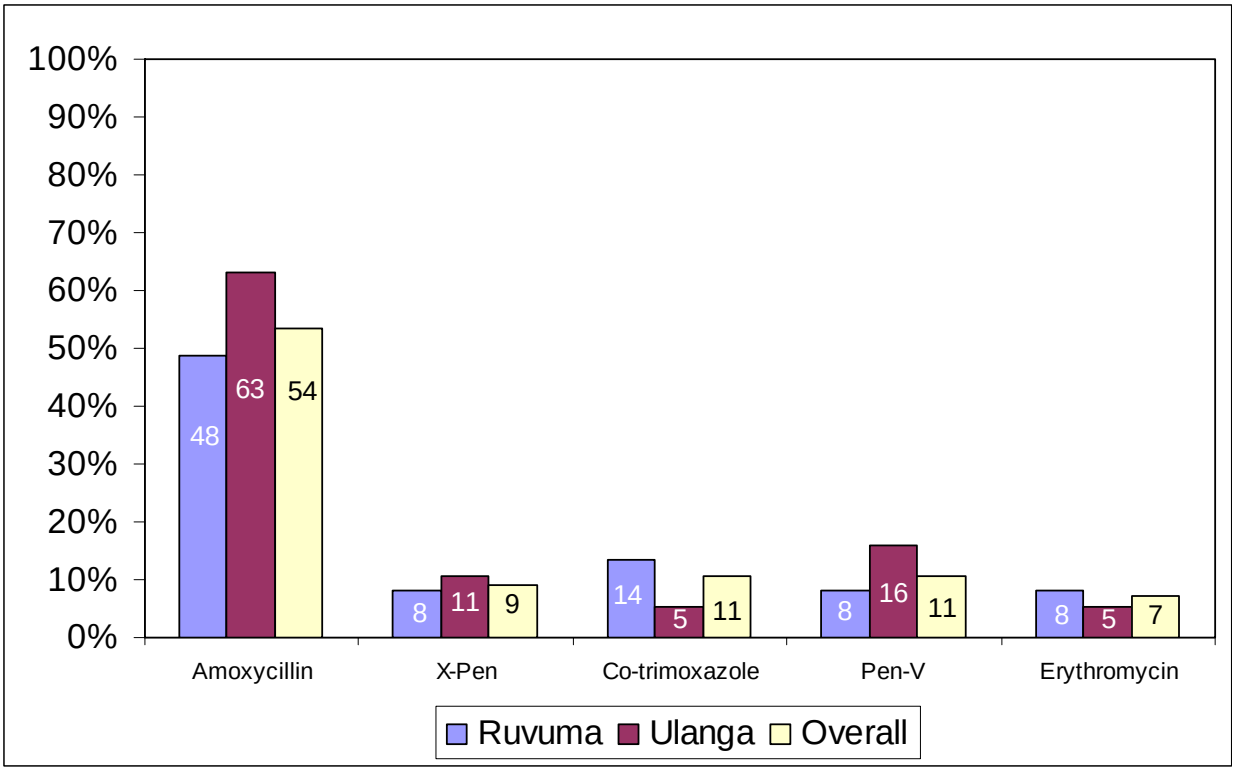

Figure 1. Recommended medicine to treat a child with pneumonia as mentioned by ADDO dispensers[5]

Visual Aids on Pneumonia

No visual aids on treatment of pneumonia were found in any of the ADDOs visited.

Malaria

Awareness of Signs/Symptoms of Malaria in a Child

According to IMCI guidelines in Tanzania, signs and symptoms of malaria include fever, chills, vomiting, diarrhea, listlessness, lack of appetite, and convulsions (the last for severe malaria).

Table 7 presents key symptoms mentioned by ADDO dispensers to indicate malaria in a two-year-old child. Fever or hot body was correctly mentioned by 93 percent of dispensers. Incorrect responses included anemia (23 percent), headache (13 percent), and cough (7 percent). Because

[5] X-Pen is injectable benzylpenicillin and Pen-V is phenoxymethyl-penicillin suspension.

most ADDO dispensers mentioned more than one symptom, totals per region or district do not add up to 100 percent.

Table 7. ADDO Dispensers' Awareness of Symptoms of Malaria in a Child, by Location*

Sign/Symptom	*Ruvuma n=37*	*Ulanga n=19*	*Overall n=56*
Fever (hot body)	34 (92%)	18 (95%)	52 (93%)
Vomiting	27 (73%)	13 (68%)	40 (71%)
Frequent/runny stool	25 (68%)	12 (63%)	37 (66%)
Fever with convulsions	12 (32%)	14 (74%)	26 (46%)
Refusing to eat	20 (54%)	6 (32%)	26 (46%)
Lethargy	14 (38%)	8 (42%)	22 (39%)
Anemia	3 (8%)	10 (53%)	13 (23%)
Headache	4 (11%)	3 (16%)	7 (13%)
Cough	2 (5%)	2 (11%)	4 (7%)

* Reduction in total number of ADDOs is due to nonresponse by 2 ADDO dispensers.

Awareness of Key Symptoms for Differentiating Malaria from Severe Malaria

ADDO dispensers should be able to differentiate an uncomplicated case of malaria from severe malaria, for which referral to a health facility is recommended. Severe malaria is indicated in the following cases—

- The child is not able to drink or breast-feed.
- The child vomits everything he/she eats or drinks.
- The child has convulsions.
- The child is lethargic (very weak and not alert to what is happening around him/her) or unconscious (sleeping all the time and not responding to stimulation such as tapping on his/her cheek or calling his/her name).
- The child has suffered severe weight loss.
- The child has already been taken for care and his/her condition has not improved.

Of dispensers interviewed, many had difficulty in recognizing the signs of severe malaria, mentioning many of the same signs/symptoms of uncomplicated malaria, as seen in Table 8. Only 4 percent of ADDO dispensers correctly said that convulsions are the key sign that differentiates severe from uncomplicated malaria. Because most ADDO dispensers mentioned more than one symptom, totals per region or district do not add up to 100 percent.

Table 8. ADDO Dispensers' Awareness of Key Symptoms for Differentiating Uncomplicated Malaria from Severe Malaria, by Location*

Sign/Symptom	*Ruvuma n=37*	*Ulanga n=19*	*Overall n=56*
Fever (hot body)	30 (81%)	7 (37%)	37 (66%)
Vomiting	12 (32%)	6 (32%)	18 (32%)
Refusing to eat	14 (38%)	2 (11%)	16 (29%)
Frequent/runny stool	9 (24%)	5 (26%)	14 (25%)
Lethargy	5 (14%)	1 (5%)	6 (11%)
Headache	4 (11%)	2 (11%)	6 (11%)
Sweating	3 (8%)	0	3 (5%)
Convulsions	1 (3%)	1 (5%)	2 (4%)
Cough	0	2 (11%)	2 (4%)
Runny nose	0	2 (11%)	2 (4%)

* Reduction in total number of ADDOs is due to nonresponse by 2 ADDO dispensers.

Awareness of Recommended Medicine to Treat a Child with Uncomplicated Malaria

At the time of the survey, SP was the recommended first-line treatment for uncomplicated malaria according to national guidelines.

Nearly all (95 percent) of the 56 ADDO dispensers who responded to this question reported SP as a recommended medicine for treating uncomplicated malaria. Only three ADDO dispensers interviewed incorrectly reported amodiaquine (AQ) as a recommended medicine.

Awareness of Measures for Preventing Malaria in Children

Of the 53 ADDO dispensers interviewed on malaria prevention (there were 5 missing values not included in the analysis), all were aware that ITNs are a preventive measure against malaria in children below five years. Forty-two percent of these dispensers mentioned environmental management, which includes clearing of grasses/ bushes around houses and draining/filling of pit holes. Other reported malaria preventive measures are shown in Table 9. Because most ADDO dispensers mentioned more than one measure, totals per region or district do not add up to 100 percent.

Table 9. ADDO Dispensers' Awareness of Malaria Preventive Measures, by Location*

Preventive Measure	*Ruvuma n=34*	*Ulanga n=19*	*Overall n=53*
Use of ITNs	34 (100%)	19 (100%)	53 (100%)
Environmental management	24 (71%)	1 (5%)	25 (47%)
Window screening	4 (12%)	4 (21%)	8 (15%)
Aerosol	4 (12%)	0	4 (8%)
Intermittent presumptive therapy in pregnancy	3 (9%)	0	3 (6%)
Wear long-sleeve shirts	1 (3%)	0	1 (2%)

* Reduction in the total number of ADDOs is due to nonresponse by 5 dispensers.

Visual Aids on Malaria

Only five of 56 ADDOs visited had visual aids on malaria (information was missing for two ADDOs, which were not included in the analysis); three ADDOs had materials from MOHSW, one ADDO had materials developed by the TFDA/ADDO program, and one had materials provided by the pharmaceutical industry. All were located in the Ruvuma region.

Diarrhea

Awareness of Recommended Medicine for Treating Diarrhea

Diarrhea causes dehydration, which, if left untreated, can lead to death in young children. According to national IMCI guidelines, the recommended treatment for children under five years of age with diarrhea is ORS. The use of antibiotics should be reserved only for cases of bloody diarrhea.

ORS was correctly mentioned by 98 percent of ADDO dispensers as the recommended treatment for non-bloody diarrhea (Table 10). However, nearly all ADDO dispensers also incorrectly mentioned treatment with antibiotics, including co-trimoxazole (79 percent) and metronidazole (80 percent), as other possible options. Because most ADDO dispensers mentioned more than one treatment, totals per region or district do not add up to 100 percent.

Table 10. ADDO Dispensers' Awareness of Recommended Medicine for Non-bloody Diarrhea, by Location*

Medicines	*Ruvuma n=37*	*Ulanga n=19*	*Overall n=56*
ORS	36 (97%)	19 (100%)	55 (98%)
Co-trimoxazole	33 (89%)	11 (58%)	44 (79%)
Metronidazole	33 (89%)	12 (63%)	45 (80%)

* Reduction in total number of ADDOs is due to nonresponse by 2 dispensers.

Awareness of ADDO Dispensers on Key Signs/Symptoms of Diarrhea That Might Need Antibiotics

If there is blood in the stool, dysentery is very likely. For treating childhood dysentery, the MOHSW recommends the antibiotic co-trimoxazole as treatment.

As seen in Table 11, less than one-half (42 percent) of 55 ADDO dispensers responded that blood in the stool was the key sign that antibiotics may be required. Other symptoms, such as frequent or runny stools and lethargy, were incorrectly mentioned as signs and symptoms requiring treatment with an antibiotic. Because most ADDO dispensers mentioned more than one symptom, totals per region or district do not add up to 100 percent.

