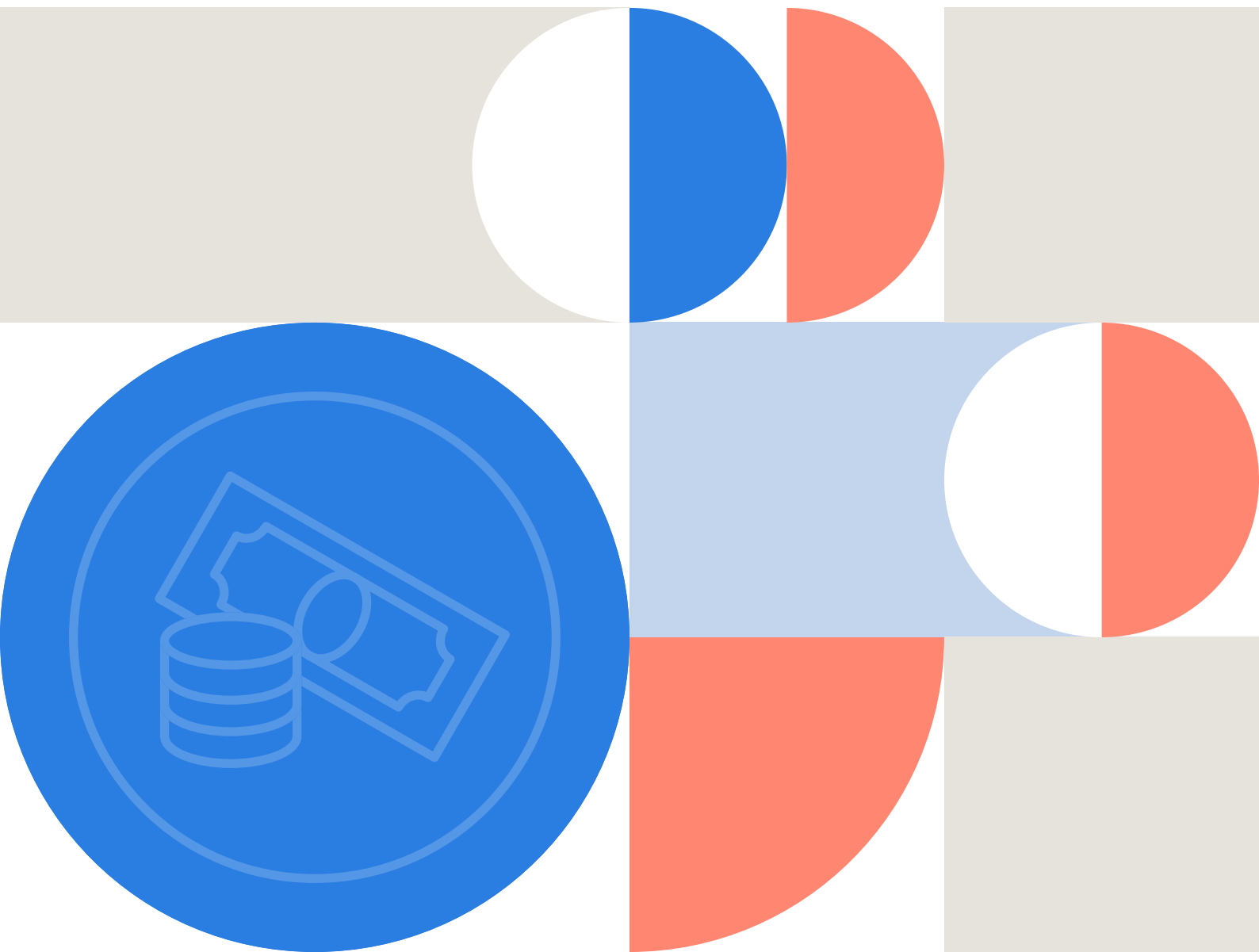# WHO Costing and Budgeting Tool for National Action Plans on Antimicrobial Resistance

User guide

WHO Costing and Budgeting Tool for National Action Plans on Antimicrobial Resistance

User guide

Contents

Acknowledgements

Abbreviations

AMR	antimicrobial resistance
CSF	cerebrospinal fluid
dNTP	deoxynucleoside triphosphate
FAO	Food and Agriculture Organization of the United Nations
GAP	Global Action Plan
IPC	infection prevention and control
KAP	knowledge, attitudes and practices
M&E	monitoring and evaluation
NAD	nicotinamide adenine dinucleotide
NAP	national action plan
OIE	World Organisation for Animal Health
PCR	polymerase chain reaction
TB	tuberculosis
UHC	universal health coverage
UTI	urinary tract infection
VBA	Visual Basic for Application
WASH	water, sanitation and hygiene
WHO	World Health Organization

01

Introduction

In 2015, in an effort to advance the global and national response to AMR, the World Health Assembly issued resolution WHA68.7 calling for all Member States to develop AMR NAPs that address the five objectives of the Global Action Plan (GAP) by May 2017. The WHO GAP provides a framework to support countries in developing their NAPs. As of July 2021, 145 countries have developed NAPs and an additional 41 countries are currently developing a NAP. In 2020, according to the Tripartite AMR Country Self-Assessment Survey data, approximately 20% of NAPs were fully funded and 40% had a budgeted operational plan.[1]

An AMR NAP is a "plan of plans" (Figure 1[2]) that often comprises many activities that have not been costed or linked to existing national health plans and budgets. These aspects are important – for example, some national programmes might already contain strategies to control disease-specific drug resistance. Some activities might already be included in other health-related programmes addressing water, sanitation and hygiene (WASH). Leaders making funding decisions need to understand how much the activities included in the NAP will cost, how many activities are already being funded and how the budget can be increased. A clear approach to costing and budgeting AMR NAPs is therefore a critical first step in ensuring that efforts are practical and can be implemented sustainably.

To support countries in costing and budgeting their AMR NAP activities in order to operationalize their AMR NAPs, WHO has developed a costing and budgeting tool and this accompanying user guide. In developing this tool, a desktop review of existing costing tools and implementation guidance documents was undertaken.

This pragmatic and modular tool is intended to be user-friendly, flexible, easy to navigate and adaptable to the needs of various countries. It can be used to generate detailed costs for the technical activities included in AMR NAPs. The tool can be used to cost priority activities that still need to be funded. It can also be used for costing and budgeting all activities (including already funded activities) through AMR and other programmes – such as universal health coverage (UHC), vaccines, malaria, tuberculosis (TB) and HIV – to document funds already available and identify funding gaps. The modularity of the tool allows flexibility in how it can be filled out given specific country preferences:

- all sectors/ministries/departments within ministries can fill in one single tool; or
- sectors/ministries/departments can fill in the tool separately and then consolidate results into a combined dashboard.

This user guide describes the step-by-step processes for using the costing tool and data capture forms, functionalities of the tool, resulting outputs of dashboards, graphics and summary analyses. This manual should be used in conjunction with other WHO resources, such as the *draft WHO implementation handbook for national action plans on antimicrobial resistance and Turning plans into action for antimicrobial resistance (AMR)[3]. Working paper 2.0: implementation and coordination* to prioritize, cost and operationalize activities in AMR NAPs.

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[1] Global database for the tripartite antimicrobial resistance (AMR) country self-assessment survey (TrACSS). Geneva: World Health Organization; 2018 (https://amrcountryprogress.org/, accessed 29 August 2021).

[2] Turning plans into action for antimicrobial resistance (AMR). Working paper 2.0: implementation and coordination. Geneva: World Health Organization; 2019 (https://www.who.int/antimicrobial-resistance/publications/AMR-Turning-plans-into-action-working-paper-march-2019.pdf?ua=1, accessed 29 August 2021).

[3] Available at Supporting countries with national action plan implementation (who.int)

Figure 1. Turning plans into action: an overview
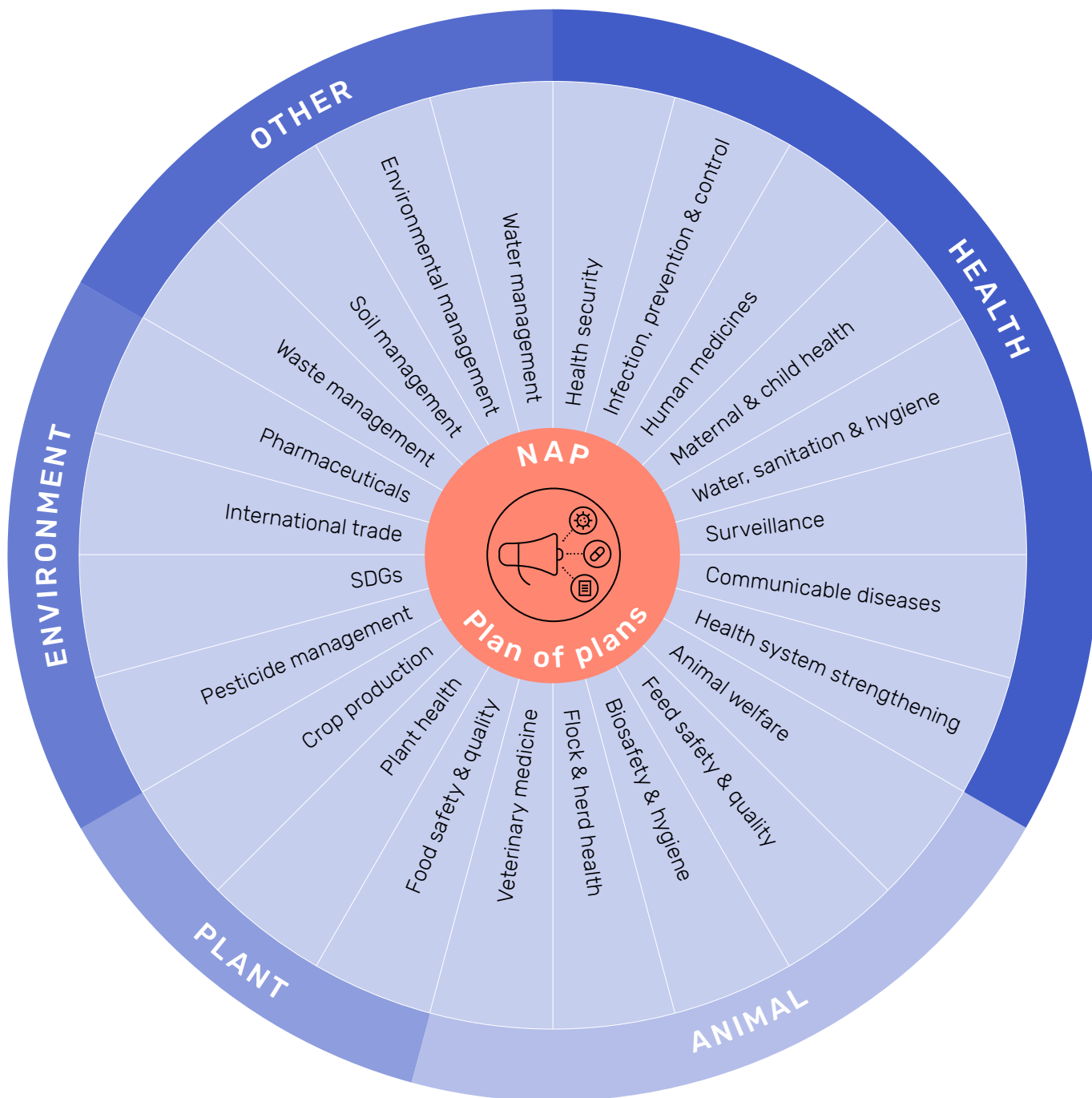
02

**Turning plans
into actions**

Embedding AMR activities in government planning and budgeting processes at the national/subnational, sectoral and departmental levels is one strategy for success outlined in the *draft WHO implementation handbook for national action plans on antimicrobial resistance* (Figure 2).

Figure 2. Overview of NAP development and implementation
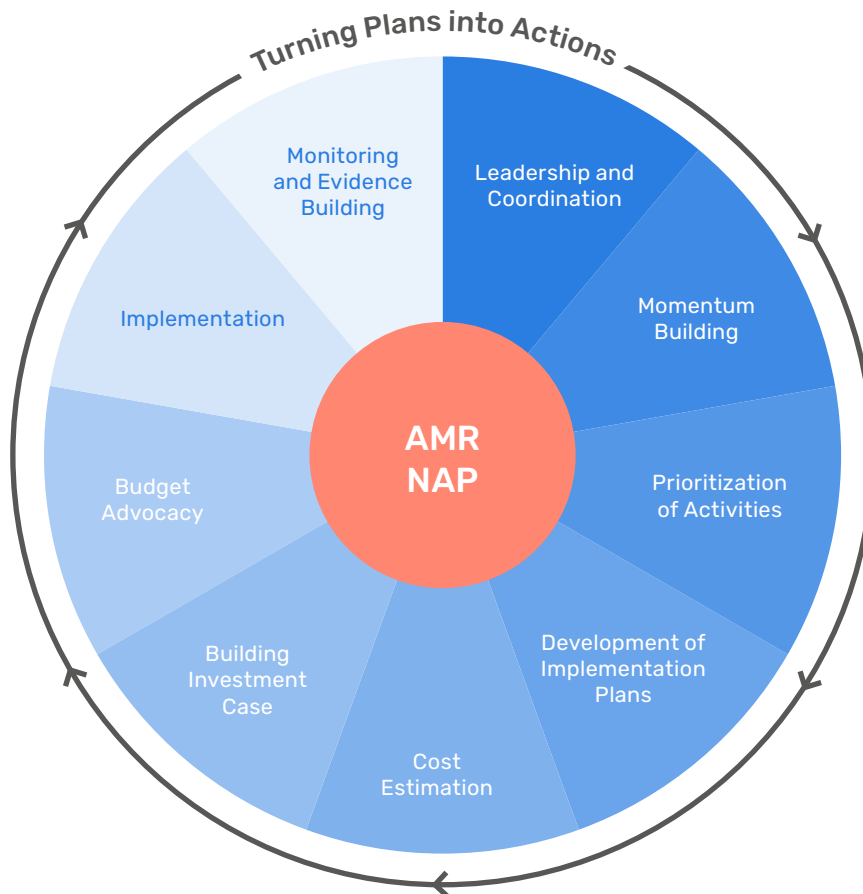
2.1 Selecting activities for costing

As a plan of plans, national AMR NAPs are not always realistic in terms of considering available funding. Because AMR is a multisectoral issue, activities are linked to many other existing national programmes and plans, such as infection prevention and control (IPC), WASH and surveillance. Countries are encouraged to undertake a process of prioritizing activities based on assessment of the current situation. This process should identify which activities should be implemented first and which can be left for later in order to develop a stepwise and time-bound AMR NAP operational plan to be costed. Subsequent resource mapping should also be undertaken to identify existing and future funding opportunities.

Note also that activities may need to be reprioritized based on the estimated costs and resources/funding available (Figure 3).

In identifying/prioritizing activities for costing, the following factors should be taken into consideration:

- timeline for implementation
- stakeholders involved in implementation
- activities that will have the greatest impact
- activities that address an imminent risk
- activities that are easy and highly feasible (quick wins).

