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PUBLIC HEALTH AGENCY OF SWEDEN

Proposal for tentative Swedish support for capacity development in Mozambique to contain antibiotic resistance

Mission report December 2019



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Abbreviations

AMR – Antimicrobial Resistance

AMS – Antimicrobial Stewardship

AMU – Antimicrobial Use

AST – Antimicrobial Susceptibility Testing

ATLASS – Assessment Tool for Laboratories and AMR Surveillance Systems

CISPOC - Centro de Investigação e Treino em Saúde da Polana Caniço

CVL – Central Veterinary Laboratory

DINAV – National Veterinary Directorate

FAO – Food and Agriculture Organization of the United Nations

GHSA – Global Health Security Agenda

GLASS – Global Antimicrobial Surveillance System

HAI – Healthcare Associated Infections

IEC – Information, Education and Communication

INS – National Institute of Health

IPC – Infection Prevention and Control

JEE – Joint External Evaluation

KAP – Knowledge, Attitudes and Practises

M&E – Monitoring and Evaluation

MASA – Ministry of Agriculture and Food Safety

MISAU – Ministry of Health

NAP – National Action Plan

OIE – World Organization for Animal Health

PHAS – Public Health Agency of Sweden

PPS – Point Prevalence Survey

SLU – Swedish University of Agricultural Sciences

Strama – Swedish Strategic Programme against Antibiotic Resistance

SVA – National Veterinary Institute of Sweden

SWOT – Strengths, Weaknesses, Opportunities and Threats

WHO – World Health Organization

Summary

This report was developed during a short-term country mission to Mozambique in December 2019 by a multi-sectoral team of Swedish experts in the field of antimicrobial resistance and use (AMR/AMU), including antibiotic stewardship (AMS), from the Public Health Agency of Sweden (PHAS) and the Swedish University of Agricultural Sciences (SLU).

The mission noted a strong commitment to the national work on AMR/AMU containment among representatives from the ministries, governmental agencies, academia, and other stakeholders in Mozambique. In addition, there is strong support for collaboration with Swedish experts in this area.

In Mozambique, an endorsed and signed One Health National Action Plan (NAP) for antibiotic resistance and use is in place. Further, necessary structures for One Health collaborations are established and officially endorsed. Legislations to support AMR containment are mostly in place in both the human and animal sectors. These factors are necessary and will facilitate the process of capacity development suggested in this report.

According to AMR experts in Mozambique, the implementation of the NAP is put at risk because of limited resources and lack of coordination between stakeholders. In addition, resources are required to tackle major natural disasters and other pressing health issues. One conclusion from the mission is that there is a strong demand for support in the capacity development process in several areas. An integrated approach is suggested, involving stewardship and infection prevention and control (IPC) as well as surveillance data, for the development and implementation of any local programs, activities or interventions.

We identified five possible target areas where capacity development could play a vital role to increase Mozambique's ability to implement the NAP. All proposed activities in this report were outlined together with a multi-sectoral team of researchers at the National Institute of Health (INS).

The five target areas for proposed collaboration are:

- National governance and coordination for AMR containment
- Antibiotic access, use, and consumption
- Antibiotic resistance, including surveillance and laboratory capacity
- Infection prevention and disease control, biosecurity, and good animal husbandry
- Awareness and education on antibiotic resistance and use

A hands-on example of a requested activity, where Swedish expertise could be utilised, is mentoring Mozambican experts in the process of collecting and analysing current national data in both the human and animal sectors on AMR/AMU and Healthcare Associated Infections (HAI) and to publish the data in

a publicly available national report. A report like this would be useful to guide future work and also make it possible for Mozambican experts to advocate for funding to improve the national situation. We want to stress that target areas and activities in the work plan are suggestions and are all possible to support and work with individually. Prioritising will be necessary depending on available funding and other resources such as experts in Mozambique and Sweden who can allocate the required time.

As suggested in this report, the support of Swedish experts would facilitate the capacity development process by bringing all stakeholders together. This would enable and encourage a One Health approach in line with the Tripartite vision and would make it easier for Mozambican experts to achieve the objectives set in their NAP. It would also facilitate the process of advocating for political support and necessary funding. Swedish expertise would be utilised as a mentoring partnership where Mozambican experts would be responsible for the development and implementation of the actions they prioritise.