Table 11. ADDO Dispensers' Awareness of Key Symptoms of Diarrhea That Might Require Antibiotics, by Location*

Sign/Symptom	*Ruvuma n=36*	*Ulanga n=19*	*Overall n=55*
Blood in stools	13 (36%)	10 (53%)	23 (42%)
Frequent/runny stools	15 (42%)	6 (32%)	21 (38%)
Stool with mucus	10 (28%)	9 (47%)	19 (35%)
Lethargy	13 (36%)	3 (16%)	16 (29%)
Thirst/dehydration	5 (14%)	0	5 (9%)
Fever (hot body)	4 (11%)	1 (5%)	5 (9%)
Severe stomachache	4 (11%)	0	4 (7%)
Refusing to eat	3 (8%)	0	3 (6%)

* Reduction in total number of ADDOs is due to nonresponse by 3 dispensers.

Visual Aids on Diarrhea

Only two of 54 ADDO dispensers visited (reduction in total number of ADDOs is due to missing data for 4 ADDOs) reported having visual aids on treatment of diarrhea. These two ADDOs were both in the Ruvuma region. The visual aids were obtained from TFDA/ADDO.

Awareness of Appropriate Dosing for Treatment

Dosing for Co-trimoxazole

Co-trimoxazole is the recommended treatment for pneumonia and bloody diarrhea. Figure 2 details the recommended dosing for co-trimoxazole in children under five years.

	Co-trimoxazole (trimethoprim + sulfamethoxazole) Give 2 times a day for 5 days		
Age	**Adult tablet** 80 mg trimethoprim + 400 mg sulfamethoxazole	**Pediatric tablet** 20 mg trimethoprim + 100 mg sulfamethoxazole	**Syrup** 40 mg trimethoprim + 200 mg sulfamethoxazole
2 months–12 months	½	2	5.0 ml (one teaspoon)
13 months–5 years	1	3	7.5 ml (one and one-half teaspoons)

Figure 2. Recommended dosing for co-trimoxazole in children under five

Overall, ADDO dispensers were knowledgeable of correct dosage information for co-trimoxazole for treatment of pneumonia or bloody diarrhea in a two-year-old child. Seventy-six percent of ADDO dispensers stated the correct dosage. Eight-seven percent were aware of the correct frequency of treatment, and 83 percent stated the correct duration for treatment.

However, only 56 percent of ADDO dispensers provided all information (dose, frequency, and duration of treatment) correctly, as shown in Table 12.

Table 12. ADDO Dispensers' Awareness of Appropriate Dosing of Medicine for Co-trimoxazole for Pneumonia or Bloody Diarrhea, by Location*

Description	*Ruvuma n=35*	*Ulanga n=19*	*Overall n=54*
Correct dose	29 (83%)	12 (63%)	41 (76%)
Correct frequency	29 (83%)	18 (95%)	47 (87%)
Correct duration	29 (83%)	16 (84%)	45 (83%)
All correct	21 (60%)	9 (47%)	30 (56%)

* Reduction in total number of ADDOs is due to nonresponse by 4 dispensers.

Dosing and Preparation of ORS

The majority (93 percent) of ADDO dispensers could correctly describe the preparation of ORS: pouring 1 liter of safe water (boiled and cooled) into a container, then adding one sachet to water and stirring. On frequency and duration, a total of 77 percent reported correctly (i.e., giving frequently within 24 hours). Responses are shown in Table 13.

Table 13. ADDO Dispensers' Awareness of Appropriate Dosing and Preparation of ORS, by Location*

Description	*Ruvuma n=37*	*Ulanga n=19*	*Overall n=56*
Correct preparation description	34 (92%)	18 (95%)	52 (93%)
Correct frequency and duration	27 (73%)	16 (84%)	43 (77%)
All correct	25 (68%)	15 (79%)	40 (71%)

* Reduction in total number of ADDOs is due to nonresponse by 2 dispensers.

Dosing for Malaria

At the time of the survey, the recommended first-line treatment for uncomplicated malaria was SP according to national guidelines. The Government of Tanzania officially adopted the combination therapy artemether (20 mg) and lumefantrine (120 mg) (AL) as the first-line treatment for malaria in January 2007. Due to the imminent change in policy, information was not gathered on SP dosing for malaria; ADDO dispensers were not yet trained in the management of malaria using AL.

Medicines in Stock

Availability of medicines at the ADDOs was assessed using a predefined tracer list of medicines and other pharmaceutical supplies for the treatment of childhood illnesses that should be stocked at the ADDOs, according to the list defined by the TFDA. For a full list of medicines authorized by the TFDA for sale through ADDOs, see Annex 1.

As shown in Table 14, most medicines on the tracer list were found in stock, though in different formulations. Overall, only 23 percent of shops had ITNs in stock, and approximately one-half (51 percent) had ORS in stock. It is important to note that differences were seen between Ruvuma and Ulanga. Whereas only 31 percent of shops in Ruvuma had ORS available at the time of the survey, 89 percent of shops in Ulanga had ORS in stock. Although both Ruvuma and Ulanga had low availability of ITNs, 31 percent of shops in Ruvuma had ITNs available, whereas only 6 percent of shops in Ulanga had ITNs in stock.

Table 14. Availability of Tracer Medicines and Products at ADDOs, by Location*

Medicine	*Ruvuma n=35*	*Ulanga n=18*	*Overall n=53*
Amodiaquine tablets	33 (94%)	18 (100%)	51 (96%)
Amoxicillin syrup	28 (80%)	15 (83%)	43 (81%)
Amoxicillin tablets	27 (77%)	14 (78%)	41 (77%)
Artemether-lumefantrine	1 (3%)	1 (6%)	2 (4%)
Co-trimoxazole syrup	26 (74%)	14 (78%)	40 (76%)
Co-trimoxazole tablets	26 (74%)	17 (94%)	43 (81%)
ITNs	11 (31%)	1 (6%)	12 (23%)
ORS	11 (31%)	16 (89%)	27 (51%)
Quinine injection	26 (74%)	14 (78%)	40 (76%)
Quinine tablets	21 (60%)	15 (83%)	36 (68%)
Sulfadoxine-pyrimethamine	32 (91%)	18 (100%)	50 (94%)

* Reduction in total number of ADDOs is due to non-response by 5 dispensers.

Awareness of Dispensing Practices and Labeling of Medicines

Information to Be Written on the Package Label of Medicine Dispensed

As part of ADDO dispenser training, candidates are taught appropriate dispensing and labeling practices. According to the ADDO training manual, the following information should be included on the labels of medicines dispensed—

- Name of the patient
- Name and strength of the drug
- Quantity of the drug supplied
- Instructions on how the drug is to be used—
    - How much each time
    - How often per day
    - How many days
    - With or without meals
    - With plenty of fluids, etc.
- Date supplied
- Name and address of the health care facility/ADDO shop

As shown in Table 15, the information most commonly reported by ADDO dispensers to be included on the package was how to take the prescribed medicine (at 91 percent of responses),

followed by the name of the medicine (85 percent) and the patient name (71 percent). Just over half of ADDO dispensers included information on the label about the duration for which the medicine should be taken.

Table 15. ADDO Dispensers' Awareness of Information to Be Written on Medicine Package, by Location*

Information	*Ruvuma n=37*	*Ulanga n=18*	*Overall n=55*
How to take	32 (87%)	18 (100%)	50 (91%)
Name of medicine	31 (84%)	16 (89%)	47 (85%)
Patient name	23 (62%)	16 (89%)	39 (71%)
Duration	22 (60%)	8 (44%)	30 (55%)

* Reduction in total number of ADDOs is due to nonresponse by 3 dispensers.

Awareness of Information to Be Provided to Caregivers During Dispensing

When asked what information they provide to customers when dispensing medicines, most (93 percent) ADDO dispensers responded that they explain when and how to take the medicine, as shown in Table 16. All other information provided was far less commonly cited, including information on side effects (57 percent) and on how to store the medicines (55 percent). Only 20 percent of ADDO dispensers included the importance of completing the dose as information given when dispensing medicines. Only four of 55 dispensers said that they told the client the name of the medicine when they dispensed.

Table 16. ADDO Dispensers' Awareness of Information about Medicine That Should Be Explained During Dispensing, by Location*

Information	*Ruvuma n=37*	*Ulanga n=18*	*Overall n=55*
When and how to take	33 (89%)	18 (100%)	51 (93%)
Side effects	17 (46%)	15 (83%)	32 (58%)
How to store	15 (41%)	15 (83%)	30 (55%)
Importance of completing dose	9 (24%)	2 (11%)	11 (20%)
What it treats	9 (24%)	0	9 (16%)
Not to drink liquor	5 (14%)	0	5 (9%)
Name of medicine	3 (8%)	1 (6%)	4 (7%)

* Reduction in total number of ADDOs is due to non-response by 3 dispensers.

FINDINGS: PATIENT REGISTER REVIEW

A retrospective record review was conducted at randomly selected ADDOs to assess sales practices of dispensers. Ten cases of each target condition from the preceding six months were randomly selected from the patient register in each shop.

The record review focused on collecting information on the quality of record-keeping, diagnosis, and management of target diseases for children under five years (malaria, diarrhea, and ARI) in terms of recognition of the illness and its seriousness, the type of medicine prescribed, dosage, and referral.

Characteristics of Sample

For the record review a total of 69 ADDO shops were visited, 50 in the Ruvuma region and 19 in Ulanga district. From the patient registers a total of 1,436 cases of children under five years from a period of six months was reviewed, as seen in Table 17.

Table 17. Cases Reviewed in Patient Registers of ADDO Shops, by Location*

Cases Reviewed	*Ruvuma n=50*	*Ulanga n=19*	*Overall n=69*
Total number of cases reviewed	1,022	414	1,436
Cases of non-pneumonia ARI	272	110	382
Cases of pneumonia	224	92	316
Cases of malaria	281	110	391
Cases of non-bloody diarrhea	222	66	288
Cases of bloody diarrhea	23	36	59

*n is the number of ADDOs visited.

TFDA Adverse Drug Reaction Form and Register

The TFDA ADR program aims to collect, monitor, assess, and evaluate information from health care providers and patients on the adverse effects of medications. According to TFDA regulations, the ADR form is to be filled out and forwarded to TFDA when an adverse reaction is reported. As part of patient records review, information was collected on the availability of TFDA ADR forms and ADR registers.

None of the 69 ADDO shops visited had TFDA ADR forms on hand, although 32 shops had ADR registers. The majority of these shops were located in the Ruvuma region. All shops had patient register books.