Figure 3. Prioritization of activities

6.
Re-prioritization
of activities based
on evidence and
resources available

5.
Resource
mapping

1.
Identification of
priority activities
from existing
AMR NAP

2.
Prioritization of
activities based
on evidence and
resources

4.
Costing of
operational
plan

3.
Development and/or
revision of AMR NAP
operational plan
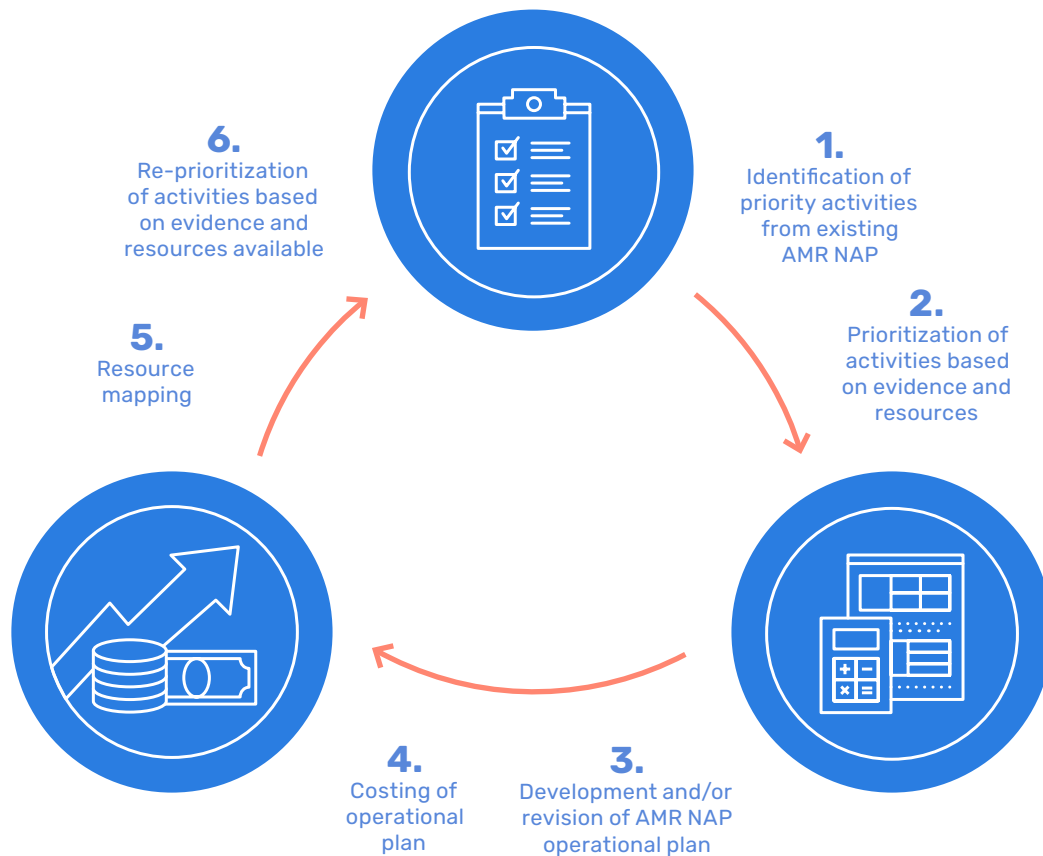
In addition, it is important to consider:

New activities versus activities that are already ongoing – many activities may already be ongoing within other programmes (UHC, immunization, malaria, TB, HIV, etc.) and have significant potential to reduce the spread of AMR if they are more broadly implemented.

Sequencing of activities – prioritize activities that are a necessary first step to other important components of the plan.

Availability of resources – prioritize activities where existing human and financial resources and technical capacity are potentially available to implement.

Once the priority activities have been identified, they should be inserted into a time-bound operational plan that includes the following:

- the activity
- responsible entity
- unit and quantity
- implementation level (national/subnational)
- timeline
- monitoring indicator(s).

The plan can then be costed and sources of funding added where available. Planning and costing AMR NAPs (or components of NAPs) are often iterative. Initial planning will identify the strategic direction, objectives and activities. Subsequent review and analyses will identify detailed activities and inputs leading to initial cost estimates, and review of total costs will provide a basis for strategic adjustments and reprioritization for implementation.

This process may be repeated until the final costed plan is developed and endorsed. Cost estimation can aid policymakers and implementers in prioritizing within resource constraints and in revising plans, if necessary (e.g. the number or scale of activities can be adjusted to fit available budgets). Additional information on selecting activities in AMR NAPs is available in *Turning plans into action for antimicrobial resistance.*

2.2 Process for costing

Costing can be defined as (i) the estimated cost (price) of producing a product or accomplishing an activity and (ii) the process leading to this estimated price for all activities in the project. In the WHO costing and budgeting tool, costing is the system for estimating costs for each activity that has been identified. Costing relies primarily on a bottom–up (or detailed) approach: estimating all individual work packages/activities with the greatest level of detail possible and summarizing higher-level estimates by combining the individual estimates. The accuracy of bottom–up estimating is optimized when individual work packages/activities are defined in detail.

Costing readiness assessment

It is recommended that countries complete a costing readiness assessment before using the costing tool.[4] Given the multisectoral nature of AMR NAPs, costing a NAP can be complex, as components of AMR NAPs span various sectors, departments and stakeholders. To ensure that the results of the costing process are optimal, countries should make certain that they are ready by:

- developing a defined, detailed operational plan for selected activities to be costed that includes an implementation timeline;
- identifying unit costs and quantities for the specific inputs that will be required for each activity to be costed; and
- identifying available resources/funding to implement each activity.

Developing/revising operational plans

While NAPs usually include defined strategic objectives, they often do not include operational plans with associated activities and sub-activities (see Table 1 for a summary of common operational activities included in AMR NAPs). For costing purposes, countries should develop an operational plan that identifies activities and sub-activities, with sufficient detail to describe who is doing what, how often and with what resources, before beginning costing. Given the multisectoral nature of AMR NAPs, the AMR coordinating mechanism (or other relevant body) should initiate this overall operational planning process and complete and validate final plans before starting to cost.[5]

Table 1. Common AMR NAP operational activities

Construction and renovation (laboratories and health facilities)	Operational/implementation research
Procurement of lab equipment, vehicles and supplies	Field visits/inspection
Advocacy activities (for budget, oversight/governance)	Database and software development
Working group meetings/workshops with multisectoral partners	Monitoring and evaluation
Needs assessments	Survey development and implementation
Human resources/technical assistance and mentorship/consultants	Data entry and analysis
Public awareness campaigns (AMR awareness, hygiene, sanitation, optimal use of antibiotics and vaccination)	Materials/document development (reports, questionnaires, indicators, guidelines, protocols, curricula, training, reporting and recording forms)
Behaviour change activities	Translation, editing and printing of materials
Data/knowledge sharing among agencies (labs, health facilities, government stakeholders)	

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[4] Adapted from Maximising the Quality of Scaling Up Nutrition (MQSUN+) (https://mqsunplus.path.org/resources/assessing-readiness-for-costing-of-a-common-results-framework-or-national-nutrition-plan-guidance-note/).

[5] Because technical expertise is required to develop operational plans and budgeting processes that are often ministry or sector specific, individual ministries or stakeholders might initially cost the individual activities and components and later combine them into one costed plan.

As an example, for a training course the operational plan should contain sufficient detail for users to be able to estimate the number of trainers and participants, duration of the course and whether refreshments, lodging, per diem and travel will be covered, as this information will be needed to cost the training. If an awareness campaign is included as part of the NAP, the operational plan should describe whether formative research will be conducted to develop messaging (e.g. conducting a baseline survey or qualitative research with focus groups); the channels to be used for disseminating messages (e.g. flyers, billboards, radio, TV); the scale (e.g. how many flyers, TV spots) and how impact will be monitored, amongst others.

For each activity to be costed, the operational plan should also identify whether it is an existing activity that can be scaled up or a new one. The plan also should describe, in detail, how the activity will be implemented. In addition, the following aspects of implementation should be considered in planning:

- The **level of operation** should be specified. Will the activity be conducted in the field at the local level (e.g. health centre, farm, fishery, district), regional level or national/subnational level?

- What is the **entity primarily responsible for implementing the activity?** This aspect is usually already described in country AMR NAPs.

- The **implementation timeline** should be used to determine the cost budget over time. For a specified calendar period, the activity costs planned for that period can be combined to determine the time-phased budget.

- The **scope** will indicate whether any specific deliverables or contractual or legal constraints are mandated by the funding organization, contracts or other groups, such as government and nongovernmental agencies.

WHO has several guidance documents that may be helpful in developing operational plans for specific components of AMR NAPs. Examples of such resources are available on the WHO AMR website.

2.3 Determining quantities, unit costs and available resources

Once the activities have been detailed, countries will determine the unit cost and quantity (i.e. the number of recipients) of the activity. Stakeholders will need to clearly define the unit of scale-up that will be costed. For example, if the activity is to hold a 5-day workshop to train 20 individuals, the scale-up unit is the workshop. Or, if the activity is to incorporate IPC in an education and training curriculum, the scale-up unit is the curriculum.

Example of detailed activity description

———

"Quarterly meeting of AMR coordination committee" can be written in detail as "Quarterly meeting of AMR coordination committee with 20 participants conducted at the external venue, facilitated by one external consultant, with food provided for breakfast, lunch and tea breaks, and one 50-page binder of meeting materials provided to each participant".

Unit costs

When using the ingredients (bottom-up) approach, unit costs of inputs must be determined. These unit costs might already be available from recently conducted cost studies of a similar scale or method. Nonetheless, they might need to be estimated through a combination of key informant interviews with implementing agencies and review of accounting, human resources, procurement and various financial records. In instances where the unit costs are unknown, unit costs from similar programmes within the country (e.g. human resources, supplies, meetings), vendor websites or similar programmes and activities in other countries can be used.

In using an ingredients approach, costs should be allocated only to the task for which unit costs are being estimated. For example, if a microbiologist spends 30% of her time identifying AMR-related pathogens and 70% of her time on non-AMR-related pathogens, only 30% of her salary should be included (see note on AMR-relevant activities in Annex 3 for additional information regarding allocations). The same is true for other inputs not solely used for AMR-related activities. Various stakeholders and implementers might need to be consulted to estimate the percentage of time used for AMR-related activities versus irrelevant activities.

Although the ingredients approach (reviewing actions selected for implementation and breaking down activities into quantifiable units with estimated unit costs) is the primary method used in this tool, the tool also has the flexibility to cost various activities at higher levels to enable efficiencies using existing country data (e.g. government guidance/databases on rate schedules, previous estimates or budgets for similar activities). For example, if unit costs for a "standard" 3-day meeting with 20 participants already exists in a document, this estimate can be used in the tool instead of building meeting costs from the bottom up.

> **TIP:**
>
> Although using existing estimates could save time, users will need to consider the applicability of existing estimates to the actual implementation of specific activities in AMR NAPs. For example, if existing estimates assume that only national-level participants will attend a meeting, such unit costs might underestimate travel costs associated with attendance of participants from the subnational units.

Quantity

In determining the quantities of each activity, countries should consider outputs and targets and ensure that a country AMR monitoring and evaluation (M&E) plan is reflected in the determinations. Guidance on country-level AMR NAP M&E planning is available in the [Monitoring and evaluation framework of the global action plan on antimicrobial resistance.](#)[6] In addition, national-level M&E guidance is currently under development. The number of recipients participating in the activity will be determined from document review and in collaboration with implementing agencies, that is, programme and M&E managers. For each activity or sub-activity, the projected number of recipients to be reached (e.g. number of health providers trained, number of schools where awareness activities will be conducted) or objects to be produced (number of guideline documents to be developed, number of meeting agendas to be printed) needs to be determined.

Such estimates could be contingent on the level of scale-up and whether specific regions or subsets of the population are targeted. A country could opt not to scale up nationwide but instead concentrate only on priority regions. In this case, the population size will initially be based on the priority regions and will subsequently increase to cover the nation. In addition, countries will need to consider the rate of scale-up, if applicable. This scale-up rate should be determined on the basis of what is achievable within the NAP timeline. The annual reach or coverage target of each activity is estimated from the scale-up rate. This rate should be realistic, given the country constraints on available resources, and should be implementable during the period of the NAP.

2.4 Determining existing resources

Before starting costing, determining whether any resources are already available and committed to AMR NAP activities is beneficial. Entering this information into the tool will enable identification of funding gaps, with users of the tool being able to specify at which level of the AMR NAP funding gaps will be calculated (e.g. priority, objective, activity, sub-activity).

Examples include salaries for hospital-level antimicrobial stewardship coordinators paid for by the ministry of health, laboratory commodities paid for by a donor through a separate programme or funding stream, or funding for AMR activities available in other plans and/or budgets (e.g. UHC). These funding amounts then can be added to the available resource projections to produce more precise funding gap estimates.

2.5 Costing readiness checklist

To summarize the steps and information gathering described above, a simple checklist can be used in assessing costing readiness for each AMR NAP component to be costed.[7] For each item in the checklist, a rating such as the following is recommended:

- 0 = Not ready for costing
- 1 = Needs significant additional information
- 2 = Good but needs additional detail
- 3 = Adequate for costing.

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[6] Monitoring and evaluation of the global action plan on antimicrobial resistance: framework and recommended indicators. Geneva: World Health Organization; 2019.

[7] The checklist can be downloaded from https://who.int//teams/surveillance-prevention-control-AMR/who-amr-costing-and-budgeting-tool

The Costing readiness checklist (Box 1) is set up to apply this scale and to calculate an average score for each activity across the various items in the checklist. Although the checklist is not required to be completed for every AMR NAP component to be costed, they can guide the process of gathering the required information and appropriately phasing which components can be costed first and which can be costed after additional information is gathered. The checklist can also be compared across activities to identify whether systematic information gaps are present for specific items in the checklist. For example, if sufficiently detailed information on annual targets is missing across multiple activities, a joint meeting with M&E experts could be useful in refining the information. If unit cost information is spotty or questionable, a meeting with the ministry of finance may be useful to obtain consistent national benchmarks.

Box 1. Costing readiness checklist

✓ Detailed description of the activity/sub-activity developed

✓ Activities/sub-activities separated into individual rows

✓ Target population/scale clearly indicated for activities

✓ Targets defined for activities

✓ Ingredients/inputs required to conduct activity/sub-activity (e.g. personnel, consultants, travel, laboratory supplies and equipment) identified

✓ Quantities of ingredients/inputs determined

✓ Frequency of activity/sub-activity per year defined

✓ Existing unit costs of inputs/ingredients identified (e.g. per diem, government salary lists, historic procurement records)

✓ Existing resources/funding documented

03

WHO costing and budgeting tool for national action plans on AMR: how to use it

3.1 Where to find the tool and who should use it

The WHO costing and budgeting tool, accompanying documentation and resources are available on the WHO AMR website.

The primary audience for the tool is national AMR (One Health) multisectoral coordinating mechanisms. Given that the technical expertise required to develop operational plans and budgeting processes is often ministry or sector specific, costing of individual activities and components might be conducted separately by individual ministries or sectors, and then later combined into a single costed plan (modular approach).

3.2 In-country process

Although specific processes might differ depending on the country or implementer, the following steps illustrate a possible coordination of costing across various actors and sectors:

- **Step 1:** The National AMR coordinating mechanism receives/downloads the tool and resources pack and designates a (or multiple) costing coordinator(s).[8]

- **Step 2:** The costing coordinator reviews this user guide and available training materials and tests the tool functionality/features. If questions arise, the costing coordinator contacts the WHO helpdesk (amrnap-helpdesk@who.int) for additional technical assistance.