Purpose

The aim of the short-term mission of Swedish experts to Mozambique in December 2019 was to identify possible entry points for capacity development that would strengthen Mozambique's ability to implement their National Action Plan (NAP) for antimicrobial resistance (AMR). In this report we have summarised the target areas and activities agreed upon with the Mozambique AMR experts we met during the mission. The focus of the report is on antibiotic, rather than antimicrobial, resistance and use in humans and terrestrial food-producing animals.

In order to suggest relevant activities for future collaborations, an analysis of the current capacity in Mozambique was performed by conducting interviews and study visits during the mission. The aim was to identify the target areas and to investigate what needs and priorities AMR experts in Mozambique had in relation to the NAP.

Special attention was put on identifying on-going initiatives, available human resources, and institutions that are or can be included in the antimicrobial resistance and use (AMR/AMU) work to make the implementation sustainable and cost efficient. Focus was on understanding the national situation regarding monitoring and surveillance of AMR/AMU. This is also relevant for the overall AMR/AMU work, including stewardship activities, where surveillance data are used to revise practices. Swedish expertise can be utilised to support organisations in implementing activities in the NAP, which is further explored in this report. Suggested activities are as far as possible based on published documents, guidelines, methodologies, protocols and plans developed by relevant stakeholders including the FAO/OIE/WHO Tripartite collaboration on AMR. The key documents used to produce this report are referenced (1-14). A list of key institutions and organisations met during the mission is included in Annex 1.

Background

National situation on antimicrobial resistance and use

AMR is an increasing threat that needs to be addressed in parallel with other major national health and natural disaster issues. The true burden of AMR in Mozambique is unknown because limited data are available on AMR in both the human and animal sectors. There is no national programme in place for AMR/AMU surveillance in either sector, and data are collected within research projects and local programmes in hospitals. Upgraded surveillance and diagnostics would help to provide an improved evidence base for the development of policies addressing AMR/AMU in both sectors.

Mozambique is participating in the WHO Global antimicrobial surveillance system (GLASS) and supplies data on bacterial resistance from human infections.

However, no specific resistance genes and/or pathogen combinations are notifiable (excluding *Mycobacterium tuberculosis* and *Neisseria gonorrhoeae*) thus few isolates reach the national reference laboratory for antimicrobial susceptibility testing (AST) and molecular typing. In the animal health sector, similar to many other countries, regulations and surveillance capacity are less advanced than in the human sector. The Central Veterinary Laboratory (CVL) is the assigned reference laboratory for AMR, but lacks basic infrastructure and material and is not yet operational for AMR surveillance.

Limited access to antibiotics is a serious nationwide problem. During the interviews, several of Mozambique's experts as well as local medical and veterinary staff reported that the suggested antibiotic for first-line treatment is often unavailable. Over the counter sales are common, even though prohibited by law. The need to start to collect information with good coverage on the use of antibiotics is acknowledged at all levels. This information is fundamental to understand the situation and forms the foundation for designing effective stewardship activities. An initial pilot study has been conducted on AMU in primary care in Maputo, financed by the WHO. For inpatient care there are no data available, but the INS, with support from the WHO, is planning for a hospital based point prevalence survey (PPS) on antibiotic use, hospital acquired infections, and resistance.

Limited focus on infection prevention and control (IPC) in both hospitals, as well as poor overall hygiene and sanitation in the community was brought up by several experts as areas that need urgent attention. Currently there are ongoing projects in this area within INS and WHO that need to be strengthened by additional resources. The equivalent in the animal sector, good animal husbandry and biosecurity, was also brought up by experts as an area for further attention. Without proper preventive measures, disease control will be challenging and infections continuously abundant.

During the mission, several of Mozambique's experts reported that the awareness on AMR and its challenges is limited among stakeholders as well as among professionals and the general public. Few activities have been initiated regarding

training, education, and awareness. There has not yet been any national awareness campaign in Mozambique on AMR/AMU, but the aim is to have material in place for the annual WHO world antibiotic awareness week in November 2020.