Non-pneumonia ARI Cases

A total of 379 non-pneumonia ARI cases were reviewed for which information was provided regarding prescriptions (three cases were missing information on the prescription and so were not included in the analysis). Most of these cases (78 percent) were diagnosed by the ADDO dispenser, with medicines sold on the dispenser's recommendation (as seen in Table 18). Of the 85 cases that came to the ADDO with a prescription, 49 cases were from the Ruvuma region and the remaining 36 were from Ulanga district.

Table 18. Diagnosis of Non-pneumonia ARI Cases, by Location*

Diagnosed By	Ruvuma n=270	Ulanga n=109	Overall n=379
ADDO dispenser	221 (82%)	73 (67%)	294 (78%)
Health facility/came to ADDO with a prescription	49 (18%)	36 (33%)	85 (22%)

* Reduction in total number of cases reviewed is due to missing information for 3 cases.

The majority of these cough/cold (non-pneumonia ARI) cases, in both the Ruvuma region and Ulanga district, were not treated with an antibiotic, as indicated in Table 19.

Table 19. Medicines Sold to Caregivers with Children Presenting with Non-pneumonia ARI, by Location*

Medicine Sold	Ruvuma n=270	Ulanga n=109	Overall n=379
Antibiotics	30 (11%)	18 (17%)	48 (13%)
Other medicine	240 (89%)	91 (83%)	331 (87%)

* Reduction in total number of cases reviewed is due to missing information for 3 cases.

But for those small number of cases inappropriately treated with an antibiotic, most (63 percent) were not diagnosed by the ADDO dispenser but referred to the ADDO with a prescription, as seen in Table 20.

Table 20. Source of Medicine Choice for Non-pneumonia ARI Cases Treated with an Antibiotic, by Location

Diagnosed/Prescribed By	Ruvuma n= 30	Ulanga n= 18	Overall n= 48
ADDO	15 (50%)	3 (17%)	18 (38%)
Health facility/ came to ADDO with a prescription	15 (50%)	15 (83%)	30 (63%)

For most cases that were treated with a medicine other than an antibiotic, most (69 percent) were unnecessarily treated with cough syrup, as shown in Table 21. Similar trends were seen in the medicines dispensed, whether in cases treated by ADDO diagnosis or those who arrived at the shop with a prescription.

Table 21. Medicines Sold to Non-pneumonia ARI Cases Not Treated with an Antibiotic, by Location*

Medicine	Ruvuma n= 241	Ulanga n=78	Overall n=319
Cough syrup	163 (68%)	55 (71%)	218 (68%)
Coldril	63 (26%)	22 (28%)	85 (27%)
Ephedrine	5 (2%)	0	5 (2%)
Priton (chlorphenamine antihistamine)	3 (1%)	0	3 (1%)
Antipyretics	3 (1%)	1 (1%)	4 (1%)
Ammonium	4 (2%)	0	4 (1%)

* Reduction in total number of cases reviewed is due to missing information for 12 cases.

Pneumonia

A total of 316 pneumonia cases were reviewed from the patient register books during the survey. Of the cases where information was available on source of prescription, only 23 percent were diagnosed by ADDO dispensers, as shown in Table 22. All other cases were treated based on prescriptions brought to the shop.

Table 22. Diagnosis for Pneumonia Cases, by Location*

Diagnosed By	Ruvuma n=221	Ulanga n=92	Overall n=313
ADDO dispenser	53 (24%)	18 (20%)	71 (23%)
Health facility/came to ADDO with a prescription	168 (76%)	74 (80%)	242 (77%)

* Reduction in total number of cases reviewed is due to missing information for 3 cases.

As shown in Table 23, 97 percent of pneumonia cases were appropriately treated with an antibiotic. Of the eight cases that were not sold an antibiotic, five came to the ADDO with a prescription (for other treatment) and three came to the ADDO with no prescription.

Table 23. Type of Medicine Sold to Caregivers of Children with Pneumonia ARI, by Location

Medicine Sold	Ruvuma n=224	Ulanga n=92	Overall n=316
Antibiotic	220 (98%)	88 (96%)	308 (97%)
Other	4 (2%)	4 (4%)	8 (3%)

Of the cases that received an antibiotic, only 17 percent were given the recommended first-line treatment, co-trimoxazole. Of the cases that received co-trimoxazole 81 percent were sold the correct amount to treat pneumonia. Of the cases sold the correct amount of co-trimoxazole, 86 percent came with a prescription and the remaining 14 percent came to the ADDO with no prescription.

Malaria

A total of 391 malaria cases were reviewed from the patient registers. The majority were uncomplicated malaria, with the few severe malaria cases all being referred to ADDOs with prescriptions, as seen in Table 24.

Table 24. Malaria Cases Reviewed, by Location

Type	Ruvuma n=281	Ulanga n=110	Overall n=391
Uncomplicated malaria	280 (100%)	104 (95%)	384 (98%)
Severe malaria	1 (0%)	6 (6%)	7 (2%)

As Table 25 shows, diagnosis of malaria cases treated at the ADDOs was nearly an even split, with slightly more than one-half (57 percent) of cases being diagnosed by the ADDO dispenser rather than arriving with a prescription.

Table 25. Diagnosis of Malaria Cases, by Location

Diagnosed By	Ruvuma n=281	Ulanga n=110	Overall n=391
ADDO dispenser	158 (56%)	65 (60%)	223 (57%)
Health facility/came to ADDO with a prescription	123 (44%)	45 (40%)	168 (43%)

When investigating treatment by ADDO diagnosis as compared to treatment with prescription by referral, however, there is a clear difference in the medicines dispensed, as seen in Table 26. In both circumstance, a range of antimalarials was sold. Under one-half (42 percent) of cases diagnosed by ADDO dispensers were treated with SP tablets, followed by AQ syrup (23 percent). Only 14 percent of referral cases were treated with the recommended first-line treatment, SP.

No one antimalarial stands out as the most frequently sold based on referral with prescription. Twenty-five percent were prescribed and sold AQ syrup, 21 percent were prescribed and sold AQ tablets, and 21 percent were prescribed and sold quinine tablets. Surprisingly, 24 cases (14 percent) referred to ADDOs with prescriptions for malaria were prescribed and sold quinine injections (only four of these were documented as severe malaria).

Table 26. Antimalarial Medicines Sold to Malaria Patients per Source of Medicine Choice, by Location

Diagnosed by ADDO Dispenser			
Medication Sold	**Ruvuma n=158**	**Ulanga n=65**	**Overall n=223**
SP tablets	66 (42%)	27 (42%)	93 (42%)
Amodiaquine syrup	32 (20%)	19 (29%)	51 (23%)
Amodiaquine tablets	29 (18%)	10 (15%)	39 (18%)
Quinine tablets	24 (15%)	1 (2%)	25 (11%)
Quinine injection	2 (1%)	0	2 (1%)
Quinine syrup	0	1 (2%)	1 (0%)
Other	5 (3%)	7 (11%)	12 (5%)
Referred with a Prescription			
Medication Sold	**Ruvuma n=123**	**Ulanga n=45**	**Overall n=168**
Amodiaquine syrup	32 (26%)	10 (22%)	42 (25%)
Amodiaquine tablets	18 (15%)	17 (38%)	35 (21%)
Quinine tablets	31 (25%)	4 (9%)	35 (21%)
Quinine injection	22 (18%)	2 (4%)	24 (14%)
SP tablets	15 (12%)	8 (18%)	23 (14%)
Quinine syrup	3 (2%)	3 (7%)	6 (4%)
Other	2 (2%)	1 (2%)	3 (2%)

Of the seven cases of severe malaria, all of which were referred with prescriptions, four cases were treated with quinine injection, one case was treated with AQ syrup, and another with quinine syrup. (One case had no information on medication.)

In Table 27, dosing of antimalarials for cases diagnosed by the ADDO dispensers is analyzed. Just over one-half (58 percent) of medicines were dispensed in the correct dose based on treatment guidelines: 88 percent of SP tablets (the first-line treatment at the time of the survey) were correctly dosed, and 75 percent quinine tablets were correctly dosed. Problems seem to surround the correct dosing of AQ, with only 26 percent of cases receiving AQ tablets given the correct dose and only 23 percent of cases receiving AQ syrup given the correct dose.

Table 27. Correct Dose in Malaria Cases Diagnosed by ADDO Dispenser, by Location*

Medication	***Ruvuma n=147***	***Ulanga n=56***	***Overall n=203***
Quinine syrup	0	0/1 (0%)	0/1 (0%)
SP tablets	56/63 (89%)	22/26 (85%)	78/89 (88%)
Quinine tablets	17/23 (74%)	1/1 (100%)	18/24 (75%)
Amodiaquine tablets	9/29 (31%)	1/10 (10%)	10/39 (26%)
Amodiaquine syrup	9/30 (30%)	2/18 (11%)	11/48 (23%)
Quinine injection	0/2 (0%)	0	0/2 (0%)

* Reduction in total number of cases reviewed is due to missing information for 13 cases.

Diarrhea

A total of 347 cases from patient registers were reviewed. The majority (83 percent) of cases were non-bloody diarrhea, as seen in Table 28.

Table 28. Diarrhea Cases Reviewed, by Location

Type	Ruvuma n=245	Ulanga n=102	Overall n=347
Diarrhea (non-bloody)	222 (91%)	66 (59%)	288 (83%)
Bloody diarrhea	23 (9%)	36 (35%)	59 (17%)

Of the 347 diarrhea cases reviewed, 288 were cases of non-bloody diarrhea. Of these, just over one-third (37 percent) were diagnosed by ADDO dispensers, as shown in Table 29.

Table 29. Diagnosis of Non-bloody Diarrhea Cases, by Location

Diagnosed By	Ruvuma n=222	Ulanga n=66	Overall n=288
ADDO dispenser	85 (38%)	22 (33%)	107 (37%)
Health facility/came to ADDO with a prescription	137 (62%)	44 (67%)	181 (63%)

With treatment of diarrhea, two main aspects were assessed, (1) how often ORS was appropriately sold, and (2) how often antibiotics were inappropriately sold. Eighty-four percent of non-bloody diarrhea cases were incorrectly sold antibiotics. Fewer of these cases were diagnosed by the ADDO dispenser, but antibiotics are sold too often for non-bloody diarrhea, whether diagnosed at the ADDO or referred with a prescription. Only 45 cases (16 percent) were sold ORS, the recommended treatment for diarrhea. For 12 of these cases, ORS was inappropriately accompanied by an antibiotic.

Bloody Diarrhea

Of 347 diarrhea cases reviewed, 59 cases were bloody diarrhea. The majority (80 percent) of these cases came to ADDOs with prescriptions, as shown in Table 30.