- **Step 3:** The costing coordinator, together with the members of the national AMR coordinating mechanism agree on the process for completing the costing tool: (i) one costing tool to be filled out for all activities irrespective of sector/ministry/department, or (ii) each sector/ministry/department to fill out the tool separately with the designated costing coordinator. Then, a lead costing coordinator will compile the information at the end into one costed plan (modular approach).

- **Step 4:** The costing coordinator holds a meeting with the relevant sectors, ministries and stakeholders who will be implementing the activities prioritized and selected for costing.

- **Step 5:** The costing coordinator completes the draft costing based on input from the relevant sectors, ministries and stakeholders and sends the completed costing tool to the main costing coordinator.

- **Step 6:** The costing coordinator reviews the submitted data and, if errors or incomplete data are detected, sends feedback.

- **Step 7:** The costing coordinators from the different sectors and ministries send revised, finalized results to the lead costing coordinator.

- **Step 8:** The main costing coordinator combines the data from multiple costing sheets to produce a comprehensive costed plan and dashboards (modular approach).

- **Step 9:** The costing coordinators shares the comprehensive costed plan with the relevant actors.

Note that the process presented here describes only the specific steps of compilation and merging of required data in the tool. This illustration assumes that the pre-costing steps described earlier in this guide have been completed and that all actors have been engaged and informed about the overall process.

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[8] Countries might consider working with the ministry of finance or a donor agency to help identify a coordinator with experience in costing and budgeting.

3.3 Software requirements

The minimum software requirements for using the tool are Excel 2010 or later.[9] The tool is designed to function in a Windows operating environment and will not function properly with Mac operating systems. Earlier versions of Excel affect tool functionality. The tool uses VBA (Visual Basic for Application) programming, so users must enable macros to activate tool functionality. The Excel tool should first be saved to the user's computer/laptop and opened from the folder location. Opening the file directly from email is not recommended, as some functionality might be lost.

To summarize, save the Excel file on your computer/laptop and, on opening the Excel file, enable macros. Users need (i) to ensure that Power Pivot is **enabled** in their version of Excel and (ii) to **disable** "Fill formulas" in Excel AutoCorrect options. Detailed instructions are provided in Annex 4.
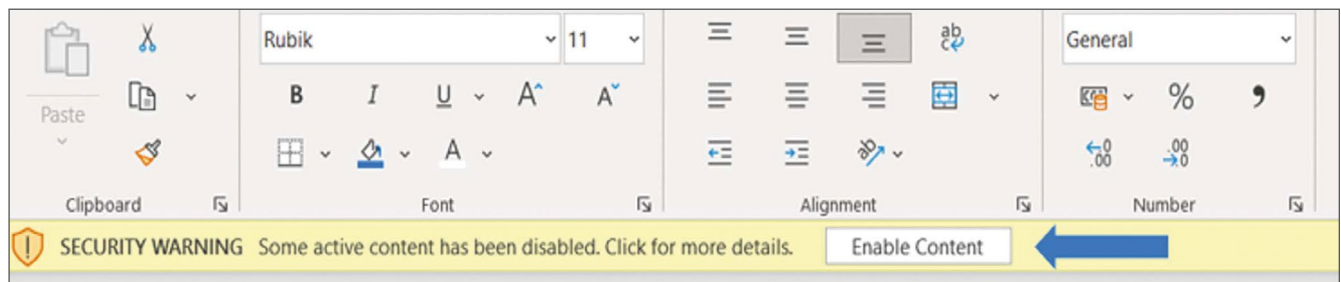
The tool is an Excel file consisting of several worksheets, data entry forms, control buttons and VBA programming, summary tables, graph outputs and tracking worksheets. **Inserting columns in any of the worksheets is strongly discouraged, as doing so negatively impacts tool functionality.** We also recommend enabling the automatic save function in Excel, or saving the tool regularly during data entry.

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[9] Excel 2010 may require installing the pivot table add-on.

3.4 Overview and tool workflow

Completing the tool involves five key steps (Figure 4 provides an overview of key components of the tool and tool workflow completion):

• **Step 1.** NAP entry: The user specifies the NAP priorities, objectives and activities that were selected for costing.

• **Step 2.** Basic inputs: The user enters key parameters relevant to their country, including ministry/implementer names, funder names, implementation years and unit costs for various items.

• **Step 3.** Costing matrix: These tabs are automatically generated after NAP entry is completed and are used to insert sub-activities and to enter unit costs and units according to the implementation developed by the country prior to costing.

• **Step 4.** Funding (optional): The user enters existing funds from various sources/donors. This step is optional but recommended and can be completed at any time after NAP entry is complete.

• **Step 5.** Dashboards: The user can specify various cross-tabulations and levels of analysis to produce dashboards and visualize all data. The Dashboard tab summarizes cost data entered by the user. The Funding Dashboard tab combines cost and funding data (if funding data in Step 4 above have been entered) by the user.

Additional functionality is available for the lead costing coordinator in a supplemental consolidator tool that combines modules of the costing tool submitted by various implementers. The consolidator tool produces an aggregate dashboard across all implementers (see the section on Module Consolidator Tool).

Figure 4. Tool workflow
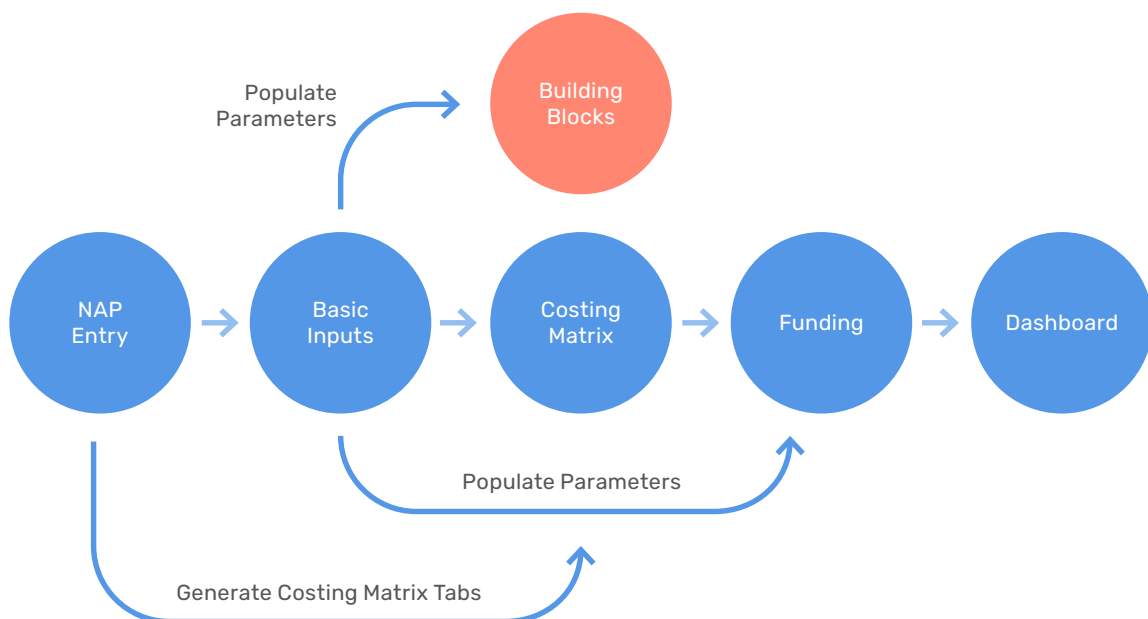
Step 1. NAP entry

Completing the NAP Entry tab is the first step in the process of completing the tool. This is where the user enters the activities selected for costing. Most countries' NAPs are structured as a set of strategies or objectives, with specific actions (and sometimes sub-actions) developed for each strategy. For the purposes of the tool, we adapted the term "level" to specify various components of NAPs. For example:

- Level 1 refers to the highest-level objective or strategy.

- Level 2 refers to the next level strategy or objective.

- Level 3 refers to a specific action under the strategy or objective.

- Level 4 refers to a sub-action, and so forth, to Level 6.

In an example presented in Figure 5, a country is using the terms "strategy", "objective" and "activity" in their NAP. The first (or highest) level is called "Strategy"; Level 2 is called "Objective" and the specific actions under that objective represent Level 3 and are called "Activity". Different countries may have different terminology for each level. For this reason, the tool allows users to customize level names to match country-specific NAP and operational plan terminology (described further below). Most country NAPs have two or three levels, but the tool allows entry of up six levels.

Figure 5. Sample section of a country NAP

Strategy – Level 1	**Strategy 1.** Raise awareness and understanding and improve education on antimicrobial use, resistance prevention, and containment through effective communication and training
Objective – Level 2	**Objective 1.** Improve Community Awareness and Understanding, Education, and Empowerment
Activity – Level 3	**Activities** • Promote society engagement, awareness raising, education, and empowerment about antimicrobial use and resistance containment though use of the media • Incorporate hygiene, sanitation, infection prevention, and antimicrobial use and resistance into school curricula to promote better understanding and awareness • Support the media to accurately report relevant information and reinforce key messages about antimicrobial use and resistance • Support the develop of core communication materials and tools • Advocate AMR as a national and global priority across all government ministries • Increase public engagement to promote key messages about antimicrobial use, with responsibility for appropriate use • Ensure proper disposal of unfit-for-use antimicrobials to protect the environment

The table in the NAP Entry tab has two main components:

- a table for entry of activities to be costed; and

- a form for renaming the levels to match country NAPs.

Table for entry of activities for costing

The blank table for entering activities for costing is presented in Figure 6. This tab is completed in three basic steps: (i) enter the level of each activity to be costed, (ii) enter an activity description and (iii) provide a short name (if needed) for Level 1 strategies/objectives/activities. These steps are presented in Figure 7 and described in further detail below.

Figure 6. NAP entry table

Figure 7. Sample NAP entry table with data filled out by user

Level	Sequence	Description	Tab name (only use light blue rows)
1	1	Raise awareness and understanding and improve education on antimicrobial use, resistance prevention, and containment through effective communication and training	Awareness
2	1.1	Improve Community Awareness and Understanding, Education, and Empowerment	
3	1.1.1	Promote society engagement, awareness raising, education, and empowerment about antimicrobial use and resistance containment though use of the media	
3	1.1.2	Incorporate hygiene, sanitation, infection prevention, and antimicrobial use and resistance into school curricula to promote better understanding and awareness	

Enter level and description of each activity

In each line/row of the table, the user should select the level of the activity in the "Level" column and enter a short description of the activity in the "Description" column, which can be copied and pasted from the country's NAP. The user need not enter anything in the "Sequence" column: the numbers in this column generate automatically once the levels are chosen. This field is necessary only to ensure internal tool functionality and is not intended to match the actual numbering of activities in the country NAP. **PLEASE NOTE:** The user should only enter activities that will be costed.

The user should enter each activity sequentially, providing the next strategy, objective, followed by the activity supporting it and so on. When entering descriptions (and selecting appropriate levels), **do not skip rows.**

Enter a short name for Level 1 items (optional)

The "Tab name" column can be used to specify a short version of the activity's name if the description is lengthy. For example, if the description of the first strategy is "Improve cooperation among sectors", the user can rename it simply as "Cooperation" in the "Tab name" column. This column is optional. Using it will change the names of the tabs that will be generated at a later stage. Instead of using the generic tab names pre-set in the tool (SO1, SO2, SO3, etc.), the tab names will be whatever is specified in the "Tab name" column. Note that these names cannot exceed 15 characters (the general limit for Excel tab names). If users choose this function, they should fill in the column (**in the rows high-lighted in light blue only**) and then click on the "Change Tab Names" button to apply their changes. Click "OK" in the pop-up that appears to apply changes.

Form for renaming levels to match country names

On the top right of the NAP Entry tab is a button for customizing level names.

This feature allows users to customize level names to match the names used in the country's AMR NAP. For example, in one country, Level 1 might be called "Objective"; Level 2, "Activity"; and Level 3, "Sub-activity". In another country NAP, Level 1 might be called "Strategy"; Level 2, "Objective"; and Level 3, "Activity". Pressing this button opens the form shown in the screenshot below. The purpose of this form is to enter country-specific names for levels. The user needs to enter the name of each level and click "Save Levels". The entries in the "Level name" column will automatically update.

Creating Costing Matrix tabs

The last step in completing the NAP Entry tab is to create Costing Matrix tabs.

After the user presses "Create Costing Matrix Tabs", there is a short pause while the information is processed. The user will then see several new tabs along the bottom of the screen. If the user enters three Level 1 strategies, three new tabs appear. If the user enters five strategies, five new tabs appear. In each newly created Costing Matrix tab, information entered in the table for Level 2, 3, etc. activities are placed in separate blocks. **Note that the "Create Costing Matrix Tabs" button can only be pressed once. Revising the NAP entry after Costing Matrix tabs have been created is not possible.** If users wish to revise the NAP table, they should start with a new blank tool.

Step 2. Basic inputs

The Basic Inputs tab is used to enter key parameters to set up the tool and default values for most cells on the data entry forms. To ensure full functionality of the tool, default values must be entered in the "Basic inputs for tool" worksheet before costing is completed.

General information

The user is **required to enter all fields in the "General information" table** (Figure 8). Users enter the country name, and then the first year of costing and total number of years of costing. For example, if the NAP activities selected for costing start in 2021 and will be implemented over total of 3 years, the user would enter "2021" as the first year of costing and then enter "3" in the total number of years of costing. This will change the number of years available for entry in the Costing Matrix tabs. The tool assumes that all costs will be entered by users in local currency. However, in the tool dashboards users will be able to generate summary information in both local currency and USD. Users will specify which currency they are using from a drop-down menu, which will automatically populate the currency code. Users should then enter the exchange rate of the local currency to USD, that is, USD 1 is equal to how many units of local currency. Users can use XE Currency Converter to find current and reliable exchange rate information. Filling in the exchange rates enables visualizations to be displayed in USD and local currencies in the dashboards. Note that users can update exchange rates in the Basic Inputs tab throughout the process of tool completion (this may be necessary for countries where exchange rates fluctuate frequently).

Figure 8. General information

Users can also account for expected inflation (optional). Entering inflation information will enable estimated costs to be adjusted for future inflation. To do so, the user should check the "*Include inflation?*" box. When the box is checked, a table will appear where users can enter annual inflation values (e.g. for year 2022, enter the percent increase relative to 2021; for year 2023, enter the percent inflation relative to 2022).

1 Parameters	All fields are mandatory	
Country name	Turkey	☑ *Include inflation?* *IE*
First year of costing	2021	
Number of years of costing	3	*You should fill in all the values in "General Information" table*
Exchange rate local currency/USD	10	
Local currency code	Turkey Lira	*TRY*

Inflation rate	Percentage
Year 2022	5%
Year 2023	7%

Costing the building blocks

For each section, users should progress through each field and enter the average or typical cost for each item in their country for meetings/workshops/training, field visits, consultants and human resources (as shown in the screenshots in Figure 9). These entries serve as "building blocks" for calculating the cost of each activity. These costs should be entered in local currency.