National governance and coordination for AMR containment

A One Health NAP for AMR has been in place since 2019, signed by the Minister of Health and the Minister of Agriculture and Food Safety, and both ministries are responsible for coordinating its implementation. The development of the NAP was initiated after an externally supported situation analysis and a Joint External Evaluation (JEE) with the recommendation to formalise a collaboration between the Ministry of Agriculture and Food Safety (MASA) and the Ministry of Health (MISAU). Other key recommendations of the JEE were to build laboratory capacity for AMR and to reinforce regulations and inspections for controlling inappropriate antibiotic use. Since the JEE completion, Mozambique has developed a NAP for Health Security (the national GHSA) that includes activities to combat AMR.

Several ministries in different sectors are involved in the AMR work and are also members of the National Coordinating Mechanism that is organised under MISAU, with the INS as the responsible governmental agency. In 2015 an inter-sectoral mechanism, the National Health Observatory, was officially established at the INS through a ministerial decree. The mission of the Observatory is to monitor the relevant health indicators, including AMR, and contribute to the formulation of health policy.

There are several formal structures in place to build on, and the Observatory has the potential to become an important platform, including enforcing multi-sectoral work on AMR. National level support is also required to enhance collaboration and build capacities at the provincial and local levels.

In order to make the outcomes of the proposed activities sustainable and to achieve long-term results, Swedish support is suggested to build on the existing commitments and on-going work. By focusing on strengthening the weaker parts of the current structures, the suggested efforts will have a greater potential for success.

Target areas and potential Swedish support

This section focuses on how Swedish experts could contribute to the capacity development process. Each of the five target areas for support is introduced and the corresponding activities listed. All proposed activities in the tentative work plan were developed in agreement with AMR experts from Mozambique interviewed during the mission, and all activities suggested are in alignment with the NAP.

Target area 1 – National governance and coordination for AMR containment

Mozambique's experts could utilise Swedish mentorship on the overall national coordination of the NAP implementation within existing organisations and structures. Advice on technical arrangements, formalisation of mandates, and terms of reference for different collaborative structures and their members, including groups of the National Health Observatory could also be provided. In addition INS and the National Veterinary Directorate (DINAV) could exploit Swedish knowledge when developing a formal structure for their internal organisation of AMR activities. Mozambican experts could further use Swedish mentorship in the process of writing and publishing a multi-sectoral national report using available data on AMR/AMU and HAI. The summary and analysis of available data in this report could form a foundation for the development of treatment guidelines.

Suggested activities for tentative work plan; target area 1

1. Conduct a NAP implementation workshop including prioritisation of activities, activity responsibilities, coordination and development of a monitoring and evaluation (M&E) framework, and mapping of available financial resources.
2. Conduct a follow up workshop on NAP implementation and M&E framework development.
3. Develop and disseminate a multi-sectoral national report and a scientific review on AMR/AMU available data in Mozambique.
4. Organise a national multi-sectoral AMR/AMU conference.

Target area 2 – Antibiotic access, use, and consumption

Mozambique's experts could utilise Swedish experts when performing data collection and reporting within on-going work with the WHO, MISAU, OIE, FAO, MASA, primary care and district veterinarians. In addition, support could be given when writing a summary of studies performed related to knowledge, attitudes, and practices (KAP) on AMR/AMU in Mozambique and prioritise new projects. Swedish experts could support Mozambique's experts when performing a review of national antibiotic access for human and animals, for conducting a SWOT analysis, and identification of intervention points.

Suggested activities for tentative work plan; target area 2

Human sector

1. Support the WHO work on substandard and falsified medical products in Mozambique.
2. Support the WHO and INS in planning a PPS on healthcare associated infections and antibiotic use, and the subsequent data analysis.
3. Support the development of a system of reporting of national antibiotic importation data (based on WHO protocols). The Pharmacy Directorate at the MISAU has the importation data in paper format but needs resources to process and organise the data. This is a WHO-requested activity.
4. Advise on the set-up of a pilot AMS programme at one hospital, including all aspects such as infection prevention and control (IPC).
5. Map studies on KAP at the national level, including mapping, analysis, and summary of studies performed related to KAP on AMR/AMU in Mozambique.

Animal sector

1. Assist with the OIE antibiotic use data collection and reporting to ensure that these data become nationally available.
2. Support representative KAP studies on antibiotic use in animals, adapting available questionnaires from the SLU and FAO.