Table 30. Diagnosis of Bloody Diarrhea Cases, by Location

Diagnosed By	Ruvuma n=23	Ulanga n=36	Overall n=59
ADDO dispenser	7 (30%)	5 (14%)	12 (20%)
Health facility/came to ADDO with a prescription	16 (70%)	31 (86%)	47 (80%)

Nearly all 59 cases (97 percent) of bloody diarrhea were sold antibiotics; however, only 17 of these cases (30 percent) were sold co-trimoxazole, the recommended first-line treatment. Table 31 shows the medications sold by recommendation of the ADDO dispensers and those referred with a prescription.

Table 31. Antibiotics Sold for Bloody Diarrhea Cases, by Location

Diagnosed by ADDO Dispenser			
Medicine	**Ruvuma n=7**	**Ulanga n=5**	**Overall n=12**
Antibiotic	7 (100%)	4 (80%)	11 (92%)
First-line antibiotic treatment (co-trimoxazole)	3/7 (43%)	0/4 (0%)	3/11 (27 %)
Referred with a Prescription			
Medicine	**Ruvuma n=16**	**Ulanga n=31**	**Overall n=47**
Antibiotic	16 (100%)	30 (97%)	46 (98%)
First-line antibiotic treatment (co-trimoxazole)	5/16 (31%)	9/30 (30%)	14/46 (30%)

FINDINGS: SIMULATED CLIENT SCENARIOS

Sixty-eight simulated client scenarios were conducted at randomly selected ADDOs: 47 in the Ruvuma region and 21 in Ulanga district. These simulated client scenarios consisted of 24 cases of non-pneumonia ARI, 22 cases of uncomplicated malaria, and 22 cases of non-bloody diarrhea.

To assess the practices and quality of dispensing provided by the shops, data collectors recruited women from the community between 20 and 32 years of age who were comfortable following directions to simulate caretakers with a young child for each of three illnesses: malaria, non-pneumonia ARI, and diarrhea.

Information was collected on a number of points, including whether the dispenser checked patient history, assessed the severity of illness, informed caretakers about the nature of the child's illness, as well as what medicine the dispenser recommended and any additional information that was provided to the client regarding the medicine and care of the patient.

Checking Patient History

In all case scenarios, ADDO dispensers asked caretakers the age of the sick child for all three diseases, as presented in Table 32. For non-pneumonia ARI cases, 71 percent of ADDO dispensers asked about duration of illness, but only 38 percent asked questions regarding medication history. For malaria cases, ADDO dispensers frequently asked about the duration of illness (82 percent) and medication history (86 percent). For diarrhea cases, only 27 percent of ADDO dispensers asked about duration of illness, and less than one-half (41 percent) asked the simulated client about medication history. All these questions are essential in order to appropriately assess the condition of the patient.

Table 32. Percentage of ADDO Dispensers Asking about Age, Duration of Illness, and Medication History for Non-pneumonia ARI, Malaria and Diarrhea Scenarios, by Location

Illness/Question	*Ruvuma* *n=47*	*Ulanga* *n=21*	*Overall* *n=68*
Non-pneumonia ARI	**n=17**	**n=7**	**n=24**
Age	17 (100%)	7 (100%)	24 (100%)
Duration of illness	11 (65%)	6 (86%)	17 (71%)
Medication history	6 (35%)	3 (43%)	9 (38%)
Malaria	**n=15**	**n=7**	**n=22**
Age	15 (100%)	7 (100%)	22 (100%)
Duration of illness	11 (73%)	7 (100%)	18 (82%)
Medication history	12 (80%)	7 (100%)	19 (86%)
Diarrhea	**n=15**	**n=7**	**n=22**
Age	15 (100%)	7 (100%)	22 (100%)
Duration of illness	5 (33%)	1 (14%)	6 (27%)
Medication history	7 (47%)	2 (29%)	9 (41%)

Assessing Severity and Checking General Danger Signs

For non-pneumonia ARI cases nearly all (96 percent) ADDO dispensers asked the simulated client about cough, and 71 percent correctly asked about rapid respiration in assessing the severity of illness. For malaria cases 96 percent of ADDO dispensers inquired about fever, but only 50 percent asked about the child's ability to take liquids and only 27 percent asked about vomiting. For cases of diarrhea, 64 percent of dispensers asked simulated clients about frequency of bowel movements. Just over one-half (55 percent) asked about blood in the stool, a key sign that antibiotics may be required. Other signs and symptoms for the three conditions asked about by the ADDO dispensers are presented in Table 33.

Table 33. Clinical Symptoms and Signs Asked about by ADDO Dispensers for Non-pneumonia ARI, Malaria and Diarrhea Scenarios, by Location

Illness/Symptom	*Ruvuma n=47*	*Ulanga n=21*	*Overall n=68*
Non-pneumonia ARI	**n=17**	**n=7**	**n=24**
Cough	16 (94%)	7 (100%)	23 (96%)
Rapid respiration	11 (65%)	6 (86%)	17 (71%)
Fever	7 (41%)	2 (29%)	9 (38%)
Malaria	**n=15**	**n=7**	**n=22**
Fever	14 (93%)	7 (100%)	21 (96%)
Able to drink liquid	7 (4%)	4 (57%)	11 (50%)
Vomiting	4 (27%)	2 (29%)	6 (27%)
Diarrhea	**n=15**	**n=7**	**n=22**
Frequency of bowel movements	11 (73%)	3 (43%)	14 (64%)
Blood in feces	8 (53%)	4 (57%)	12 (55%)
Vomiting	6 (40%)	5 (71%)	11 (50%)
Able to drink liquid	8 (53%)	3 (43%)	11 (50%)
Able to take in food	6 (40%)	1 (14%)	7 (32%)

Dispensers Informing Caretakers about the Nature of Child's Illness

As seen in Table 34, 69 percent of ADDO dispensers informed simulated clients about the child's illness based on the symptoms given. It is important to note that eight of the 14 ADDO dispensers (five cases from Ruvuma and three cases from Ulanga) who were presented with non-pneumonia ARI scenarios incorrectly told the simulated client that the child had pneumonia.

Table 34. Percentage of Dispensers Informing Caretakers about Child's Illness (Non-pneumonia ARI, Malaria and Diarrhea Scenarios), by Location

Illness/Action Taken	*Ruvuma n=47*	*Ulanga n=21*	*Overall n=68*
Non-pneumonia ARI	**n=17**	**n=7**	**n=24**
Informed caretakers	10 (59%)	4 (57%)	14 (58%)
Malaria	**n=15**	**n=7**	**n=22**
Informed caretakers	13 (87%)	5 (71%)	18 (82%)
Diarrhea	**n=15**	**n=7**	**n=22**
Informed caretakers	9 (60%)	6 (86%)	15 (68%)
Total	**32/47 (68%)**	**15/21 (71%)**	**47/68 (69%)**

Medicines Sold by ADDO Dispensers

Non-pneumonia ARI

As shown in Table 35, 87 percent of simulated case scenarios with cough/cold (non-pneumonia ARI) were dispensed medicines. One-half (50 percent) of the medicines sold were antibiotics (amoxicillin, erythromycin, penicillin), which are inappropriate for the treatment of cough/cold (non-pneumonia ARI). Amoxicillin was sold to 55 percent of all clients who were sold antibiotics.

Table 35. Medicines Recommended and Sold by ADDO Dispensers for Non-pneumonia ARI, Malaria and Diarrhea Scenarios, by Location

Illness/Medicine	*Ruvuma n=47*	*Ulanga n=21*	*Overall n=68*
Non-pneumonia ARI	**n=17**	**n=7**	**n=24**
Cough syrup	5 (29%)	2 (29%)	7 (29%)
Amoxicillin	4 (24%)	2 (29%)	6 (25%)
Erythromycin	4 (24%)	0	4 (17%)
Coldril	2 (12%)	0	2 (8%)
Penicillin	1 (6%)	0	1 (4%)
Ampicillin	0	1 (14%)	1 (4%)
Not sold medicine; referred to a health facility	1 (6%)	2 (29%)	3 (13%)
Malaria	**n=15**	**n=7**	**n=22**
Sulfadoxine-pyrimethamine	6 (40%)	4 (57%)	10 (46%)
Amodiaquine	6 (40%)	0	6 (27%)
Quinine	1 (7%)	0	1 (5%)
Not sold medicine; referred to a health facility	2 (13%)	3 (43%)	5 (23%)
Diarrhea (non-bloody)	**n=15**	**n=7**	**n=22**
Co-trimoxazole	6 (40%)	2 (29%)	8 (36%)
Metronidazole	6 (40%)	1 (14%)	7 (32%)
ORS	1 (7%)	2 (29%)	3 (14%)
Erythromycin	1 (7%)	1 (9%)	2 (9%)
Not sold medicine; referred to a health facility	1 (7%)	1 (14%)	2 (9%)

Malaria

Of the 22 malaria case scenarios, 77 percent were dispensed medicine for treatment. All of these received an antimalarial. Just over one-half (59 percent) of cases were correctly sold SP tablets, as shown in Table 35. Five case scenarios (23 percent) were advised to contact a health facility first for a blood-slide test to confirm if the reported fever was due to malaria. The dosages for all antimalarial medicines dispensed were correct.

Diarrhea (Non-bloody)

Of the 20 simulated cases of non-bloody diarrhea where medicines were recommended, antibiotics were inappropriately sold for 85 percent of cases. Only three simulated clients were dispensed the correct first-line treatment of ORS, as shown in Table 35.

Counseling and Complementary Information Provided by ADDO Dispensers

Counseling on issues such as preventing disease, when to come back, what to do for a worsening condition, and nutrition is important in case management of sick children. Health workers in the public sector are trained to provide this at patient consultations.

Non-pneumonia ARI

Only two simulated clients, both in the Ruvuma region, were advised to visit a doctor or clinic for a child with difficult breathing. An additional five cases (three from Ruvuma and two from Ulanga district) from the 22 ADDOs where information was collected[6] were referred to nearby health facilities. Of the five referrals given, four were verbal. Information on adverse effects of medicines dispensed was given to only one simulated client in the Ruvuma region who was dispensed Coldril for treatment of non-pneumonia ARI.

Malaria

Instructions on how to administer medicines was given to 65 percent of simulated clients. Very little complementary information was provided to clients. Only one client, in the Ruvuma region, was advised to give the child more fluids than usual. Only two clients, one each from Ruvuma and Ulanga, were instructed to visit a doctor or clinic if fever persisted. No advice was given on preventive measures such as use of ITNs, and no information was provided on possible adverse effects of any of the medicines. Of the total 22 case scenarios, six cases, including two from Ruvuma and four from Ulanga district, were verbally referred to nearby health facilities, five of these with no medicines sold.

[6] Two ADDOs were excluded from the analysis due to missing values.