Figure 9. Average or typical costs entry

For meetings/workshops and training	
Local participant per diem	400
Away participant per diem	900
Extra days for away participant	1
Rent of venue (per day)	10,000
Lunch	100
Tea break	50
Stationary	60
Per diem for trainer	900
Fee for trainer (per day)	5,000

Consultant	
International	
Per diem	900
Daily rate	6,000
International flight	9,000
National	
Per diem	400
Daily rate	5,000
Travel	2,000

Human Resource	
Annual salaries and benefits	**Salary (per year)**
Laboratory director	230,000
Laboratory assistant	100,000
Laboratory analyst	120,000
Driver	100,000
Clerk	130,000
Secretary	
Technician	

Field Visits	
Supervisor per diem	900
Driver per diem	900
Vehicle cost per DAY	
Bike	
Car	800
4 x 4	1,000
Transporter	
Pick up	
Other 1	
Other 2	
Fuel	
Fuel per day	200

Categorization

In the categorization section, users specify options for other components of the building blocks. Users are **required to specify a lead agency/implementer list.** If a separate module of the tool is being completed by various agencies in the country, either one agency name can be specified in the list or a module creator can choose to specify various subagencies within an agency. For example, if a country's Ministry of Health is completing a separate module of the tool, in the "Lead agency/implementer" column users can specify only one entry: "MOH".

Alternatively, users can choose to specify various divisions of the Ministry of Health that may be responsible for the implementation of various activities. For example, if the Ministry of Health laboratory services division will be implementing NAP activities related to laboratory strengthening, and the Ministry of Health M&E division will be leading the implementation of M&E activities, those divisions can be listed as separate implementers in the table. However, it is recommended listing lead agencies/implementers in the tool to match how the lead entities are described in the NAP and/or operational plan.

The "Capital/recurrent" and "Cost category 1" fields are optional, should a country wish to capture additional information on each costed activity systematically.

Information	Capital/recurrent (optional)	Cost category 1 (optional)	Lead Agency/Implementer (required)	Procurement categories
This is the categorization necessary to facilitate the analyses of the results. The bottom row of all forms have drop down lists for various categories of activities and costs.	Capital		MOH	General
	Recurrent		MOA	Infrastructure
	Other		MOE	Goods
				Services
The "Lead agency/Implementor" categorization is mandatory to fill in.				Logistics
				Tendering process
				Other
The other 3 categorizations (Capital/recurrent, Cost category 1, and Procurement categories) are not mandatory and the user can specify customized content of the cells for those columns.				Other 2

Additional information can be added at any time (e.g. to add personnel categories). If revisions or additions are made later, however, the user will need to press the "Check Inputs" button again to repopulate menus and forms.

Funding sources (optional)

Entering funding sources is optional but should be specified if the user wishes to enter information on funding availability at a later stage and generate funding dashboards. While this step is optional, it is highly recommended so that funding gaps can be calculated. Users can enter up to 20 sources of funding in the table, such as Ministry of Health budget, donors (e.g. USAID, Fleming Fund) or other national programmes (e.g. UHC budget). The funding sources do not have to be limited to sources that are earmarked for AMR. If resources from other programmes are expected to support activities in the AMR NAP, these should be included here as well. At least one funding source must be specified by the user in this table to be able to complete funding analysis.

4 FUNDING SOURCES (Optional)	
Funding Source 1	MOH
Funding Source 2	USAID
Funding Source 3	Fleming Fund
Funding Source 4	UHC budget
Funding Source 5	

Check inputs

On the bottom of the Basic Inputs tab, there is a "Check Inputs" button that verifies whether all required fields have been completed by the user.

5 CHECK IF INPUTS ARE CORRECTLY FILLED IN		
	Required Component	Completion Status
Check Inputs	General Information	
	Lead Agency/Implementer	

If the user did not set up all the required information, the user will receive an error message after pressing this button. If the user completed all the required information but not all the various optional items in the Basic Inputs tab, the user will receive a warning message but can choose to proceed. After successfully setting up basic inputs for the tool, the user can proceed to completing the Costing Matrix tabs. Additional information can be added to non-required fields at any time (e.g. to add personnel categories).

If revisions or additions are made later, however, the user will need to press the "Check Inputs" button again to repopulate menus and forms.

Step 3. Costing matrix

For each Level 1 strategy entered in the NAP Entry tab, a Costing Matrix tab will be created in the tool.
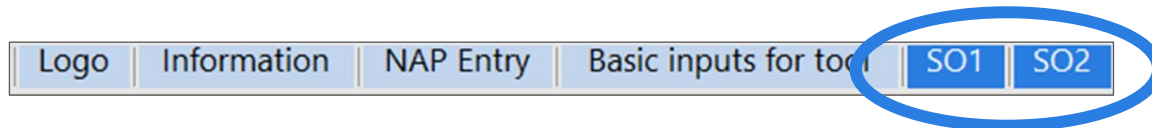
The default names for the Costing Matrix tabs are SO1, SO2, SO3, etc. If the user chooses to rename these in the NAP Entry tab, then these tabs will have the user-specified names.
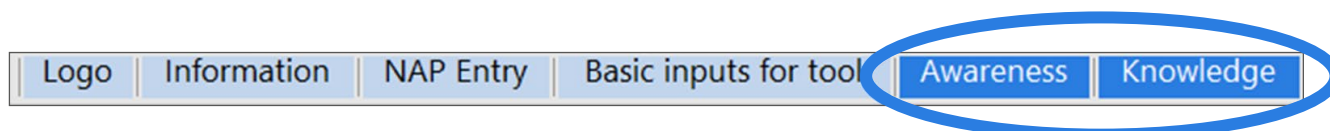
The Costing Matrix tab is shown in Figure 10. This is where users enter cost information for each activity that falls under each objective. Each Costing Matrix tab automatically populates with the strategies/objectives/activities identified in the NAP Entry tab. Otherwise, each Costing Matrix tab is identical. All information that is automatically populated from the NAP Entry tab will appear in grey-shaded rows. Users should not enter anything in the grey-shaded rows. Entry of activities should start in the row immediately following each grey-shaded block of rows.

For new users, it is recommended to scroll down through the page to see how it has been populated. There will be empty rows between each action to allow for entry of detailed activities. It is important to ensure that activities are entered correctly under each action to ensure they show correctly in the dashboards.

Figure 10. Costing matrix tabs

Users can use the "Notes" column to enter any additional, relevant information desired. The information entered in the "Notes" column will automatically be shown in a building block associated with this row.

To enter costs, users should use the building blocks buttons in pink, which are explained in further detail below. For each activity, users select the cell in column "Estimated cost (Local currency)" and then click on the relevant pink button (or building block) to begin inputting the costs.

Once the costs are inputted in the "Estimated cost" column (see below for more information about each form), users can enter the number of units for each year of implementation. For example, to enter a meeting that is expected to occur annually, the user would enter 1 in each year column (Figure 11). This will calculate a cost for each year and a total cost.

Figure 11. Entering units

Estimated cost (Local currency)	No. of units						Total
	No. of units 2021	No. of units 2022	No. of units 2023	Annual cost 2021	Annual cost 2022	Annual cost 2023	
88,200	1	4	4	88,200.00	370,440.00	377,496.00	836,136.00
				-	-	-	-
				-	-	-	-

The "Existing budget" and "Existing budget source" fields are optional. The information entered in these fields is not used in the dashboards that are automatically created in the tool. If users wish, however, they can document this information and use it later in the data set created once the data entry is finalized. If an activity already has a budget, the user should enter "yes" in the "Existing budget" column and enter the source. If the activity has no budget, the user should enter "no".

Building blocks

As explained previously, all unit costs in the "Estimated cost" column are entered through the "Building blocks" buttons. Six building blocks are available (Meeting, Consultant, Field visit, Human resources, Procurement and Other), each corresponding to commonly used inputs for various activities in the NAPs. The "Other" category can be used for inputs that do not clearly fit in any other category. Based on the operational plan, multiple rows of costs using different building blocks may be needed for each activity/action. For example, a laboratory strengthening activity may require human resources, meetings or training, and procurement of equipment and reagents.

Meeting	Consultant	Field visit	HR	Procurement	Other
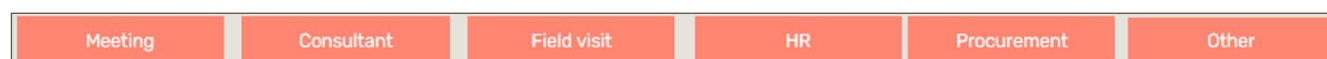
Each building block includes a form intended to capture costing details and calculate a value for the corresponding detailed activity. The user must decide which building block to use and click on the appropriate button. For the forms to open correctly, the user must select (or click) a cell in column "Estimated cost (Local currency)" (if another cell is active when a building block button is clicked, a message box will inform the user to select the correct cell). Directly typing into cells in Column G is not allowed. If users attempt to type directly in Column G, they will receive an error message.

While the "Basic Inputs" worksheet provides default values for the various forms, a user might decide to manually overwrite default values within the cells of a form should this be required for a specific activity.

Once the information is entered in the tab "Basic Inputs", **all forms** in the building blocks will be populated with default values. The user MUST fill in the remaining items that have headings in red font for the tool to calculate a cost estimate. When a cell that must be filled is left blank, an error message appears, prompting the user to fill in that cell.

Building block "meeting"

The form included in the building block "meeting" can be used to estimate the cost of meetings, trainings or workshops. Described in detail further below are the sections that comprise this form.

Category:

On first opening the form, the user must select whether the activity being costed is a meeting, workshop or training.

Category

C   Meeting   C   Workshop   C   Training

i

Numbers:

The total number of participants, number of away participants (i.e. those travelling to the meeting from other locations and hence requiring per diems and other travel-related costs) and number of days the activity will take place are blank when the form is first opened. They must be filled in to generate the cost estimate. If away participants will take part in the activity, ensure that the count of these individuals is included in the "Total number of participants" field. Note that the number of away participants cannot be greater than the number of total participants. In addition, by using the default buttons – "Large", "Medium" or "Small" – the user can automatically populate the number of participants and length of the meeting based on pre-set values set up in the tool.

Numbers

Total number of particip   Number of away partici   Number of days
10   5   2

i

Defaults

Large   Medium   Small

Per diem, travel and venue:

If per diem and venue rental costs were entered on the Basic Inputs for Tool tab, the form will automatically pull these values in the relevant boxes (shown in the screenshot below). However, the user can modify the amounts in the form itself. The user should enter the per diem cost for local and away participants. What is included in the per diem may differ by country. Generally, per diem is the amount paid to participants each day to cover meals, lodging, transportation and incidental expenses. Please ensure that only the per diem amount per participant is entered. Additionally, the cost to rent the venue where the activity is to be held should be entered in the "Rent of venue" field.

i Per diem, travel and venue

Per diem	400	= 0	Paid to each local participant each day to cover meals, lodging, transport and incidental expenses
Per diem away	900	= 0	Paid to each away participant each day to cover meals, lodging, transport and incidental expenses
Rent of venue	10000	= 0	Per day

To clear a value for any field that was already filled in, click the `= 0` button to reset the value in that field to 0.

Conference package:

As with per diem and rent of venue, the values in these boxes will be prepopulated with the information entered in the Basic Inputs for Tool tab but can be modified if desired. If these expenses were already captured in the "Rent of venue" amount, this section should show a zero cost across the three entry fields. This situation is an example of the type of information users should enter in the "Notes" column of the costing matrix tab.

Conference package			
Lunch	100	= 0	Per part. per day
Teabreak	50	= 0	Per part. per day
Stationary	60	= 0	Per part.

Trainers/facilitators:

This section captures information about paid trainers or facilitators. The fee per day (the amount paid to each trainer for his or her services) and per diem (the amount associated with the trainer's travel expenses) are prepopulated with the values entered in the Basic Inputs for Tool tab but can be modified in the form itself. The user should indicate the number of trainers or facilitators required, the number of days they will be providing their services and any extra expenses.

Trainers (or facilitators)					
Number of trainers	2	Fee per day	5000	Extra on total	0
No. of days	2	Per diem	900		i

Additional costs:

Additional expenses not included in any other items (e.g. per diem, venue rent) can be entered here. The user should specify the additional expense per person for the entire event; additional expense per day but not per participant; and additional expenses for the entire meeting. Distinguishing whether these additional costs are per participant, per day or per meeting is important, as it affects the calculation of the total cost for this activity.

Additional costs			i
Extra per part.	100	Cost per participant but NOT per day	
Extra per day	500	Extra cost per day but NOT per participant	
Extra per meeting	2000	Extra cost on total	
Extra per meeting	0	Extra cost on total	

Information:

The information in this section is automatically populated based on the description included under the "Objectives" column within the costing worksheet. This information serves as a reminder for the activity being costed, as information from the costing sheet under the "Strategies/Objectives/Activities" column is displayed under the "Summary and detailed activity" header, and any notes from the costing sheet are provided under the "Detailed cost assumptions" header.

Categories:

Four drop-down selection boxes are included in this section of the form. Selections for "WHO global objective" and "Lead agency/implementer" are required fields. "Capital or recurrent" and "Cost category 1" are optional fields. Drop-down lists for the "Lead agency/implementer", "Capital or recurrent" and "Cost category 1" fields are based on the information the user entered in the Basic Inputs for Tool tab.

Categories			
WHO global objective	Lead agency/implementer	Capital or recurrent (option	Cost category 1 (optional)

Inserting calculated values into the cell

Once all the sections of the form and the required fields have been completed, the user should click the "Preview outcome" button. The total cost is then displayed in the "Total" field.

You should first click this button before inserting the total

Preview outcome

Total   68700

The total amount can be entered into the costing worksheet by clicking "Insert total in selected cell". If some of the required parameters were not entered, the user will receive an error message.

Insert total in selected cell

Once this button is clicked, the form disappears and the values previously entered in the form are displayed in the costing worksheet. This button exists for most building blocks in the tool and functions the same way throughout.

Inserting own values into the cell

Alternatively, if users wish instead to enter their own value for the activity (meeting, training or workshop), the total cost should be entered manually in the "Total" field. The user

Insert your own value

then clicks the "Insert total in selected cell" button. By using the "Insert your own value" button, the tool ignores all default values and entries the user previously completed. This button exists for most building blocks in the tool and functions the same way throughout. This button should not be used often, because it will reduce the level of detail that can be used to justify unit cost estimates and may hinder some of the more detailed analyses that the user may wish to do at a later stage. If users choose to insert their own values, it is highly recommended that detailed explanations of the estimate be documented in the "Notes" section in the corresponding row of the Costing Matrix tab.

Building block "consultant"

The **consultant form** should be used for all costs related to hiring consultant(s) (national or international) with assumptions for travel, a daily rate and per diem.

The information included under "Summary and detailed activity" and "Detailed cost assumptions" serves as a reminder for the activity being costed. This information is pulled from the costing worksheet.

The user must select whether the consultant is from within the country for which the NAP is being costed (national), or whether the consultant is hired from abroad (international). In the entry boxes, the user indicates the number of consultants anticipated as being hired, number of days the consultant(s) will be paid, per diem amount, daily rate and any travel expenses.

Four drop-down selection boxes are included in the final section of the form. Selections for "WHO global objective" and "Lead agency/implementer" are required fields. "Capital or recurrent" and "Cost category 1" are optional fields. Drop-down lists for the "Lead agency/implementer", "Capital or recurrent" and "Cost category 1" fields are based on the information the user enters in the Basic Inputs for Tool tab.

Once all required fields are completed, the user clicks the "Preview outcome" button, which calculates the total cost. The total amount can be entered into the costing worksheet by clicking "Insert total in selected cell". Once this button is clicked, the form disappears and the values previously entered in the form are displayed in the costing worksheet.