Multi-sectoral

1. Review of national antibiotic access for human and animals, strengths weaknesses opportunities threats (SWOT) analysis, and identification of intervention points. Use Mozambique's essential medicines list for guidance.
2. Arrange multi-sectoral workshops on antibiotic use, access, and consumption.

Target area 3 – Antibiotic resistance, including surveillance and laboratory capacity

Mozambique's experts could use Swedish mentorship when developing national surveillance plans on prioritised resistance/pathogen combinations. This includes advising on the work for identification of resistance and pathogen combinations to be notifiable according to law. In addition strengthening of on-going work by advising during data analysis, reporting, and feedback could be performed. This includes supporting the development of a sustainability plan on how knowledge of, for example, data analysis and reporting should be obtained, strengthened, and maintained at the sites.

Swedish experts could be used to support capacity development at the INS and CVL in their work as a reference laboratory for AMR and their work to improve

capacity in regional/provincial laboratories. This includes support for improvements in the basic laboratory infrastructure.

Suggested activities for tentative work plan; target area 3

Human sector

1. Conduct a workshop on prioritisation of AMR surveillance, and follow-up.
2. Develop a national surveillance guidance protocol.
3. Follow up on the development of an Action Plan for AMR/AMU at the INS.
4. Strengthen the on-going surveillance at Mavalane Hospital in collaboration with Institute of Tropical Medicine, Antwerp.
5. Strengthen the on-going surveillance at the Central Hospital in Maputo, including planning a PPS for AST for bloodstream infections and data management as well as GLASS reporting.
6. Improve laboratory capacity at the INS according to the AMR and pathogen priority list.
7. Conduct a national AMR data reporting workshop (GLASS) for surveillance sites.

Animal sector

1. Assess the national AMR surveillance system using FAO ATLASS.
2. Conduct a Consultative Workshop on Prioritisation of AMR Surveillance in Animal Health.
3. Develop an AMR surveillance framework for animals.
4. Train laboratory staff at the CVL in AST. Support for strengthening the bacteriology laboratory infrastructure.
5. Conduct a pilot study on AMR surveillance in animals at the CVL for priority pathogens and resistances.

Multi-sectoral

1. Organise a multi-sectoral workshop to define a priority list of AMR and pathogens to be included in surveillance and a shortlist of those that should be made notifiable.
2. Organise a multi-sectoral workshop to define a priority list of AMR and pathogens to be included in surveillance and a shortlist of those that should be made notifiable.
3. Conduct an AMR data analysis workshop, including data management using various statistical tools (Excel, WHOnet and possibly R).

Target area 4 – Infection prevention and disease control, biosecurity, and good animal husbandry

Mozambique's experts could utilise Swedish mentorship during implementation of programs to combat HAI and improve antibiotic use in hospitals together with the WHO country office and the INS. In addition support could be given to ongoing projects with the aim to reduce community transmission of infectious diseases. Swedish mentorship could also be used when developing good animal husbandry to prevent infectious diseases in animals without antibiotics and how to use antibiotics in a prudent and medically efficient way.

Suggested activities for tentative work plan; target area 4

Human sector

1. Support the on-going development and piloting of evidence-based interventions to improve IPC in communities. Collection of data for the design of the interventions is planned to be performed during 2020, at CISPOC. Support the possible piloting of the intervention via the research going on at the Faculty of Medicine at Eduardo Mondlane University.
2. Support the development of PPS protocols for HAI in hospitals and provide guidance for performing measurements, including analysis and reporting.
3. Train staff, including nurses in hospitals, regarding sustainability. Setting up a programme at Mavalane Hospital that could serve as a pilot.

Animal sector

1. Conduct a review of locally available manuals, guidelines, and training programmes on good animal husbandry.
2. Develop a locally applicable manual on the prevention of infectious diseases and how to use antibiotics in a prudent and medically efficient way, and explore ways of using the manual in on-going training programmes.
3. Compile and analyse data from the mandatory record-keeping books in animal farms on overall management and medicine use.

Target area 5 – Awareness and education on antibiotic resistance and use

Mozambique's experts could utilise Swedish mentorship when developing communication strategies and setting up of campaigns towards desired target audiences. This includes supporting events such as the participation in the WHO world antibiotic awareness week and the use of available data for decision makers and political action.