Diarrhea

Of the 22 case scenarios for diarrhea, only four simulated clients, two in Ruvuma and two in Ulanga, were advised to visit a doctor or clinic if diarrhea persisted. Four clients, two from Ruvuma and two from Ulanga, were instructed to continue breast-feeding often; four clients, all in Ruvuma, were told to continue giving liquids and food; and only one simulated client, in Ruvuma, was advised to give the child more fluids than usual.

In relation to preventive measures, only three case scenarios, all in Ruvuma, were given advice on maintaining personal hygiene and cleanliness. Five of 22 cases, three in Ruvuma and two in Ulanga, were referred (verbally) to health facilities.

Of those cases where medicines were sold, 65 percent were given the correct dosage, 75 percent were told the correct frequency, and 50 percent were instructed on the correct duration of intake. Instructions on how to take the medicines (e.g., with water) were given in only 45 percent of cases. Only two cases, or 10 percent, of simulated clients received information on adverse effects.

FINDINGS: HOUSEHOLD SURVEY

A total of 544 caretakers of recently sick (in the previous two weeks but now recovered) children below five years of age were interviewed to assess community perceptions about care of sick children, and to gain information about care seeking and medicine use practices within families. The questionnaire focused on care-seeking behavior for sick children suffering from malaria, ARI, and diarrhea, recognition of clinical symptoms of targeted diseases, source of medicines, and measures used to prevent illness. Information on how medicines were administered to the child was also collected.

Of the 544 sick children discussed during caretaker interviews, age information was available for only 538. Thirty-two percent of these children were ages birth to below one year; 28 percent were ages one to below two years; 17 percent were ages two to below three years; 12 percent were ages three to below four years; and 11 percent were ages four to below five years. The median age was 25 months.

Illness Reported by Caretakers

According to their two-week recall, the majority of caretakers (78 percent) reported having children with fever or hot body; only 4 percent reported convulsions. The other illnesses reported by caretakers are shown in Table 36.

Table 36. Illnesses Experienced by Children under Five Years as Reported by Caretakers, by Location*

Illness	*Ruvuma n=290*	*Ulanga n=254*	*Overall n=544*
Fever/hot body	231/290 (80%)	191/254 (75%)	422/544 (78%)
Diarrhea	66/290 (23%)	65/254 (26%)	131/544 (24%)
Cough	9/287 (3%)	54/249 (22%)	63/536 (12%)
Fast breathing	29/290 (10%)	41/253 (16%)	70/543 (13%)
Convulsions	12/287 (4%)	12/249 (5%)	24/536 (4%)

*Due to missing values, sample sizes vary for each illness.

Perception of Severity of Illness and Danger Signs

Table 37 examines the ability of the caretakers to correctly judge the severity of signs of illness. Among the 61 cases with difficult or rapid breathing, 73 percent recognized this as a very serious or somewhat serious sign of illness. Of the 20 caretakers with children experiencing convulsions, 65 percent recognized this as a very serious or somewhat serious sign of illness, but more than one-quarter (30 percent) stated that convulsions were not serious and over half (53 percent) of caretakers with children experiencing bloody diarrhea stated that the condition was not serious.

Table 37. Perceptions among Caretakers of Serious Illness in Children under Five Years, by Location

Sign of Illness/Perception of Severity	*Ruvuma*	*Ulanga*	*Overall*
Difficult/Fast breathing	**n=28**	**n=33**	**n=61**
Very serious	3 (11%)	4 (12%)	7 (12%)
Somewhat serious	13 (46%)	24 (73%)	37 (61%)
Not serious	9 (32%)	5 (15%)	14 (23%)
Don't know	3 (11%)	0	3 (5%)
Convulsions	**n=12**	**n=8**	**n=20**
Very serious	1 (8%)	2 (25%)	3 (15%)
Somewhat serious	7 (58%)	3 (38%)	10 (50%)
Not serious	3 (25%)	3 (38%)	6 (30%)
Don't know	1 (8%)	0	1 (5%)
Bloody Diarrhea	**n=11**	**n=6**	**n=17**
Very serious	0	0	0
Somewhat serious	3 (27%)	5 (83%)	8 (47%)
Not serious	8 (73%)	1 (17%)	9 (53%)
Don't know	0	0	0

However, as shown in Table 38, when asked to identify danger signs of serious illness in children under five, caretakers had poorer awareness. Correctly, 45 percent of caretakers mentioned a child's being very sleepy or lethargic as a danger sign of serious illness. Other responses, also correct, include vomiting (29 percent), refusal to eat or drink (25 percent), and convulsions (18 percent).

Table 38. Caretakers' Awareness of Danger Signs of Illness in Children under Five, by Location*

Danger Signs (as Defined by IMCI)	*Ruvuma n=290*	*Ulanga n=246*	*Overall n=536***
Very sleepy/lethargic	118 (41%)	125 (51%)	243 (45%)
Vomiting	54 (19%)	102 (41%)	156 (29%)
Refuse to eat or drink	74 (26%)	61 (25%)	135 (25%)
Convulsions	20 (7%)	74 (30%)	94 (18%)
Severe weight loss	5 (2%)	6 (2%)	11 (2%)
Don't know	18 (6%)	5 (2%)	23 (4%)
Other***	290	247	537

*Because some caretakers provided more than one response, column totals do no add up to 100%.
**Eight cases had missing information and were excluded from the analysis (1 in Ruvuma and 7 in Ulanga).
***Caregivers frequently mentioned one or more danger signs that are not part of the national guidelines for key danger signs.

Pneumonia

Of the 70 caretakers who reported having children who experienced fast breathing, 96 percent sought advice, treatment, or medicine outside the home. In only a few cases did caretakers leave the condition alone until the child got better or treat it at home without going anywhere for advice, treatment, or medicine, as seen in Table 39.

Table 39. Action Taken by Caretakers for Child with Fast Breathing, by Location

Action Taken	*Ruvuma n=29*	*Ulanga n=41*	*Overall n=70*
Sought care outside the home	27 (93%)	40 (98%)	67 (96%)
Left the condition alone until the child got better	1 (3%)	1 (2%)	2 (3%)
Treated in the home	1 (3%)	0	1 (1%)

As demonstrated in Table 40, most caregivers who sought care did so the same or next day that the symptom appeared.

Table 40. Timing of Care Seeking for Fast Breathing, by Location

Time of Action	*Ruvuma n=27*	*Ulanga n=40*	*Overall n=67*
Same day	16 (59%)	13 (33%)	29 (43%)
Next day	7 (26%)	19 (48%)	26 (39%)
Two days	3 (11%)	4 (10%)	7 (10%)
Three or more days	1 (4%)	4 (10%)	5 (8%)

The first source of care that caretakers choose is important in assessing appropriateness of action. An appropriate source of care, if visited, is likely to encourage appropriate treatment and recovery. The majority of caregivers (68 percent) reported first contacting a government facility (health center, health post, or hospital), with only 15 percent first seeking care at an ADDO. Other sources of care consulted by caretakers are shown in Table 41.

Table 41. Outlets Consulted for Advice, Treatment, or Medicine among Caretakers Who First Sought Advice or Treatment Outside the Home for Pneumonia, by Location*

Outlet	*Ruvuma n=21*	*Ulanga n=39*	*Overall n=60*
Government health center	4 (19%)	20 (51%)	24 (40%)
Government health post	8 (38%)	2 (5%)	10 (17%)
Government hospital	3 (14%)	6 (15%)	9 (15%)
ADDO	1 (5%)	8 (21%)	9 (15%)
Private or mission health facility	5 (24%)	3 (8%)	8 (13%)

*Seven cases had missing information and were excluded from the analysis.

Medicines Received to Treat Pneumonia

Of the 70 caretakers who reported having a child suffering from fast breathing, a total of 94 medicines were dispensed, with some caretakers reporting having received more than one medicine. Of the total medicines dispensed, 19 percent of these medicines were antibiotics. Only 14 of the 70 caretakers with a child experiencing fast breathing received antibiotics as treatment.[7] Of these, only six received the first-line recommended treatment of co-trimoxazole (five in Ulanga and one in the Ruvuma region).

[7] Two caregivers received more than one antibiotic.

Of the 14 cases that received antibiotics, 12 of these caregivers sought care at government health posts, centers, or hospitals, while one sought care from an ADDO and one from a private or mission health facility. Of the 56 cases that did not receive any antibiotic, eight (14 percent) sought care from an ADDO.

Regardless of the source of medicine, nine (64 percent) of the caregivers reported the correct number of days that the antibiotic needed to be given (which is five to seven days). It is important to note that about one-third of cases of pneumonia were incorrectly treated with antimalarials, which surpasses the percentage of clients who were dispensed antibiotics.

Malaria

A total of 414 caretakers reported children who had experienced malaria (fever or hot body) in the previous two weeks.

As shown in Table 42, the majority (97 percent) of caretakers reported that they sought advice, treatment, or medicine outside the home. Only five caretakers reported leaving signs of illness alone until they improved, and only seven caretakers reported that they had treated the child at home without seeking treatment elsewhere.

Table 42. Action Taken by Caretakers for Child with Fever or Hot Body, by Location

Action Taken	*Ruvuma n=225*	*Ulanga n=189*	*Overall n=414*
Sought care outside the home	214 (95%)	188 (100%)	402 (97%)
Monitored the condition until child got better	5 (2%)	0	5 (1%)
Treated in the home	6 (3%)	1 (1%)	7 (2%)

Of those who sought advice, treatment, or medicine outside the home, nearly all (91 percent) caretakers reported taking action to seek care either the same or the next day, as shown in Table 43.

Table 43. Timing of Care Seeking for Fever or Hot Body, by Location*

Time Taken for Action	*Ruvuma n=208*	*Ulanga n=190*	*Overall n=398*
Same day	77 (37%)	77 (41%)	154 (39%)
Next day	110 (53%)	98 (52%)	208 (52%)
Two days	15 (7%)	10 (5%)	25 (6%)
Three or more days	5 (2%)	5 (3%)	10 (3%)
Don't know	1 (0%)	0	1 (0%)

*Four cases had missing information and were excluded from the analysis.

As shown in Table 44, only 8 percent of those who sought advice, treatment, or medicine outside the home went to ADDO shops as the first point of contact. Most (38 percent) sought care from

government health centers, followed by private or mission facilities (18 percent) and government hospitals (18 percent).

Table 44. Outlets Consulted for Advice, Treatment, or Medicine among Caretakers Who First Sought Advice Outside the Home for a Child with Fever or Hot Body, by Location*

Source of Care Received	*Ruvuma n=206*	*Ulanga n=187*	*Overall n=393*
Government health centers	49 (24 %)	102 (55%)	151 (38%)
Private or mission health facility	55 (27%)	17 (9%)	72 (18%)
Government hospital	35 (17%)	36 (19%)	71 (18%)
Government health post	40 (19%)	17 (9%)	57 (15%)
ADDO	18 (9%)	13 (7%)	31 (8%)
Traditional healer	7 (3%)	1 (1%)	8 (2%)
Pharmacy	2 (1%)	1 (1%)	3 (1%)

*Nine cases had missing information and were excluded from the analysis.