Alternatively, if users wish instead to enter their own value for the activity, the total cost can be entered manually in the "Total" field. The user then clicks the "Insert total in selected cell" button. By using the "Insert your own value" button, the tool ignores all default values and any previous entry completed by the user.

Building block "field visit"

The **field visit form** is used to enter costs for field visits or supervision activities. The number of supervisors, number of days the field visit will occur and supervisor(s) per diem should be provided.

Additionally, if a vehicle is required to complete the field visit, the type of vehicle(s), number of vehicles, cost per day to operate the vehicle(s) (excluding fuel) and fuel cost should be provided.

The number of drivers, the per diem rate for the driver and any additional expenses for completing the field visit should be entered. The "Extra cost" field allows for entry of expenses not captured in this form.

The information included under "Summary and detailed activity" and "Detailed cost assumptions" serves as a reminder for the activity being costed. This information is pulled from the costing worksheet.

Four drop-down selection boxes are included in the final section of the form. Selections for "WHO global objective" and "Lead agency/implementer" are required fields. "Capital or recurrent" and "Cost category 1" are optional fields. Drop-down lists for the "Lead agency/implementer", "Capital or recurrent" and "Cost category 1" fields are based on the information the user enters in the Basic Inputs for Tool tab.

Once all the required fields have been completed, the user clicks the "Preview outcome" button, which will indicate the total cost. The total amount can be entered into the costing worksheet by clicking "Insert total in selected cell". Once this button is clicked, the form disappears and the values previously entered in the form are displayed in the costing worksheet.

Alternatively, if users wish instead to enter their own value for the activity, the total cost can be entered manually in the "Total" field. The user then should click the "Insert total in selected cell" button. By using the "Insert your own value" button, the tool ignores all default values and previous entries the user completed.

Building block "human resources"

The **human resources form** enables users to enter an itemized list of human resource costs. A complete list of positions relevant for completing NAP activities can be entered before completing entry using this form. These positions are entered in the "Basic Inputs for Tool" worksheet, which then provides the drop-down list on this form.

The user should indicate the personnel positions, the number of individuals serving in that position and the salary for the individuals. If more than one person has the same position but receives a different salary, each person serving in that position should be entered as a separate entry within this form. Note that for the form to function properly, the number of personnel should be entered before the number of months is specified.

This form allows entry of salary information that is available by month rather than by year. The box under the heading "Per month" should be checked in this case. Additionally, the number of months the individuals will serve in the position while the activity is being carried out should be entered.

The information included under "Inputs from matrix" and "Detailed cost assumptions" serves as a reminder for the activity being costed. This information is pulled from the costing worksheet.

Four drop-down selection boxes are included in the final section of the form. Selections for "WHO global objective" and "Lead agency/implementer" are required fields. "Capital or recurrent" and "Cost category 1" are optional fields. Drop-down lists for the "Lead agency/implementer", "Capital or recurrent" and "Cost category 1" fields are based on the information the user enters in the Basic Inputs for Tool tab.

Once all required fields have been completed, the user clicks the "Preview outcome" button, which indicates the total cost. The total amount can be entered into the costing worksheet by clicking "Insert total in selected cell". Once this button is clicked, the form disappears and the values previously entered in the form are displayed in the costing worksheet.

Alternatively, if users wish instead to enter their own value for the activity, the total cost can be entered manually in the "Total" field. The user then clicks the "Insert total in selected cell" button. By using the "Insert your own value" button, the tool ignores all default values and previous entries the user completed.

Building block "procurement"

The **procurement form** enables users to enter an itemized list of goods and or services, indicating quantities and unit costs.

Up to 10 items can be added using this form. If more than 10 items are required for a specific activity, the user should start an additional entry in the Costing Matrix tab and complete another Procurement form.

Five drop-down selection boxes are included in this form. Selections for "WHO global objective" and "Lead agency/implementer" are required fields. "Capital or recurrent", "Cost category 1" and "Procurement category" are optional fields. Drop-down lists for the "Lead agency/implementer", "Capital or recurrent" and "Cost category 1" fields are based on the information the user enters in the Basic Inputs for Tool tab.

Once all required fields have been completed, the user clicks "Insert total in selected cell". Once this button is clicked, the form disappears and the values previously entered in the form are displayed in the costing worksheet.

Alternatively, if users wish instead to enter their own value for the activity, the total cost can be entered manually in the "Total" field. The user then clicks the "Insert total in selected cell" button. By using the "Insert your own value" button, the tool ignores all default values and any previous entries the user completed.

Building block "other"

The **other form** enables users to enter lump sum estimates, or any other costing which is not covered by any of the specialized data entry/building block forms. This form should not be used often, as all other forms should cover the majority of activities. However, it can be used in certain situations where there is an established cost estimate for a block of activities that is already known, and the user does not want to re-estimate it using several individual forms. For example, one of the activities being costed may be an evaluation study. An evaluation study may include a series of steps, such as planning meetings, hiring a consultant to develop a study protocol, implementation of field visits, and human resources to analyse the data and write a report. To cost such a study, multiple appropriate building blocks can be used. However, if a country conducted a very similar study recently and has an estimate of the overall costs, the user may prefer to just enter this estimate in the Other form.

Note that, in using the Other form, it is advisable to enter detailed information for the basis of the estimate in the "Notes" field in the cost matrix or in the "Description" field in the Other form.

Four drop-down selection boxes are included in this section of the form. Selections for "WHO global objective" and "Lead agency/implementer" are required fields. "Capital or recurrent" and "Cost category 1" are optional fields. Drop-down lists for the "Lead agency/implementer", "Capital or recurrent" and "Cost category 1" fields are based on the information the user enters in the Basic Inputs for Tool tab.

Once all required fields have been completed, the user clicks on "Insert total in selected cell". After this button is clicked, the form disappears and the values previously entered in the form are displayed in the costing worksheet.

Step 4. Funding inputs (optional but recommended)

In this tab, users can enter amounts of funding available for the costed activities. While this tab is optional, it is highly recommended that users complete it if they want to generate information on funding gaps. This tab should only be completed after the NAP Entry tab has been completed and the funding sources list has been entered in the Basic Inputs for Tool tab. Note that while cost data has to be entered at a very detailed level, users have the flexibility to enter funding data at more aggregated levels if desired.

The first step in completing the Funding Inputs tab is to click the "Refresh NAP Information" button. This will read information from the NAP tab and load it into the Funding Inputs tab.
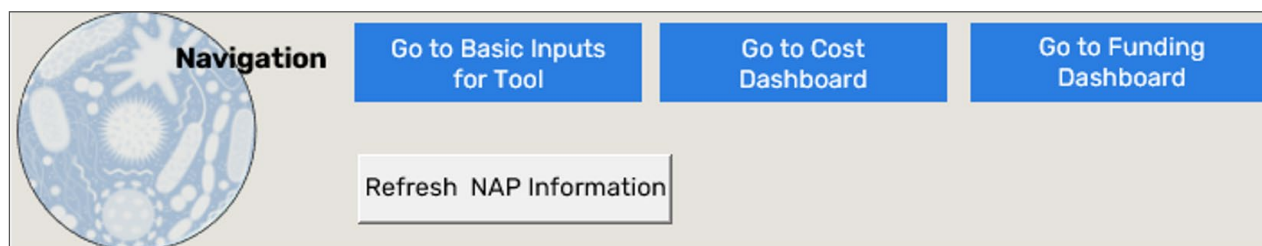
After refreshing the NAP information, users need to select the level at which they want to enter funding data. The buttons shown below will prepopulate with the level names the user previously entered in the NAP Entry tab. For example, if in the NAP Entry tab there were three levels (strategy, objective, activity), the user will see three buttons with the corresponding names. The user should click on the appropriate button to select the desired level for the entry of funding information.
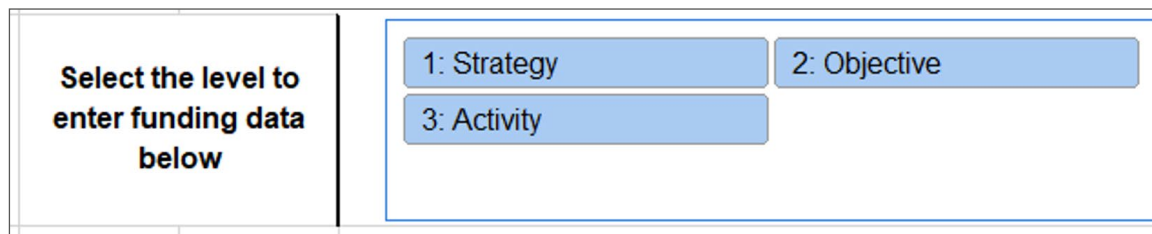
For example, choosing "Strategy" will require the user to enter data at the highest, most aggregated level. Choosing "Objective" or "Activity" will require the user to enter progressively more detailed information. If the user chooses to enter information at more detailed levels, funding dashboards will be available at both detailed and more aggregated levels. For example, if the user chooses "Activity" and enters data at that level, summary data in the dashboards will be available at the "Action", "Objective" and "Strategy" levels. Note that funding information can be only entered at one level. If the user later decides to change the level at which the funding information is entered, the amounts entered previously need to be deleted. Funding amounts should be entered in local currency.

After the level is selected, the user can proceed to enter funding amounts for the appropriate years and funding sources. Column headings for funding sources will be populated based on the information specified in the Basic Inputs tab. Note that as described in the Basic Inputs tab section, the funding amounts specified do not have to be limited only to those earmarked for AMR. It can include existing funding from general country budgets, UHC or funding from other programmes that are expected to support activities in the AMR NAP (e.g. WASH).

Select the level to enter funding data below		1: Strategy		2: Objective								
		3: Activity										
				2022	2022	2022	2022	2023	2023	2023	2023
Level name	Sequence	Description		MOH	USAID	Fleming Fund	UHC budget	MOH	USAID	Fleming Fund	UHC budget
Objective	1.1	Improve Community Awareness and Understanding, Education, and Empowerment		20000	30000	20000					
Objective	1.2	Support Education and Training of Human and Animal Health Care Professionals				15000					
Objective	2.1	Support Surveillance of Antimicrobial Use				30000				25000	
Objective	2.2	Establish or Strengthen Capacity of Laboratories		50000			10000				10000

Step 5. Dashboards

Two tabs in the tool contain summary tables and visualizations: the Dashboard tab and the Funding Dashboard tab. To update tables and graphics in the dashboards, the user will need to refresh data using the button in the screenshot below. Note that the dashboards may take several minutes to generate. If the user makes changes to the data in the Costing Matrix tabs or Funding Inputs tab, the user should continue to refresh data to ensure that the most up–to–date data are shown in the dashboards. Summary tables and visualizations can be printed to PDF format.

Refresh Data and Visuals
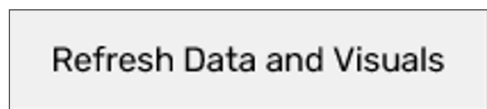
Dashboard

Tables and graphics in this dashboard (see following screenshots) are automatically produced based on the cost data entered by the user in the Costing Matrix tabs.

Total Cost
4,080,417

Display Amount   Display Pie

Display Percent   Display Bar

Distribution of Costs Across Lead Agencies/Implementers

MOH — MOH 3,466,639

MOE — MOE 418,897

MOA — MOA 194,882

0   1,000,000   2,000,000   3,000,000   4,000,000
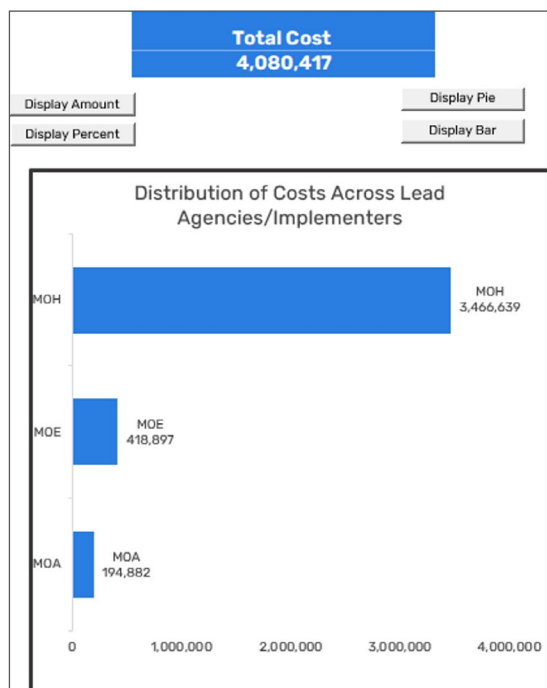
Costs by Activities and Lead Agency/Implementer

Strategy   Objective   Action

	MOA	MOE	MOH	Total
Strategy 1: Raise awareness and understanding and improve education on antimicrobial use, resistance prevention, and containment through effective communication and training	73,689	195,095	2,893,222	3,162,006
Objective 1.1: Improve community awareness and understanding, education, and empowerment	73,689	195,095	2,893,222	3,162,006
Action 1.1.1: Promote society engagement, awareness raising, education, and empowerment about antimicrobial use and resistance containment through use of the media	73,689		1,325,304	1,398,993
Action 1.1.2: Incorporate hygiene, sanitation, infection prevention, and antimicrobial use and resistance into school curricula to promote better understanding and awareness		54,450	1,179,992	1,234,442
Action 1.1.3:Ensure proper disposal of unfit-for-use antimicrobials to protect the environment		140,645	387,926	528,571
Strategy 2: Support education and training of human and animal health care professionals	144,190		983,190	1,127,380
Objective 2.1: Support surveillance of antimicrobial use	44,770		769,560	814,330
Action 2.1.1: Support a series of population-based, real-time surveillance systems to monitor antimicrobial use to demonstrate the extent of the problem in both human and animal health	44,770		769,560	814,330
Objective 2.2: Establish or strengthen capacity of laboratories	99,420		213,630	313,050
Action 2.2.1: Support standardization of laboratory methodologies and quality assurance techniques and improve availability and reliability of microbiology laboratory facilities and tests	55,812		80,530	136,342
Action 2.2.2: Support and conduct tests on targeted microorganisms and antimicrobials that will help assess the impact of interventions in human and animals	43,608		133,100	176,708
Total	217,879	195,095	3,876,412	4,289,386

Users cannot modify the types of calculations and graphics produced by the tool. However, users can employ various "slicers" and vary the degree of aggregation by NAP level for which the summary data are presented. The screenshot on the right shows the various slicers available. These slicers can be used to modify the data in the tables and charts in this dashboard. The five available slicers are year, lead agency, cost category, AMR global objective and currency.

A selected item will appear in grey and an unselected item will appear in white. To clear the filter, press the ⏳ button on the top right. For example, users can choose to present data only for a specific year and/or specific lead agency.

For the chart, users can use the "Display Amount" and "Display Percent" buttons to change the presentation of data in the chart. Similarly, the "Display Pie" and Display Bar" buttons can be used to vary the chart type. Above the table, the user will see buttons that allow presentation of various levels of aggregation in the table.

These buttons will prepopulate with the level names the user previously entered in the NAP Entry tab. For example, if in the NAP Entry tab there were three levels (strategy, objection, action), the user will see three buttons with the corresponding names. The user can click on the desired button to select the desired level of presentation of summary cost information.