Swedish expertise could also be utilised when designing and performing AMR/AMU and disease prevention training at Universities.

Suggested activities for tentative work plan; target area 5

Human sector

1. Develop web-based education for health workers and information material including common infections in primary care. Materials are available, for example, from Swedish Strama and from SLU. Possibility for translation.
2. Training at hospitals including web-based education. Some education on-going at the Central hospital. Materials are available from, for example, Sweden and could possibly be translated.

Animal sector

1. Develop IEC (Information, Education and Communication) material, including adoption and translation of already existing IEC material (Tripartite and SLU/SVA) related to the prudent use of antibiotics in animals.

Multi-sectoral

1. Support the development of a multi-sectoral communication strategy. Use current national communication expertise in INS, DINAV, and National Communication School. Organise a workshop to start the development of a strategy.
2. Organise activities in conjunction to the WHO antibiotic awareness week, and develop/produce materials for these events.
3. Provide AMR/AMU and disease prevention training for Eduardo Mondlane University lecturers (veterinary and medical faculties).

Resources proposed for implementation of the AMR National Action Plan

Based on the findings from the mission, the proposed specific expertise support for each activity is specified below. The risks, feasibility, and effectiveness have been taken into account when suggesting activities.

For implementation of the full set of activities listed for Target areas 1–5, there is a need for a Swedish coordinator for one year to be based in Mozambique to start up the collaboration and to monitor the onset of activities. In addition, there is a need for one Mozambican national coordinator for the full duration of the support. This should preferably be someone who can continue the work after the Swedish support has ended. Therefore, it would be beneficial if this person is already employed within a Mozambican organisation.

Table 1. Suggested needs of resources for activities in Target area 1.

Sectors	Activity	Duration	Mozambican expertise and resources
Human and animal sectors	Multi-sectoral team of three experts to help plan and attend the NAP implementation workshop, develop an M&E framework, attend the workshop, and assist in writing the national report and scientific publication.	2 months each over 2 years.	High-level ministry attendance at workshops and a strong commitment in implementing, coordinating, monitoring, and evaluating the NAP activities at relevant ministries, institutions, and universities. Personnel who can work with developing the M&E framework. Personnel who can work with writing, collecting, and analysing data as well as writing the national report and scientific publications. Institutions and staff to host, plan, and organise an AMR/AMU conference. Financial resources for an AMR/AMU conference.

Table 2. Suggested needs of resources for activities in Target area 2.

Sectors	Activity	Duration	Mozambican expertise and resources
Human sector	One Swedish expert to work with the WHO and INS on the falsified and substandard medicine work and the performance of the PPS on IPC and antibiotic use.	3 months over 2 years.	
Human Sector	One Swedish expert to work together with the WHO to set up a template for the entry of data and to help with the analysis.	2 months over 1 year.	One master's student who can go through the paper-based orders and invoices and digitise the data on the importation of antibiotics.
Multi-sectoral, including the environment	Support by a Swedish expert in KAP design, data analysis, and reporting of the data.	2 months over 2 years.	Personnel for KAP planning, implementation, data analysis, and reporting. Funding for fieldwork (transport).
Multi-sectoral, including the environment	Two experts (one in the human sector and one in the animal sector) to help with the review and SWOT analysis of antibiotic access and to attend a conference.	1 month each over 1 year.	Institutions and staff to host, plan, and organise an AMR/AMU conference. Financial resources for a workshop.

Table 3. Suggested needs of resources for activities in Target area 3.

Sectors	Activity	Duration	Mozambican expertise and resources
Human sector	Workshop strategy team, three persons.	2 months each over 1 year.	Institutions and staff to host, plan, organise, and report on workshops. Financial resources for workshops. Personnel for writing guiding documents.
Human sector	One person to support surveillance, data analysis, and reporting at Mavalane and Central Hospital.	6 months over 2 years.	Financial support for surveillance initiatives and analysis of samples and isolates.
Animal sector	Workshop strategy team, three persons.	2 months each over 1 year.	Institutions and staff to host, plan, organise, and report on workshops. Financial resources for workshops. Personnel for writing guiding documents.
Animal sector	One laboratory expert for ATLASS, lab improvements, and lab training.	2 months over 2 years.	Surveillance team for sampling and lab personnel. Costs for lab infrastructure, surveillance material, lab equipment, materials, reagents, and bench fees. Institutions and staff to host, plan, organise, and report on workshops. Financial resources for workshops. Personnel for writing the suggested guiding documents.
Animal sector	One expert in surveillance planning, data analysis, and report writing.	4 months over 2 years.	
Multi-sectoral, including the environment	Workshop strategy team, three persons.	2 months each over 1 year.	Institutions and staff to host, plan, organise, and report on workshops. Financial resources for workshops.
Multi-sectoral, including the environment	Two persons with expertise in AMR data analysis.	1 month each.	