Medicines Received to Treat Malaria

Of 405 caretakers with children suffering from fever (without convulsions), 64 percent received at least one antimalarial. Of the antimalarials dispensed, 21 percent were SP (the first-line treatment), 41 percent were AQ, and 36 percent were quinine. Interestingly, four cases were incorrectly given chloroquine, which has not been recommended to use as the first-line treatment for malaria since the national policy was revised in 2001. Other medications dispensed by the various outlets are shown in Table 45.

Table 45. Medicines Reported by Caretakers as Dispensed to Children Under Five Years with Fever or Hot Body, by Location*

Medicine	*Ruvuma n=356*	*Ulanga n=364*	*Overall n=720*
Antimalarial	156 (44%)	150 (41%)	306 (43%)
Analgesic	142 (40%)	140 (39%)	282 (39%)
Antibiotic	31 (9%)	36 (10%)	67 (9%)
ORS	17 (5%)	18 (5%)	35 (5%)
Cough syrup	4 (1%)	18 (5%)	22 (3%)
Other	6 (2%)	2 (1%)	8 (1%)

* Some caretakers received more than one medicine.

Source of Antimalarial Medicines

Information on the source of antimalarial medicines was provided by caretakers of children with uncomplicated malaria (fever or hot body) for 290 antimalarial medicines (there was missing data for 16 medicines which were not included in the analysis). For most (80 percent) of these, caretakers reported that antimalarials were prescribed by health workers in either public or private health facilities. Only 16 percent of the antimalarials were reportedly prescribed or advised by the ADDOs. As seen from the record review, the majority of ADDO customers arrived with prescriptions for treating malaria. It is important to note that Table 46 does not

demonstrate where the caregivers purchased the antimalarial, but only who prescribed or advised the caregiver to take the antimalarial.

Table 46. Source for Antimalarial Prescription or Advice as Reported by Caretakers, by Location

Source	*Ruvuma n=151*	*Ulanga n=139*	*Overall n=290*
Prescribed by health worker	112 (74%)	121 (87%)	233 (80%)
ADDO dispenser	27 (18%)	18 (13%)	45 (16%)
Recommendation of pharmacy staff	5 (3%)	0	5 (2%)
Personal decision	4 (3%)	0	4 (1%)
Other (friend, relative, other vendor)	3 (2%)	0	3 (1%)

Regardless of source, of the 228 antimalarial medicines for which caretakers reported information on duration (information was missing for 62 medicines on duration), 126 (55 percent) reported the correct number of days that the medicine needed to be given (one, three, and seven days for SP, AQ, and quinine, respectively).

Availability and Use of Mosquito Nets

As shown in Table 47, 84 percent of households visited had at least one mosquito net; 68 percent of caretakers reported that the nets were insecticide treated.

Among those possessing mosquito nets, 97 percent reported that children under five years of age slept under the nets (both nontreated nets and ITNs combined). Of children under five who slept under mosquito nets, the majority (69 percent) slept under ITNs specifically.

Table 47. Availability and Use of Mosquito Nets in Households, by Location*

Mosquito Net Use	*Ruvuma n=289*	*Ulanga n=247*	*Overall n=536*
Household possesses at least one mosquito net	218/289 (75%)	233/247 (94%)	451/536 (84%)
Nets treated with insecticide (ITNs)	159/218 (73%)	148/233 (64%)	307/451 (68%)
Children under 5 reported children under sleeping under nets, overall	210/218 (96%)	227/233 (97%)	437/451 (97%)
Children under five reported sleeping under ITNs	157/210 (75%)	146/227 (64%)	303/437 (69%)

*Eight cases had missing information and were excluded from the analysis (1 in Ruvuma and 7 in Ulanga).

Convulsions

Convulsion was reported by 23 caretakers, all of whom sought care outside the home. Similarly, all caretakers reported seeking care either the same day (70 percent) or the next day (30 percent) once symptoms began. Most children were taken to government health centers (35 percent) or

government hospitals (26 percent) for care, as seen in Table 48. Of these 14 caregivers who sought care at government health centers or government hospitals, eight cases of convulsions received one or more antimalarials, but six received no antimalarials. Of the eight cases receiving antimalarials from a government health center or hospital, five received quinine (three caregivers received more than one antimalarial). The cases that received antimalarials other than quinine received SP, AQ, or chloroquine.

Table 48. Type of Outlet First Consulted by Caretakers Seeking Advice, Treatment, or Medicine for Convulsions, by Location

Outlet	*Ruvuma n=11*	*Ulanga n=12*	*Overall n=23*
Government health center	5 (46%)	3 (25%)	8 (35%)
Government hospital	1 (9%)	5 (42%)	6 (26%)
Traditional healer	1 (9%)	2 (17%)	3 (13%)
Private/mission hospital	1 (9%)	2 (17%)	3 (13%)
Government health post	3 (27%)	0	3 (13%)

Overall, only nine cases (39 percent) of convulsions received antimalarials, while over one-half (61 percent) of the cases received no antimalarials. A total of 31 medicines were reported to be received by caretakers with children suffering from convulsions. Of these 31 medicines, a total of 12 antimalarial medicines were received (three cases received two different types of antimalarial) and all were dispensed by government health workers (over one-half of the antimalarials given were quinine, with the remainder including AQ and SP, with one case even given chloroquine). Of the nine caretakers who reported knowing the duration of the antimalarial treatment, only one reported the correct duration, with the remaining eight reporting an incorrect duration. Of the remaining 19 medicines received, six were antibiotics, four were ORS, and nine were analgesics (Panadol). Nearly all of these medicines were obtained from government health workers (the exception being one case that was dispensed antibiotics by a traditional healer).

Diarrhea

A total of 109 caretakers reported that their children had experienced non-bloody diarrhea. Of those who prescribed medicines for non-bloody diarrhea cases, the majority (78 percent) were health workers, with ADDO dispensers recommending medicine or providing advice to 17 percent of caretakers for children with non-bloody diarrhea, as seen in Table 49. Note that 109 caretakers reported using 166 medicines in total as some caretakers received more than one medicine.

Table 49. Source of Medicine Prescription or Advice as Reported by Caretakers for Cases of Non-bloody Diarrhea, by Location*

Source of Medicine Choice	*Ruvuma n=73*	*Ulanga n=93*	*Overall n=166*
Health care worker	51 (70%)	80 (86%)	131 (79%)
ADDO dispenser	18 (25%)	11 (12%)	29 (17%)
Other	4 (5%)	2 (2%)	6 (4%)

*Some caretakers received more than one medicine.

Of these 109 caretakers, 67 cases (61 percent) reported receiving ORS, as seen in Table 50. These 67 caretakers received ORS from a variety of providers, including government health centers (34 percent), health posts (22 percent), government hospitals (21 percent), and private/missionary hospitals (18 percent).

Table 50. Source of ORS for Non-bloody Diarrhea Cases as Reported by Caretakers, by Location

Source of ORS	*Ruvuma n=33*	*Ulanga n=34*	*Overall n=67*
Government health center	6 (18%)	17 (50%)	23 (34%)
Government health post	12 (36%)	3 (9%)	15 (22%)
Government hospital	8 (24%)	6 (18%)	14 (21%)
Private or mission health facilities	5 (15%)	7 (21%)	12 (18%)
ADDO	1 (3%)	1 (3%)	2 (3%)
Other drug shop	1 (3%)	0	1 (1%)

A total of 32 cases (29 percent) of non-bloody diarrhea inappropriately received antibiotics (22 provided by health workers, nine by ADDOs, one by a pharmacy person, and one by a friend), which are inappropriate for non-bloody diarrhea.[8]

Bloody Diarrhea

Caretakers reported 17 cases of bloody diarrhea. As shown in Table 51, 11 caretakers sought advice, treatment, or medicine outside the home, while the remaining caregivers opted to treat the child at home without going anywhere for advice, treatment, or medicine.

Table 51. Caretakers Reporting Child with Bloody Diarrhea, by Location*

Source of Care	*Ruvuma n=10*	*Ulanga n=6*	*Overall n=16*
Sought care outside the home	6 (60%)	5 (83%)	11 (69%)
Treated in the home	2 (2%)	1 (2%)	3 (19%)
Don't know/don't recall	2 (2%)	0	2 (13%)

*One case had missing information and was excluded from the analysis.

[8] One caregiver received two different antibiotics from two sources, and for one caregiver there was missing information on the source of the antibiotic received.

All caretakers who reported seeking advice, treatment, or medicine did so within the same (36 percent) or the next day (64 percent) following the onset of bloody diarrhea. Of those caretakers with children suffering from bloody diarrhea, 1 of 11 (9 percent) sought care from an ADDO.

Caretakers reported receiving a total of 29 medicines. Twelve cases (71 percent) received ORS (of which two were treated at home, nine sought care outside the home, and one did not report on action taken). Less than one-half (41 percent) of the bloody diarrhea cases received antibiotics (of which one was treated at home and six sought care outside the home). Some diarrhea cases received more than one type of antibiotic. Nearly all of the antibiotics were prescribed by government health workers, with only one caregiver receiving antibiotics from a pharmacy worker. Out of the seven caregivers who received antibiotics,[9] five knew the correct duration (five to seven days) for antibiotics as instructed by the provider of the medicines.

Instruction on Use of Medicine

Overall, for each medicine received by a caretaker, nearly all (99 percent) reported receiving instructions on how to administer the dispensed medicine. Of the 627 medicines dispensed by health workers, 618 (99 percent) caretakers reported receiving instructions on how to administer the dispensed medicine. Similarly, of the 147 medicines dispensed by ADDO dispensers, for 145 (99 percent), caretakers reported receiving instructions on administration.

[9] One caretaker received more than one antibiotic.

SUMMARY OF FINDINGS

The purpose of this study is to provide guidance for rollout of a child health package, based on IMCI methodology, as part of the ADDO network in Tanzania. The study therefore investigates not only the current knowledge of ADDO dispensers about the management of childhood illness (by interviewing ADDO dispensers), but also how that knowledge is reflected in the care provided (by looking at the patient registers and sending simulated clients into ADDO shops).

In so doing, the study can determine where poor practice can be addressed by improving knowledge—for example, through training or supportive supervision initiatives—and where problems in practice need to be addressed by other interventions, directed perhaps at supply issues, care-seeking behavior, or other factors affecting the management of these three key childhood illnesses (ARI, malaria, and diarrhea).