Funding dashboard

The funding dashboard will function correctly only if at least some of the information in the Funding Inputs tab has been completed. Information summarized in the tables and graphics in this dashboard combines the cost and funding data entered by the user to compare cost requirements and funding availability.
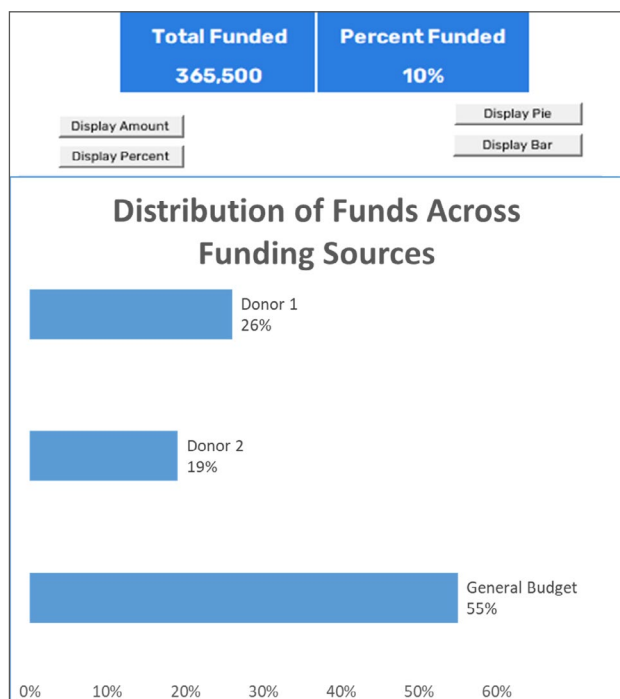
Costs and Available Funding

	Cost	Funded	Funding Gap
Strategy 1: Raise awareness and understanding and improve education on antimicrobial use, resistance prevention, and containment through effective communication and training	**2,777,751.00**	**156,000.00**	**2,621,751.00**
Objective 1.1: Improve Community Awareness and Understanding, Education, and Empowerment	2,558,171.00	65,000.00	2,493,171.00
Objective 1.2: Support Education and Training of Human and Animal Health Care Professionals	219,580.00	91,000.00	128,580.00
Strategy 2: Strengthen the knowledge and evidence on antimicrobial use and resistance through one-health surveillance and research	**931,719.00**	**209,500.00**	**722,219.00**
Objective 2.1: Support Surveillance of Antimicrobial Use	673,000.00	54,500.00	618,500.00
Objective 2.2: Establish or Strengthen Capacity of Laboratories	258,719.00	155,000.00	103,719.00
Total	**3,709,470.00**	**365,500.00**	**3,343,970.00**

Funding by Agency and Year

	Total	General Budget	Donor 1	Donor 2
Strategy 1: Raise awareness and understanding and improve education on antimicrobial use, resistance prevention, and containment through effective communication and training	**156,000.00**	**81,000.00**	**30,000.00**	**45,000.00**
Objective 1.1: Improve Community Awareness and Understanding, Education, and Empowerment	65,000.00	35,000.00	30,000.00	
Objective 1.2: Support Education and Training of Human and Animal Health Care Professionals	91,000.00	46,000.00		45,000.00
Strategy 2: Strengthen the knowledge and evidence on antimicrobial use and resistance through one-health surveillance and research	**209,500.00**	**120,000.00**	**40,000.00**	**49,500.00**
Objective 2.1: Support Surveillance of Antimicrobial Use	54,500.00		40,000.00	14,500.00
Objective 2.2: Establish or Strengthen Capacity of Laboratories	155,000.00	120,000.00		35,000.00
Total	**365,500.00**	**201,000.00**	**70,000.00**	**94,500.00**

As with the cost dashboard, users can subset information using the available slicers and buttons on the left-hand side of the tab, to change the information presented in the chart and the level of aggregation in the table.

Exporting from the dashboards

Buttons on the top panel of both dashboards allow information to be exported. In the Dashboard tab, clicking the "Export Cost Data" button will generate an Excel file with cost data from all Costing Matrix tabs combined into a single data set. This data set will be saved in the same directory where the tool itself is saved on the user's computer. The data set can be used for further analysis of the data if so desired. Clicking the "Export to PDF" button will produce two PDF files: one where the chart will be saved and another where the table will be saved. Note that chart or table content saved in the resulting PDF files will match the most recent representation of information in the graphs or tables. If the user decides to use specific filters or change a chart type from pie to bar, PDF files displaying new information will have to be generated again. PDF files will be saved in the same directory where the tool is saved on the user's computer.

Export Cost Data	Export to PDF

In the funding dashboard, exporting data or PDF files works in an identical way. The exported data set will contain cost data with combined funding data entered by the user. Exporting to PDF will produce three files: one with a chart and two files with the tables contained in the Funding Dashboard tab.

Navigation with the tool and general features

In addition to the basic facilities Excel offers for navigation (such as Ctrl + Home, PgUp, PgDn, arrows [←↑→↓], Tab, Shift + Tab, Enter, etc.), several additional functionalities have been developed to facilitate navigation within the tool.

Yellow buttons enable simple functions such as clearing data from a row, inserting a new row or deleting a row. Users can also use the standard Excel functions to complete these actions. Note that inserting rows is not always allowed for some tabs. This will be noted at the top of each tab.

Clear Row data	Insert Row	Delete Row
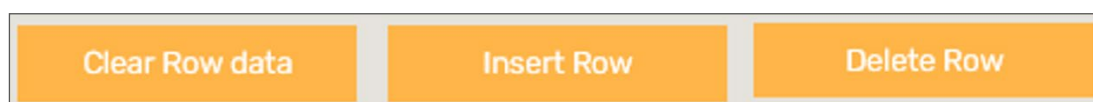
Blue buttons allow for easier navigation across different tabs in the tool.

Go to Basic Inputs for Tool	Go to Cost Dashboard	Go to Funding Inputs	Go to Funding Dashboard

3.5 Module consolidator tool

This is an optional separate tool that the AMR NAP costing coordinators will need to use if multiple implementers/ministries filled out a separate version of the tool. Each costing and budgeting tool contains a hidden database that aggregates all data entered by users on different Costing Matrix tabs. The Module Consolidator Tool allows the combination of data sets from multiple users to create a single dashboard.

In order to combine files, the costing coordinator should:

1. Place all individual cost tool files in a single folder. How the files are named is not important as long as the file names are unique.

2. Refresh dashboards in each individual file.

3. Open the consolidator tool and fill out fields as shown in the screenshot.
   - Specify the path to the folder where all the individual tool files were saved.
   - Specify file names (only include the names of the files that you want to combine).
   - Specify unique names for the lead agency/implementer who completed the tool.

4. Click the "Combine Files" button (depending on the number of files that are being combined, there will be a short pause while the data are being processed).

5. Click the "Refresh All Data" button (depending on the amount of data, there will be a short pause while the data are being processed).

After the process is complete, users can use and manipulate the dashboards in the same manner as described earlier for the AMR Costing and Budgeting Tool.

3.6 Summary

To successfully complete the tool, users need to complete the following:

1. NAP entry tab

2. Basic inputs for Tool tab

3. Costing matrix tabs

4. Funding inputs tab

5. Generate dashboards.

If multiple tools have been completed in each country (e.g. each sector completed their own tool), the consolidator tool may need to be used to present combined results.

Annexes

1

Country case study
– Indonesia

This case study describes key findings that relate to the costing of Indonesia's AMR NAP. It provides an overview of the country's current AMR NAP, describes overall processes and systems for costing and budgeting in Indonesia, summarizes specific approaches this country has undertaken to cost AMR NAP activities and outlines key lessons learned.

Background:

Indonesia participated in the scoping exercise to inform the development of the WHO costing and budgeting tool for AMR NAPs. A activities included engagement with key Indonesian stakeholders throughout the project, a WHO mission to Indonesia in November 2019, workshops, key informant interviews, and post-mission data collection and consultations.[10]

Indonesia AMR NAP: overview and implementation

The draft 2020–2024 Indonesia AMR NAP was completed in December 2019 in accordance with the AMR GAP developed by the FAO, OIE and WHO.

It built on the 2017–2019 AMR NAP and was developed in consultation with multiple sectors, including the Ministry of Health, Ministry of Defence, National Agency of Drug and Food Control, Ministry of Agriculture, Ministry of Marine and Fisheries, Ministry of Environment and Forestry, professional and community organizations, and private stakeholders.

The Indonesia AMR NAP is pending formal approval[11] by the Coordinating Ministry for Human Development and Cultural Affairs. Overall coordination of activities is led by the National Committee for AMR Control.

Indonesia's AMR NAP has six strategic objectives:

1. Raising awareness and understanding regarding AMR control through effective communication, education and training.

2. Increasing knowledge and scientific proof through surveillance and research.

3. Reducing incidence of infection through sanitation, hygiene and IPC.

4. Optimizing antimicrobial use in humans, animals, fish and plants.

5. Investment to find treatment methods, diagnostic methods and new vaccines for reducing existing AMR problems.

6. Building integrated governance and coordination in AMR control.

**Draft of
National Action Plan on
Antimicrobial Resistance
2020-2024**

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[10] The authors of this study would like to express their deepest gratitude to the stakeholders in Indonesia for contributing their time and effort in support of the project activities.

[11] Formal approval, initially planned for early 2020, has been delayed due to the COVID-19 pandemic response.

Prioritizing AMR NAP activities

The process of prioritizing NAP activities was accomplished through a multisectoral workshop. The workshop facilitated agreement on activities likely to have the greatest impact on AMR in the short-to-medium term and contributed to fostering greater understanding of the overlap between the AMR plan and other sector plans and budgets, as well as determining potential opportunities for cost efficiencies.

Stakeholders also considered which activities are already completed, underway or need to be scaled up or adapted for other target populations. In addition to focusing on prioritizing activities included in the AMR NAP, stakeholders determined the lead implementers for each of the prioritized activities. Lead implementers included the Ministry of Health, Ministry of Agriculture, National Agency of Drug and Food Control and Ministry of Marine and Fisheries.

Overview of costing and budgeting processes in Indonesia

Key technical and financial staff in Indonesia provided information on general budgeting processes and tools in the country.

Overview of budgeting process

Budget proposals are developed within directorates and submitted to the minister for approval. The budget is then sent to the Ministry of Finance for overall approval. The Ministry of Finance approves and then disburses a lump sum amount to each ministry, which is then distributed to directorates and sub-directorates according to ministerial priorities. Once this occurs, no additional activities can be inserted in the planning. The budget cycle for Indonesia was scheduled to be completed in January 2021, and ministries had already submitted their draft budgets for review.

Systems and software

Ministries currently use an internal accounting tool (developed by the Ministry of Finance) to plan and budget their activities as part of their annual planning.

Prioritization of AMR NAP activities in Indonesia: discussion questions

- Is this activity implementable within a 5-year period?
- Will the activity have the most influence/effect on meeting the strategic objectives?
- Does the activity include the One Health approach?
- What is the order of priority for the activities under a specific intervention?
- Who is the lead implementer for this activity?

Costing and budgeting across sectors

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Stakeholders in Indonesia noted that the existing accounting tool is detailed and generally meets their needs. However, it limits users to viewing only activities implemented by their organization and for the budgeted amounts. Given the multisectoral nature of AMR, Indonesian stakeholders favoured a costing tool that will synchronize across ministries, establishing a common unit cost for inputs.

Costing and budgeting for AMR NAP activities

As a common practice, ministers have allocated budget for each sub-directorate as a lump sum; therefore, the proposed programmes must fit into the allocated budget. Specific budget allocations are determined by the priorities of each ministry. Until 2019, the budget allocations for AMR were low given that AMR had not been a high priority for the ministries.

The workshop organized by WHO in November 2019 was an opportunity for the multisectoral stakeholders in Indonesia to come together to purposely work on developing implementation steps and to initiate costing for select AMR NAP activities. Stakeholders also provided valuable feedback and inputs on the development of the WHO AMR Costing and Budgeting Tool.

During the workshop, participants were divided into small groups to initiate development of implementation plans and costing of previously selected AMR NAP activities. This process (facilitated by a local partner supporting the WHO project) continued after the workshop.

Technical personnel determined specific implementation resources required to implement each activity, outlined various assumptions (e.g. the number of participants for various meetings and training sessions, amounts and types of supplies to be procured, additional personnel needs), and planned a timeline for each step. Finance and procurement staff helped to estimate unit costs for various items and resources that were included in the technical plans.

AMR NAP costing workshop: Jakarta, November 2019

After initial drafting conducted during the workshop, the plans and cost estimates were revised according to the feedback received during the workshop when additional information was collected.

Costing of all activities was reviewed by the WHO project staff, and several rounds of reviews were conducted before the costing plan was finalized. While some overlap between activities was identified and addressed during the initial workshop (e.g. stakeholders discussed combining certain meetings across activities to increase efficiency), sectors largely worked independently to complete costing plans for the prioritized activities.

Costing by the Ministry of Health, Ministry of Agriculture and National Agency of Drug and Food Control has been completed. Ministry of Marine and Fisheries was not able to complete the costing due to competing priorities.

Example of implementation planning: detailed steps and components

Strategic Objective 1:

Raising awareness and understanding regarding AMR control through effective communication, education and training

Strategic Intervention 1.1.

Developing strategy and an evidence-based community communication programme by targeting the audience from the general community and professional organizations

Activity 1.1.1.

Conducting a knowledge, attitudes and practices (KAP) study regarding AMR, IPC and environmental relation with the impact of antimicrobial use and AMR in human, animal and environmental health

Development of KAP study methodology	Preparation meeting
Development of questionnaire	Preparation meeting, drafting
Training on KAP study	Preparation meeting
	Small meeting for 2 days of training and field testing
Implementation of KAP study	Preparation meeting
	Field visit for data collection
KAP study analysis	Preparation meeting, data entry, data analysis
	Data entry, data analysis
Report	Preparation meeting
	Large meeting (dissemination)

Lessons learned

Development of a costed plan leads to greater multisectoral stakeholder involvement.

Although Indonesia's AMR NAP was developed through multisectoral consultations, there were limited opportunities for multisectoral coordination of implementation planning. The costing exercise was viewed as a significant step in bringing sectors together to join efforts in addressing AMR and helped to identify potential alignment between activities in the AMR plan and other sector plans and budgets.

Development of detailed implementation plans is necessary for a realistic and specific costing process.

For each of the selected activities, stakeholders spent considerable time outlining sub-activities and/or implementation steps to be able to accurately identify the type and magnitude of resources required to support each activity. Although initial planning was largely focused on central level activities, in the future additional efforts will be needed to carefully assess resource requirements associated with scale-up and or expansion to subnational activities. Given highly decentralized subnational budget processes, such an exercise might be complex and require a high level of coordination.

Implementation planning and costing must take into account the scale of planned activities, relevant targets and associated monitoring indicators.

Accurate resource planning requires deliberate consideration of the intended scale for various activities (e.g. how many health-care providers will be trained). While decisions regarding scale may sometimes depend on expected availability of funding and on several scenarios, it is important to directly relate the planned scale of activities to agreed programme targets and M&E plans. Sufficient programmatic detail and guidance are needed to calculate the degree of activity required. Similarly, if programmatic targets are revised over time, costing might need to be revised as well.

Costing requires close collaboration between technical and financial staff.

Technical staff at various ministries led the development of implementation planning and outlining the resource requirements for specific activities. They worked closely with financial and procurement staff to identify appropriate unit costs for the identified resources.