Table 4. Suggested needs of resources for activities in Target area 4.

Sectors	Activity	Duration	Mozambican expertise and resources
Human sector	Expertise may be provided by the national Swedish coordinator.		Human resources from INS/CISPOC to work with the intervention,
Animal sector	One expert on good animal production and prudent antibiotic use to support the review, manual development, and record-keeping analysis.	3 months over 2 year.	National workforce to review available animal production material and to assist in developing a new manual and in reviewing animal farmers' records. Cost for printing of manuals and other materials.

Table 5. Suggested needs of resources for activities in Target area 5.

Sectors	Activity	Duration	Mozambican expertise and resources
Human sector	Communication expert to support the adoption and adjustment of IEC material (see below under multi-sectoral activities).		English-Portuguese translator and technical experts in animal production and health to review the proposed material. Cost for printing/production of IEC material.
Multi-sectoral, including the environment	One Swedish communication expert to support the workshop, writing strategies, organising the WHO world antibiotic awareness week, and developing IEC material.	4 months over 2 years.	English-Portuguese translator and technical experts in health to review the proposed material. Cost for printing/production of IEC material. Institutions and staff to host, plan, and organise activities during the WHO world antibiotic awareness week. Financial resources for events.

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Annex 1

A list of key institutions and organisations met during the mission

National Institute of Health

Mavalane general hospital

Centro de Investigação e Treino em Saúde da Polana Caniço (CISPOC)

Faculty of Medicine Eduardo Mondlane University

Veterinary Faculty at Eduardo Mondlane University

The French agricultural research and international cooperation organization
(CIRAD)

Central Veterinary Laboratory

World Health Organization Country Office

Food and Agriculture Organization Country Office

Central Hospital of Maputo

Institute of Tropical Medicine, Belgium/ Mavalane general hospital

National Veterinary Directorate

National Pharmacy Directorate

District primary health care in Massingir - Serviço Distrital de Actividades
Económicas (SDAE)

District Veterinarian, Massingir

Cattle, pig, sheep and goat farmers, Massingir

Poultry Association, Massingir

The growing threat that antimicrobial resistance (AMR) poses to human and animal health and sustainable development can only be met through international and intersectoral collaboration. Experts from the Public Health Agency of Sweden and the Swedish University of Agricultural Sciences performed a field study in Mozambique in December 2019 in collaboration with Mozambican AMR experts. The purpose was to survey existing structures and needs for support regarding AMR containment and identify how these could benefit from Swedish expertise built during many years of addressing AMR.

In Mozambique, an intersectoral National Action Plan (NAP) for antibiotic resistance and use is in place, along with structures for intersectoral collaboration. However, Mozambican experts highlighted lack of resources and coordination as obstacles to NAP implementation. This report outlines prioritized activities in line with the NAP of Mozambique and a proposal for Swedish support to carry out the activities. The activities are grouped into five target areas:

- National governance and coordination for AMR containment
- Antibiotic access, use, and consumption
- Antibiotic resistance, including surveillance and laboratory capacity
- Infection prevention and disease control, biosecurity, and good animal husbandry
- Awareness and education on antibiotic resistance and use

The analysis is applicable to other countries in similar circumstances and could form a model for Swedish support of AMR containment efforts in low income countries. The Public Health Agency of Sweden assesses that Swedish expertise could play an important role to support efforts in other countries to reduce development of AMR and curb spread, as stated in the Swedish Strategy to Combat AMR.

The Public Health Agency of Sweden is an expert authority with responsibility for public health issues at a national level. The Agency develops and supports activities to promote health, prevent illness and improve preparedness for health threats. Our vision statement: a public health that strengthens the positive development of society.



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