The study also considers the care-seeking behaviors of parents and other caretakers of sick children under the age of five. It is important to understand if caretakers recognize the danger signs of serious childhood illness and where they seek care. As the ADDO program expands, these many drug shops are well positioned to provide important care in their communities to improve child health.

Knowledge of ADDO Dispensers

Danger Signs and Referrals

ADDO dispensers were aware of different general danger signs in children below five years. For a child of two months up to five years of age, danger signs include an inability to drink or breast-feed, vomiting everything, convulsions, and excessive sleepiness or unconsciousness. There is a need for greater awareness of danger signs, as the most frequently cited signs were convulsions (67 percent), vomiting (52 percent), high temperature (50 percent), and lethargy (47 percent). Despite this poor range of responses, 97 percent of ADDO dispensers were aware that they needed to refer children with danger signs to health facilities. In all 58 ADDOs visited, dispensers stated that they refer cases verbally with no system of written referral notes. This was expected because, although referral is emphasized in the ADDO training course, there was no formalized referral protocol for recording or writing up referrals within the ADDOs at the time of the survey.

Management of Non-Pneumonia ARI

Examining knowledge of dispensers in recognizing the signs and symptoms of non-pneumonia ARI, it is positive to note that 95 percent of ADDO dispensers correctly identified blocked or runny nose as a sign of a child suffering from cough/cold. However, fast/difficult breathing, a sign of pneumonia, was incorrectly mentioned by 14 percent of ADDO dispensers as a sign of cough/cold (non-pneumonia ARI). In addition, more than one-half of ADDO dispensers incorrectly reported cough syrup as the recommended medicine for cough/cold (non-pneumonia

ARI) in children under five, instead of paracetamol and lemon and honey as per the IMCI guidelines.

Management of Pneumonia

Ninety-three percent of ADDO dispensers correctly identified fast/difficult breathing as an indication that a child was suffering from pneumonia. However, only 42 percent of dispensers mentioned chest in-drawing as a sign of pneumonia. More than one-half (54 percent) of ADDO dispensers incorrectly reported amoxicillin as the recommended treatment for pneumonia, whereas only 11 percent reported the recommended first-line antibiotic, co-trimoxazole.

Overall, 76 percent of ADDO dispensers were knowledgeable of correct dosage information for co-trimoxazole for pneumonia and bloody diarrhea. However, just one-half (56 percent) of ADDO dispensers provided all information (dose, frequency, and duration of treatment) correctly.

Management of Malaria

Asked to identify the signs and symptoms of malaria in children under five years of age, 93 percent of dispensers correctly mentioned fever or hot body. However, many had difficulty in recognizing the distinct signs of severe malaria, as they mentioned many of the same signs and symptoms of uncomplicated malaria. Only 4 percent of ADDO dispensers correctly said that convulsion is the key sign that differentiates severe from uncomplicated malaria. Nearly all (95 percent) ADDO dispensers correctly reported SP as the recommended first-line medicine for treating uncomplicated malaria. Since this study was conducted, the first-line medicine has changed to an ACT.

Management of Diarrhea

Asked about the appropriate management of diarrhea, 95 percent of ADDO dispensers correctly mentioned ORS as the recommended medicine for treating non-bloody diarrhea. However, 79 percent of dispensers also incorrectly mentioned additional treatment with antibiotics, indicating an overuse of antibiotics. Inappropriate dispensing of antibiotics is further indicated by the fact that 58 percent of 55 ADDO dispensers failed to respond that blood in the stool was the key sign that antibiotics may be required while also incorrectly citing other symptoms (e.g., frequent or runny stools, lethargy) as signs and symptoms requiring treatment with an antibiotic.

Dispensing and Labeling of Medicines

The majority of ADDO dispensers self-reported being aware of key information to include on the label when dispensing medicines, including how to administer (91 percent), name of medicine (84 percent), patient name (71 percent), and duration (55 percent).

Providing Information to Caregivers when Dispensing Medicines

Most ADDO dispensers (93 percent) reported that they provide information to customers on when and how to take the medicine. Other information was provided far less frequently, and included information on side effects (57 percent) and on how to store the medicines (55 percent). Only 20 percent of dispensers reported telling clients about the importance of completing the full course of treatment when dispensing medicines.

Quality of Care Provided

To determine if the dispensers' reported knowledge is reflected in their care practices, information was collected from patient records and simulated client encounters to evaluate the treatment and care provided. Some cases studied were diagnosed by the dispenser, whereas other clients were referred to the ADDO with a prescription, allowing a comparison of ADDO diagnosis and treatment of ARI, malaria, and diarrhea in children with care and treatment prescribed by other health care providers. It was observed that, often, the prescription patterns of other health care providers whose prescriptions were filled at the ADDOs were no more consistent, or were even less consistent with the national treatment guidelines, than those of the ADDO dispensers. This finding demonstrates the importance, for the effectiveness of the ADDO shops, of improving rational prescribing practices of all types of providers, ADDO dispensers and other health care providers, given that many shop customers arrive with a prescription.

Diagnosis and Treatment

Non-pneumonia ARI and Pneumonia

According to the record review, most of the non-pneumonia ARI cases (78 percent) were diagnosed by the ADDO dispenser; prescriptions were not presented by clients for these cases. It is important to note that, although most of these cases were not treated with antibiotics, those that were treated with antibiotics were more likely to come as referrals to the ADDO with a prescription, specifying inappropriate treatment, given by non-ADDO health care providers. ADDO dispensers were more likely to treat with cough syrup. In the simulated case scenarios, however, over one-half of cases sold medicines for cough/cold (non-pneumonia ARI) were inappropriately given antibiotics by ADDO dispensers.

Based on the record review most of the pneumonia cases came to the ADDOs with a prescription, with 97 percent being treated appropriately with an antibiotic. However, only 16 percent of these cases were treated with the recommended first-line treatment, co-trimoxazole.

Malaria

As determined from the record review, the large majority of malaria cases were diagnosed as uncomplicated rather than severe malaria. About one-half of all the malaria cases reviewed were diagnosed by the ADDO dispenser, whereas the other half came in with a prescription. Interestingly, there was a clear difference in treatment by ADDO dispenser diagnosis as

compared to referral with a prescription. ADDO dispensers were more likely to dispense SP tablets based on their own diagnosis than when presented with a prescription. Still, only 42 percent of cases diagnosed by ADDO dispensers were treated with SP tablets, followed by AQ syrup, which was sold in 23 percent of cases. This trend is also reflected in the simulated client scenarios, in which just over one-half (59 percent) of simulated malaria cases dispensed an antimalarial were sold SP tablets. According to the record review, only 14 percent of referral cases were treated with SP. Seven cases of severe malaria were identified in the sample of cases reviewed, all of which came to the ADDOs with prescriptions, and were mostly treated with quinine injection.

Just over one-half (56 percent) of the antimalarial medicines were dispensed in the correct dose based on treatment guidelines: 88 percent of SP tablets (the first-line treatment at the time of the survey) were correctly dosed, and 75 percent of quinine tablets were correctly dosed. Problems seem to surround correct dosing of AQ, with only 26 percent of cases receiving AQ tablets being given the correct dose. Only 15 percent of cases given AQ syrup were provided the correct dose.

Diarrhea

The majority (84 percent) of non-bloody diarrhea cases were inappropriately sold antibiotics as treatment. Importantly, according to the record review over 90 percent of cases that came to the ADDOs with a prescription were inappropriately prescribed an antibiotic, as compared with 72 percent of ADDO-diagnosed clients. Only 16 percent of cases were sold ORS, the recommended treatment for diarrhea—still better than 11 percent of cases that came to the ADDO with a prescription that were sold ORS.

Similarly, in the simulated client scenarios, antibiotics were inappropriately sold for 85 percent of non-bloody diarrhea cases, with only three simulated clients dispensed ORS.

According to the record review, most of the bloody diarrhea cases were diagnosed by ADDO dispensers and in all cases sold an antibiotic, though not always the recommended first-line treatment, co-trimoxazole. However, cases that came to the ADDO with a prescription were only slightly more likely to be treated with co-trimoxazole than those given antibiotics based on ADDO diagnosis.

Checking Patient History

During the simulated client scenarios, ADDO dispensers asked caretakers the age of the simulated sick child for all three illnesses. For non-pneumonia ARI cases, 71 percent of ADDO dispensers asked about duration of illness, but only 39 percent asked questions regarding medication history. For malaria cases, ADDO dispensers frequently asked about the duration of illness (82 percent) and medication history (86 percent). For diarrhea cases, only 27 percent of ADDO dispensers asked about duration of illness, and only 41 percent asked the simulated client about medication history.

Assessing Severity and Checking General Danger Signs

For non-pneumonia ARI cases, 71 percent correctly asked about rapid respiration in assessing the severity of illness during the simulated client scenarios. For malaria cases, 96 percent of ADDO dispensers inquired about fever, but only 50 percent asked about the child's ability to take liquids and only 6 percent asked about vomiting. For cases of diarrhea, 64 percent of dispensers asked simulated clients about frequency of bowel movements. Just over one-half (55 percent) asked about blood in the stool, the key sign that antibiotics may be required.

Dispensers Informing Caretakers about the Nature of the Child's Illness

Most ADDO dispensers informed simulated clients about the child's illness based on the symptoms given. It is interesting to note that 8 of the 14 ADDO dispensers who encountered simulated clients for non-pneumonia ARI scenarios incorrectly told the simulated client that the child had pneumonia.

Counseling and Complementary Information Provided by ADDO Dispensers

The majority of ADDO dispensers self-reported that they do provide customers information on when and how to take the medicines they dispense. However, during the simulated case scenarios, very little counseling and complementary information was provided by ADDO dispensers. For example, in simulated malaria cases, no advice was given on preventive measures, such as use of ITNs. Few simulated cases were instructed to visit a doctor or clinic if the condition persisted or worsened (2 out of 22 malaria cases, and 4 out of 22 diarrhea cases).

Few simulated clients received information on adverse effects. Information on expected side effects of the dispensed medicines was given in few simulated case scenarios. Referrals, when they occurred, were verbal rather than written—as expected, given that no formal system of referrals had been established.

TFDA ADR Form and Register

None of the 69 ADDO shops visited had TFDA ADR forms on hand; however, about one-half of the shops had ADR registers.