Existing budget systems and processes are almost exclusively sector/ministry specific and might not address the multisectoral nature of AMR NAPs.

Currently, budget systems and processes in Indonesia are sector specific: each ministry submits its own budget. Although existing budgeting systems and processes should be leveraged to facilitate integration of a costed AMR NAP into overall sectoral planning/budgets, the risk of inefficiencies arises when information and budgets are spread across systems. The WHO costing and budgeting tool will be useful for sharing information across sectors and improving coordination of resource allocation and use.

2

Country case study
– Turkey

This case study describes key findings that relate to costing Turkey's AMR NAP. It provides an overview of current AMR NAP implementation, describes overall processes and systems for costing and budgeting in Turkey, summarizes specific approaches this country has undertaken to cost AMR NAP activities and outlines key lessons learned.

Background:

Turkey participated in the scoping exercise to inform the development of the WHO costing and budgeting tool for AMR NAPs. Activities included engagement with key Turkish stakeholders through the project, a WHO mission to Turkey in March 2020, workshops, key informant interviews, and post-mission data collection and consultations.

Turkey AMR NAP: overview and implementation

The draft Turkey AMR NAP was completed in 2016 in accordance with the AMR GAP developed by the FAO, OIE and WHO.

Development of the AMR NAP was coordinated by the Ministry of Health with the participation of the Ministry of Agriculture and Forestry and all related stakeholders to develop national strategies and provide intersectoral coordination.

While the Turkey AMR NAP has not yet been formally approved, several activities under the plan have already been implemented. To ensure sustainability and accountability for the implementation, however, it is critical that Turkey's AMR NAP be formally approved by the country's government.

Among key activities already implemented in Turkey are:

- Establishment of surveillance networks for antibiotic consumption and electronic prescription systems.

- Delivery of training for pharmacists to prevent the sale of antibiotics without prescription.

- Publication of an NAP on the rational use of medicines.

- Establishment of an antimicrobial stewardship team in most hospitals.

- Implementation of a national veterinary AMR monitoring programme.

- Preparation of awareness materials for use in training for kindergarten, elementary school, secondary school and high school students.

AMR NAP implementation in Turkey

Costing and budgeting

Selecting NAP activities for costing

Given that many components of the AMR NAP are already underway in Turkey, the process of selecting AMR NAP activities focused on determining activities that were already being implemented, and on identifying new activities and/or those for which costs and a detailed implementation plan had yet to be determined. A list of activities selected for costing in Turkey is available in a table at the end of this document.

Selecting NAP activities for costing

- Is this an essential activity that needs to be implemented in the near future (1–2 years), and is it feasible that this activity will be implemented?

- Is this an existing activity that is already being implemented but may be modified, adapted or scaled to address AMR-related issues, or is this a new activity that has not yet been implemented?

- Is there a detailed implementation plan for this activity with clear roles and responsibilities? Or is there an implementation plan for similar activities that have been implemented in the past?

- Has full or partial funding been identified for this activity?

Overview of costing and budgeting processes in Turkey

Key informant interviews with technical and financial government ministry staff in Turkey showed the existence of well-developed processes and systems for public procurement, budgeting and accounting. Key processes and systems are described below.

Overview of budgeting process

The governmental budgeting system starts with the publication of the budget recall and budget preparation guide in September of every year. Needs are determined through interviews between the institutions and the Strategy and Budget Office, as well as through individual meetings. Once the interviews with the institutions are completed, budget ceilings are established that correspond with the medium-term financial plan published in an official newspaper.

Related institutions constitute their budgets within the determined ceiling allowances and forward them to the Strategy and Budget Office. Once the Strategy and Budget Office achieves the necessary consolidation, the budget is dispatched to the Grand National Assembly of Turkey (Türkiye Büyük Millet Meclisi [TBMM]) by the Office of the Presidency. The budget of every institution is negotiated separately by the Commission of Plan and Budget participating in the TBMM. Once the interviews are complete, commission reports are directed to the TBMM General Board sessions, after which a vote takes place. If an "accept" vote is obtained, the decision is forwarded to the Office of the Presidency. The official budget is published and takes effect as of 1 January of the following year. The institutions make their expenditures within the allowances allocated for that year.

The budget in Turkey is prepared for 3 years at a time. The first year is based on real expenses and revenues, and the next 2 years represent the estimated budget. The various ministries coordinate budgeting activities in Turkey. If necessary, additional coordination is provided by the Ministry of Treasury and Finance and the Strategy and Budget Directorate.

Systems and software

Two custom software packages are used in Turkey for costing and budgeting. The e-budget system is used for the initial budget preparation and follow-up stages (e.g. revising the budget). This system is used in coordination with the Strategy and Budget Directorate. The second system is a budget application system which is used for tracking how the budget is released. This system is used in coordination with the Ministry of Treasury and Finance.

Operationalizing costing and budgeting: example of Turkey's Ministry of Agriculture and Forestry

All ministries in Turkey have various software tools to facilitate accounting, budgeting and planning. The Ministry of Agriculture and Forestry is linked directly to the financing departments; it is web based and updated in real time. Budget requests are entered at a "project" level, with a project being a relatively large set of activities. The system has two different dashboards: one is for routine governmental procedures that are common across ministries, such as staff salaries and operational costs; another is specific for each ministry and allows them to enter their projects. The software does not necessarily allow for very detailed entry of implementation steps/sub-activities for each project.

Consequently, staff often use their own tools (e.g. Excel) to initially calculate more details and cost/budget lists before submitting them using the ministry's software.

Procurement

Public procurement laws in Turkey require tendering for any goods or services above TL 15,000 (USD 2,407.71). Key mechanisms for procurement are open tendering, restricted tendering and negotiated tendering. The Public Procurement Authority, an independent agency, is authorized to monitor the procurement of the public agencies to ensure the process is transparent, competitive and reliable. Procurement largely relies on historical prices; however, case-by-case negotiations often result in heterogeneity across unit costs/prices for specific items/services. Prices are often "grouped" into packages rather than presented on an itemized basis (e.g. for a meeting, the unit cost covers the meeting room, transport, lunch, team dinner and the hotel rooms for participants, if applicable).

Costing and budgeting for AMR

The budget that specifically pertains to AMR activities needs to be included in allocations within the framework situated in ministry-specific strategic plans. Although many AMR NAP activities have already been implemented in Turkey, no formal implementation plans for specific AMR NAP activities have been developed. Similarly, there are no AMR-specific budget lines; funding for the activities is absorbed under existing budget line items of the Ministry of Health, the Turkish Medicines and Medical Devices Agency, and the Ministry of Agriculture and Forestry.

The workshop organized by WHO in March 2020 was an opportunity for multisectoral stakeholders in Turkey to come together to purposely work on developing implementation steps and to initiate costing for select AMR NAP activities. Stakeholders also provided valuable feedback and input on development of the WHO AMR Costing and Budgeting Tool.

AMR NAP costing workshop: Ankara, March 2020

During the workshop, participants were divided into small groups to initiate the development of implementation plans and costing of previously selected AMR NAP activities. This process (facilitated by a costing coordinator) continued after the workshop.

Technical personnel determined specific implementation resources required to implement each activity, outlined various assumptions for each step (e.g. number of participants for various meetings and training sessions, amounts and types of supplies to be procured, additional personnel needs), and planned a timeline for each step.

Finance and procurement staff helped in estimating unit costs for various items and resources that were included in the technical plans. After preliminary drafting conducted during the workshop, the plans and cost estimates were revised according to the feedback received during the workshop when additional information was collected. These revisions were made by a small group consisting of technical and procurement staff.

Example of implementation planning: detailed steps and components

STRATEGY 2:

Strengthen national AMR surveillance

OBJECTIVE 1:

Strengthen national AMR surveillance
for human and animal health

A5.

Create a surveillance system for antibiotic resistance
to *Escherichia coli* and *Klebsiella pneumoniae* isolates,
the community-acquired agents of urinary tract infection
(UTI), and gather data

Conduct workshop on community-based surveillance system

Develop software system for web-based surveillance system:

1. Purchase of software system
2. Maintenance service for software
3. Training on software

Prepare standard operating procedures (SOPs) for AMR methods for human and animal health:

1. Conduct workshop to develop SOPs
2. Train technical personnel on SOPs

Strengthen reference laboratory infrastructure:

1. Equipment maintenance and calibration (thermal cycler, biosafety cabin, McFarland instrument, incubator, refrigerator, freezer)
2. Procurement of chemicals (antibiotic disc, powdered antibiotics, Mueller Hinton agar, Mueller Hinton broth, NAD (nicotinamide adenine dinucleotide), sheep blood agar, chocolate agar)
3. Procurement of consumables (disposable inoculating loop, sterile cotton swabs, Petri dishes, sterile capped plates, PCR (polymerase chain reaction) tubes, microcentrifuge tubes, Taq DNA polymerase, dNTP (deoxynucleoside triphosphate) mix, gloves, primer, pipette tips)

Lessons learned

Development of a costed plan leads to greater multisectoral stakeholder involvement.

There is already a high level of coordination between the health and agriculture sectors in the area of AMR, with the environment sector ready to support AMR activities as well once formal government mandates are implemented. The costing exercise was viewed as a significant step in bringing sectors together to join efforts in addressing AMR.

Selecting activities for costing helped focus implementation planning and development of the costed plan.

Given that many components of the AMR NAP are already underway in Turkey, stakeholders concentrated on costing AMR NAP activities that were new or scaled up and for which funding has not yet been secured. This deliberate multisectoral, consultative process of selecting activities for costing helped focus development of the costed plan.

Development of detailed implementation plans is necessary for a realistic and concrete costing process.

For each of the selected activities, stakeholders carefully outlined sub-activities and/or implementation steps so that the type and magnitude of resources required to support each activity could be accurately identified. When detailed sub-activities were available, the costing exercise was much easier and effective.

Costing required close collaboration between technical and financial staff.

Technical staff at various ministries led the development of implementation planning and outlining of the resource requirements for specific activities. These staff worked closely with financial and procurement staff to determine appropriate unit costs for the identified resources.

Existing budgeting systems and processes should be leveraged to facilitate integration of a costed AMR NAP into overall sectoral planning/budgets.

Turkey has existing systems and processes for budgeting which the country can leverage for AMR costing and budgeting. However, because AMR activities are often a small component of the overall sectoral budget, these systems might not be conducive for AMR NAP costing and budgeting. Stakeholders in Turkey found the AMR-specific costing tool useful prior to sending formal budget submissions through the existing systems.

Existing budget systems and processes are almost exclusively sector/ministry specific and might not address the multisectoral nature of AMR NAPs.

Currently, budget systems and processes in Turkey are sector specific: each ministry submits its own budget. While improved coordination of stakeholders in Turkey is likely to mitigate any potential cost inefficiencies, the risk of such inefficiencies is still present when information and budgets are spread across systems. The costing exercise triggered an initial dialogue with the Ministry of Finance regarding a possible cross-ministerial budget structure to support AMR NAP activities of a more collaborative nature (e.g. establishment of ongoing activities of the National AMR Coordination Committee).

AMR NAP activities selected for costing by Turkish stakeholders

STRATEGY 1: Ensure coordination and cooperation among stakeholders in national studies on development of AMR	
OBJECTIVE 1: Ensure multi-stakeholder coordination at the national level with the purpose of hindering and limiting AMR	A1. Establish the National AMR Coordination Committee with the participation of fundamental stakeholders that will coordinate the activities related to policies of antibiotic usage and monitoring of resistance development
OBJECTIVE 1: Ensure multi-stakeholder coordination at the national level with the purpose of hindering and limiting AMR	A4. Ensure integration of the existing AMR and Antimicrobial Consumption surveillance systems and those to be created in human, food, agriculture, animal breeding and environment sectors
STRATEGY 2: Strengthen national AMR surveillance	
OBJECTIVE 1: Strengthen national AMR surveillance for humans	A1. Strengthen the surveillance system for blood and CSF (cerebrospinal fluid) isolates
OBJECTIVE 1: Strengthen AMR surveillance for humans	A2. Strengthen the surveillance system for enteric bacterial pathogens
OBJECTIVE 1: Strengthen AMR surveillance for humans	A3. Strengthen the surveillance system for resistance to anti-TB medicines
OBJECTIVE 1: Strengthen AMR surveillance for humans	A5. Create a surveillance system for antibiotic resistance to *E. coli* and *K. pneumoniae* isolates, the community-acquired agents of UTI, and gather data
OBJECTIVE 1: Strengthen AMR surveillance for humans	A6. Perform the pilot study on the surveillance system for antibiotic resistance to gonococcus isolates and then create this system
OBJECTIVE 1: Strengthen AMR surveillance for humans	A7. Create a molecular epidemiology surveillance system for infections related to health services
STRATEGY 4: Strengthen processes for IPC	
OBJECTIVE 1: Strengthen activities for preventing and controlling infections related to health services	A1. Strengthen the surveillance system for infections related to health services and its technical infrastructure
OBJECTIVE 1: Strengthen activities for preventing and controlling infections related to health services	A2 Ensure data exchange between the surveillance programme for infections related to health services and the hospital information management system
OBJECTIVE 2: Strengthen immunization studies and improve compliance	A3. Implement vaccine completion and acceleration programmes for immigrant children below the age of 5

STRATEGY 5.2: Monitor AMR in veterinary medicine	
OBJECTIVE 1: Plan and organize laboratory activities	A2. Improve the infrastructure of laboratories working on AMR
OBJECTIVE 1: Plan and organize laboratory activities	A3. Organize personnel training programmes
STRATEGY 7: Improve awareness on development of AMR and rational use of antibiotics	
OBJECTIVE 2: Improve public awareness of AMR and rational use of antibiotics	A3. Develop software programmes which people can use to access information on directions for use of antibiotics and which are compatible with mobile phones or tablet PCs, and put these programmes into use
OBJECTIVE 2: Improve public awareness of AMR and rational use of antibiotics	A4. Ensure that health reporters are informed about antibiotic resistance and the rational use of antibiotics and that the news regarding it is published in the various media

3

Note on AMR-relevant activities
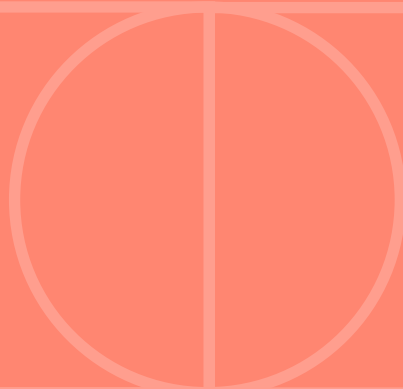
As described in *Turning plans into action for antimicrobial resistance*, systematically identifying key AMR-relevant activities and building on their existing base is important to maximize impact. Examples of entry points include adding AMR messaging to existing WASH and awareness campaigns or strengthening the links between AMR stewardship and IPC activities for greater impact.

Such strategies can lead to more efficient use of resources, but they must also be correctly accounted for in costing to avoid duplication of budgets and to clearly delineate new or additional resources and funding that might be required. This process is not always straightforward and could require extensive consultation across sectors. Nevertheless, two general scenarios for AMR-relevant activities/components are as follows:

Scenario 1:

An easily identifiable (e.g. add-on) AMR-focused activity or task that is a component of a larger programme or sector plan whose primary purpose might not be to address AMR. For example, under the existing laboratory programme, AMR-specific consumables need to be procured (e.g. PCR kits to detect AMR gene variants). This scenario is easier for the purposes of cost estimation, as all of the costs will be allocated to AMR.