Visual Aids

Visual aids can be important educational or reminder materials for clients as well as dispensers. Few ADDOs visited were in possession of visual aids for any of the key childhood illnesses investigated. Only one ADDO shop, in the Ruvuma region, had visual aids on treatment of non-pneumonia ARI. No visual aids on treatment of pneumonia were found in any of the ADDO visited. Five ADDOs, all located in Ruvuma, were in possession of visual aids on malaria and only two ADDOs visited, again both in Ruvuma, reported to have visual aids on treatment of diarrhea. These low figures may be because there have been no visual aids or information, education, and communication (IEC) materials printed for ADDOs, although materials from the MOHSW could be used in ADDOs.

Availability of Medicines and Supplies for Childhood Illnesses

All visited ADDO shops had adequate supplies of most medicines in stock, but just over one-half of the ADDOs had ORS, the recommended first-line treatment for diarrhea, in stock. Unfortunately, very few shops (23 percent) had ITNs in stock. The low stock of ITNs could be one reason why advice on the use of this important preventive measure is not being provided.

Care of Children in the Community

Recognition of Danger Signs of Serious Illness

Caretakers were not always aware of the signs of serious illness in children under five years of age. Among those who reported having a child who experienced rapid breathing, 72 percent recognized this as a very serious or somewhat serious sign of illness. Of the caretakers with children experiencing convulsions, 65 percent recognized this as a very serious or somewhat serious sign of illness. Over half (53 percent) of caretakers with children experiencing bloody diarrhea stated the condition was not serious. However, when asked to identify danger signs themselves, it was more difficult for caretakers to identify common danger signs. Less than one-half (45 percent) of caretakers mentioned excessive sleepiness or lethargy as a danger sign of serious illness in children under five years, only 29 percent mentioned vomiting, 25 percent mentioned refusal to eat or drink, and 18 percent mentioned convulsions.

However, when presented with signs of serious illness in their own children—for example, with rapid breathing, high fever, convulsions, or bloody diarrhea—the large majority of caretakers sought care outside the home, and within the same or next day.

It was encouraging to hear, through household surveys, that the majority of caretakers were in possession of mosquito nets/ITNs and that they were being used by children under five. The increase in possession and availability of mosquito nets/ITNs could be due to community awareness on the importance of nets as well as the ability to access nets through various programs in the country, such as the Tanzania national voucher scheme.

Caretakers' Care-seeking Behavior and Attitudes

Most caretakers' first contact for treatment of sick children is with government health facilities. This observation is in agreement with previous studies on treatment seeking by caregivers (McCombie 1996; Djimde et al. 1998). ADDOs are intended to fill the gap of providing access to quality-assured basic essential medicines and services in circumstances when medicines are out of stock at government health facilities or when government health facilities are far from communities and not easily accessible.

It was observed that most ADDOs are located in periurban or village/town center settings where government health facilities are also located. This could be because ADDOs seek to capture the customers who seek care at the health centers first to receive a prescription, but then need to locate another source for the medicine if it is not in stock at the health facility.

Based on the household survey, when caretakers sought advice, treatment, or medicine outside the home, their first point of contact was more often with ADDO dispensers for cases of pneumonia (15 percent), as compared with 8 percent of malaria cases (fever/hot body). This does not reflect where prescriptions were filled, but only where caretakers first sought advice, treatment, or medicine for their sick child.

To increase the use of ADDOs when government health facilities are inaccessible or experience medicine stock-outs, it is necessary to provide increased education and communication to communities about the services available through ADDO shops.

Conclusions and Opportunities to Improve the Management of Childhood Illness

Integrating the child health component into the ADDO program is likely to improve accessibility to essential medicines for the treatment of malaria, ARI, and diarrhea for children under five years. ADDOs do provide essential services and medicines to caretakers of sick children under the age of five and, with increased training and oversight, the services provided could be as good as, if not better than, those of providers currently frequented by the population. With increased education and communication provided to communities about the services available through ADDOs, it is possible that an increasing number of children can have access to quality essential care through this network, especially in rural areas, where public health facilities are less accessible.

However, dispensing practices at ADDOs need further improvement to support proper management of childhood illnesses as recommended by IMCI guidelines for those cases that present without prescription. Although ADDO dispensers receive standard training in basic pharmaceutical management and recognition of common illnesses, including the management of malaria, ARI, and diarrhea, as part of the ADDO accreditation process, inappropriate dispensing practices still frequently occur.

Deficiencies exist in ADDO dispensers' recognition of key signs and symptoms of common childhood illnesses. Although a high proportion (93 percent) of ADDO dispensers were aware that fast/difficult breathing was a sign of pneumonia, less than one-half (42 percent) mentioned chest-in-drawing as a sign of pneumonia, and over one-half (54 percent) incorrectly mentioned cough. Based on IMCI guidelines, standard classification of pneumonia is based on the presence of fast breathing and/or chest-in-drawing, not on the presence of cough. When asked about their management of malaria, only 4 percent of ADDO dispensers mentioned convulsions as the key sign differentiating severe from uncomplicated cases.

Inappropriate use of antibiotics for non-bloody diarrhea was commonly observed. ORS was rarely recommended, possibly due to its low availability. Co-trimoxazole, the recommended first-line treatment, was not the most frequently dispensed antibiotic for either pneumonia or bloody diarrhea. Additionally, SP, the first-line treatment for uncomplicated malaria at the time of the survey, was not the most frequently dispensed for malaria. It is important to note that, although these problems do exist at the ADDOs, they were also reflected in referrals coming to

ADDOs with prescriptions from other, non-ADDO health providers. According to the record review just over 42 percent of malaria cases diagnosed by ADDO dispensers were correctly sold SP tablets, and only 14 percent of referral cases were correctly treated with SP. Because a new malaria policy has been put into place (since January 2007), this issue will need to be monitored as it relates to ACTs.

ADDO dispensers also need to provide more information to caretakers about monitoring signs of worsening condition as well as measures to prevent future illness; this type of counseling is particularly important for children under five years of age because of their vulnerability. Despite most ADDO dispensers' being aware of recommended malaria preventive measures, few advised caretakers to use ITNs.

The extremely low percentage of visual aids available at ADDOs signals a need for the development and printing of visual aids or IEC materials for use in the shops. Educational materials for clients as well as dispensers could help guide the choice of medicines and dose, thereby facilitating appropriate management of illnesses, especially for children under five.

Lastly, a structured system of referrals is needed to monitor referrals made by ADDO dispensers to health facilities. Although nearly all (97 percent) ADDO dispensers interviewed stated that they refer children with danger signs to health facilities, these referrals must be tracked so that appropriate practice can be measured.

RECOMMENDATIONS

The aim of the study was to identify gaps in the knowledge, practices, and beliefs of ADDO dispensers, assess the availability of medicines and supplies at ADDOs, and better understand caretakers' practices and perceptions concerning the management of childhood illnesses. Based on the study findings, these actions are recommended—

1. Provide ADDO dispensers and, as appropriate, other health providers frequently used by communities, with a comprehensive training package or targeted refresher training to improve rational prescribing and dispensing as outlined in the national IMCI guidelines, including recognizing symptoms and making appropriate referrals for sick children.

2. Introduce visual supports, or job aids, that will help dispensers choose and prescribe appropriate medicines for children under five years of age, and to advise caretakers on how to give medicines and home-based care.

3. Emphasize the importance of counseling caretakers on how to administer medicines and providing complementary advice (i.e., ITN use, nutrition and hygiene) when dispensing medicines.

4. Provide continued and supportive supervision using a standard checklist, to be revised in collaboration with CHMT members as appropriate. Included in supervision should be recommendations for improving the way information on child health is shared between dispensers and clients and the type of advice given.

5. Improve the ADDO referral system by introducing simple referral forms and/or updating patient registers to include a column for referral.

6. Work with the NMCP and the IMCI program to improve the availability of ITNs and ORS at ADDOs.

7. Improve adverse event reporting by increasing availability and use of TFDA ADR forms.

8. Introduce community mobilization initiatives that support healthier care-seeking behaviors, including the use of ADDO services for advice and treatment, particularly in areas where public health facilities are difficult to access.

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ANNEX 1. PHARMACOLOGICAL CLASSIFICATION OF DRUGS ON THE ADDO EXPANDED LIST

Classification	Drugs Available	Dosage Form
Anti-asthmatics	Aminophylline injection (ampoules)	25 mg/ml in 10 ml
Antibiotics	Amoxicillin trihydrate capsules	250 mg, 500 mg
	Amoxicillin trihydrate oral suspension	125 mg/5 ml, 250 mg/5 ml
	Benzyl penicillin powder for injection	3 mg (500,000 IU) in vial
	Co-trimaxazole suspension	240 mg/5ml in 100 ml bottle
	Co-trimaxazole tablets	480 mg
	Doxycycline capsules/tablets	100 mg
	Erythromycin oral suspension	125 mg/5 ml, 250 mg/5ml
	Erthromycin tablets	250 mg, 500 mg
	Metronidazole tablets	200 mg, 250 mg, 400 mg
	Metronidazole suspension	200 mg/5 ml in 100 ml
	Nitrofurantoin tablets	50 mg, 100 mg
	Oxytetracycline hydrochloride eye ointment	5% (w/v), 10% (w/v)
	Phenoxymethyl penicillin suspension	125 mg/5 ml, 250 mg/5 ml in 100 ml
	Phenoxymethyl penicillin tablets	250 mg
	Procaine penicillin fortified	4 g (400,000 IU)–4MU
	Silver sufadiazine cream	10 mg
Anti-inflammatories// analgesics	Diclofenac sodium tablets	25 mg, 50 mg
	Indomethacin capsules	25 mg
	Hydrocortisone ointment/cream	1%, 0.5%
Anesthetics, local	Lignocaine injection	1% in 10 ml vial, 2% in 30 ml vial
Antifungals	Nystatin oral suspension	100,000IU/ml in 30 ml bottle
	Nystatin pessaries	100,000 IU
	Nystatin skin ointment	100,000 IU/g
	Nystatin tablets	500,000 IU
Antimalarials	Quinine tablets (sulfate or bisulfate)	300 mg
	Quinine injection (as dihydrochloride)	300 mg/ml in 2ml ampoule
Cardiovascular	Propranolol tablets (hydrochloride)	10 mg, 40 mg, 80 mg
	Bendrofluazide tablets	5 mg

Oxytocics	Ergometrine injection (maleate)	0.2 mg/ml in 1 ml ampoule, 0.5 mg/ml in 2 ml ampoule
Oral contraceptives	Ethinylestradiol (0.03 mg) + novethisterone (0.3mg)	
	Ethinylestradiol (0.03 mg) + levonorgestrel (0.15mg)	
Anti-emetics	Promethazine hydrochloride injection	25 mg/ml in 2 ml ampoule
Fluids and electrolytes	Dextrose	5%
	Normal saline Injection	0.9%
	Water for Injection	
Anti-epileptics	Phenytoin tablets/capsules (sodium salt)	50 mg, 100 mg