Scenario 2:

An additional AMR-focused activity/task that is not an easily separable or identifiable component of a more integrated programme or sector plan. For example, under the existing laboratory programme, additional general (not AMR-specific) laboratory supplies need to be procured (e.g. pipette tips, urine collection containers, biohazard bags). This scenario is more challenging because the amount of additional resources associated with the AMR requirements (e.g. how many additional pipette tips might be needed to conduct AMR-specific testing) will need to be determined. Similarly, the cost and budget of an AMR-relevant activity, such an IPC committee, may be partly or fully absorbed by another plan or budget.

Both scenarios require detailed documentation of assumptions and decisions made on the basis of stakeholder consultations to ensure accurate, transparent costing and to avoid duplication in budget and resource planning. Figure A3.1 summarizes a sample process for identifying and costing AMR-relevant activities.

**Figure A3.1.** Process for identifying and costing AMR-relevant activities
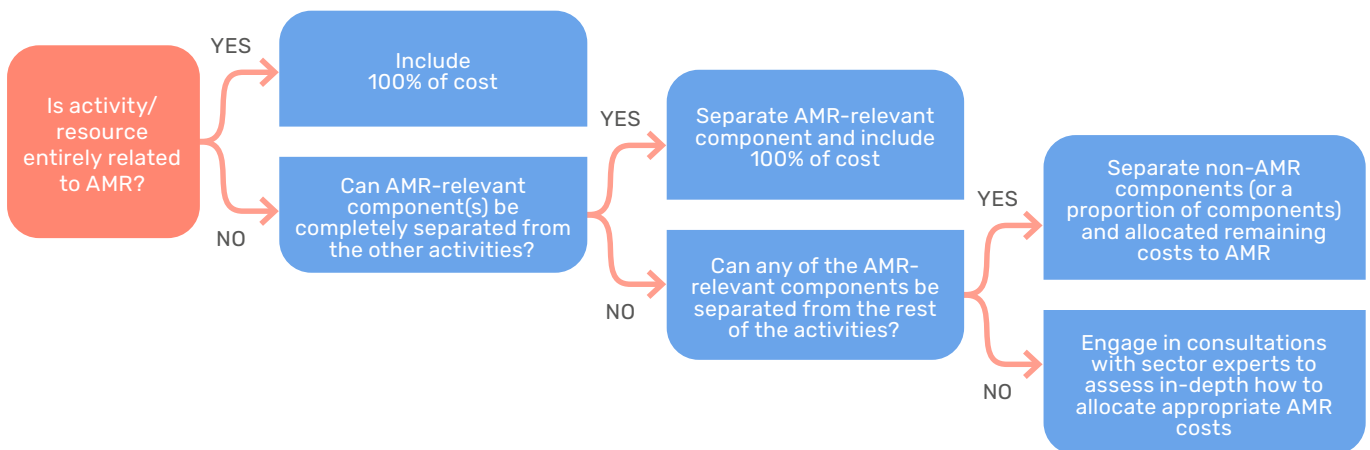
4

Disabling "Fill formulas" in Excel autocorrect options and enabling pivot functionality
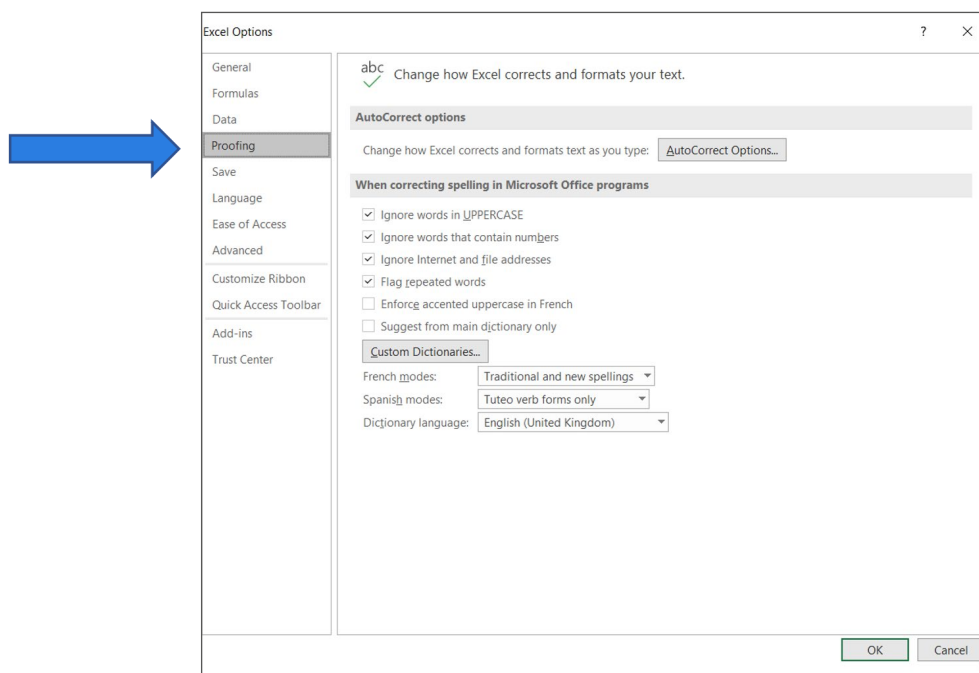
Note: Disabling this option will apply to all Excel files you may be using. If you need to use this functionality for your other work, you will need to re-enable it after using the WHO AMR Costing and Budgeting Tool.
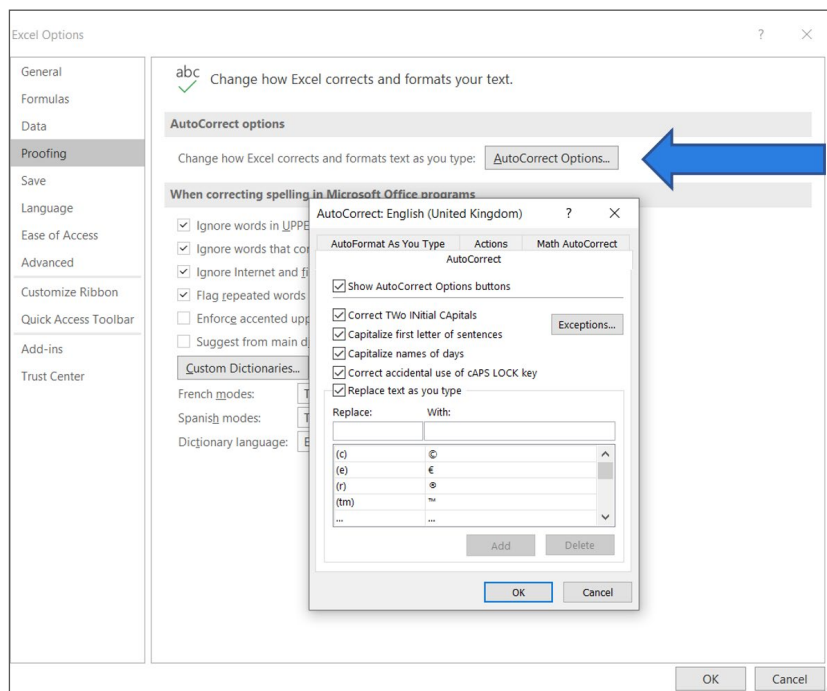
Disabling "fill formulas"
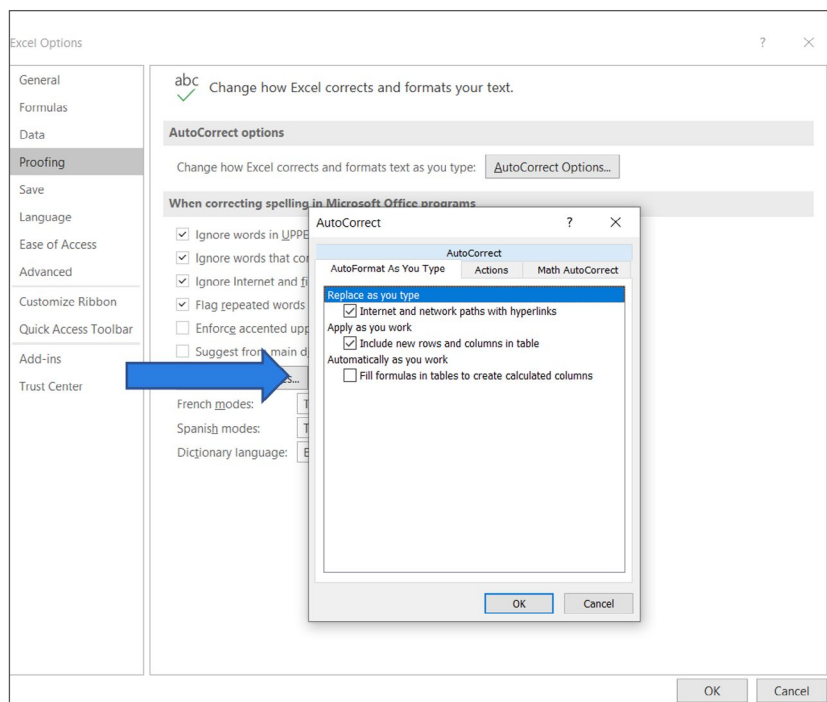
1. Go to File/Options
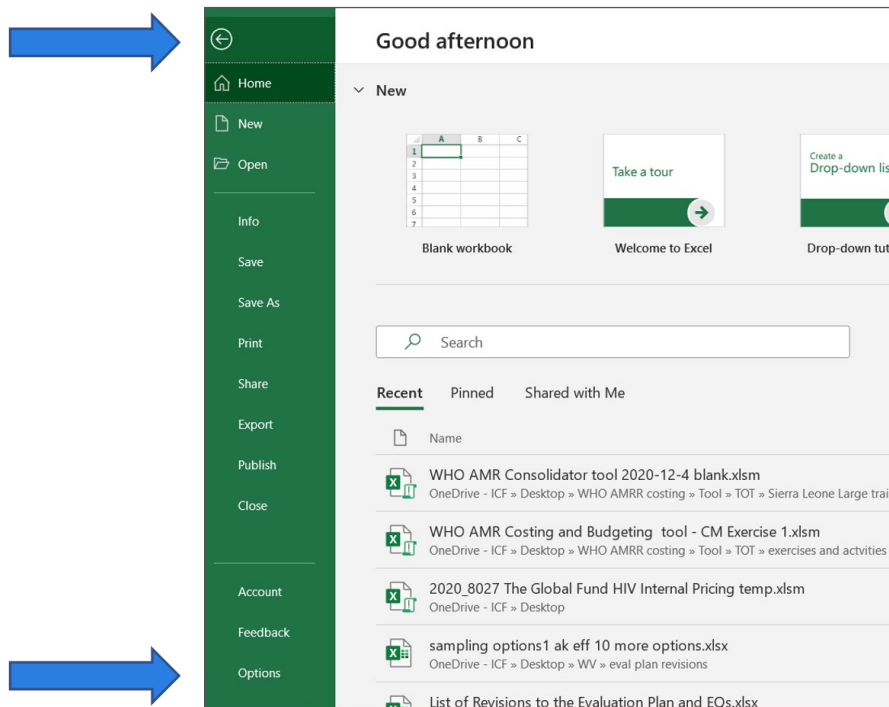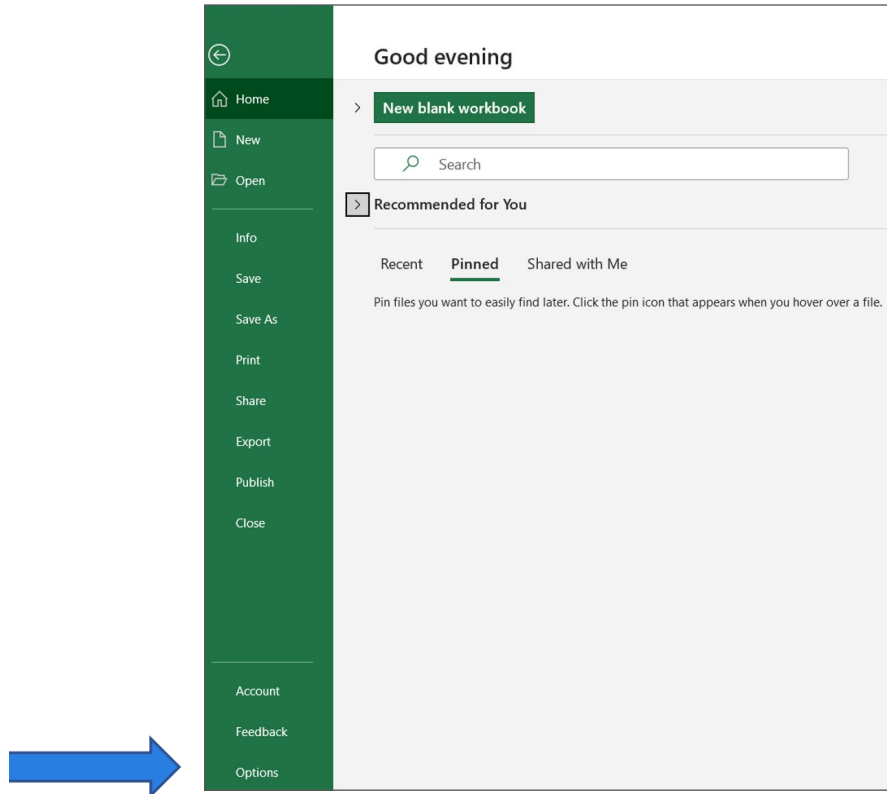

2. Select "Proofing"

3. Select "AutoCorrect options"

4. Click on "AutoFormat As You Type" and ensure that "Fill formulas in tables to create calculated columns" is unchecked.
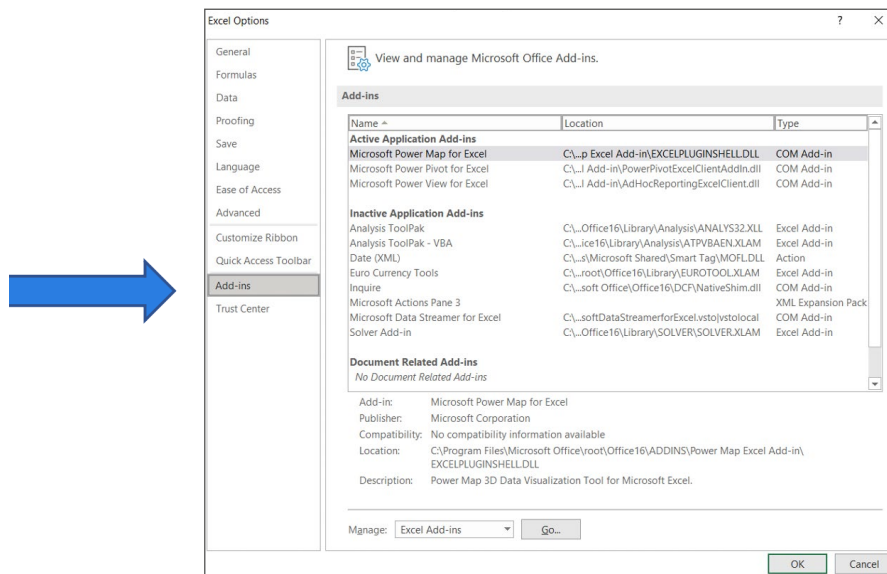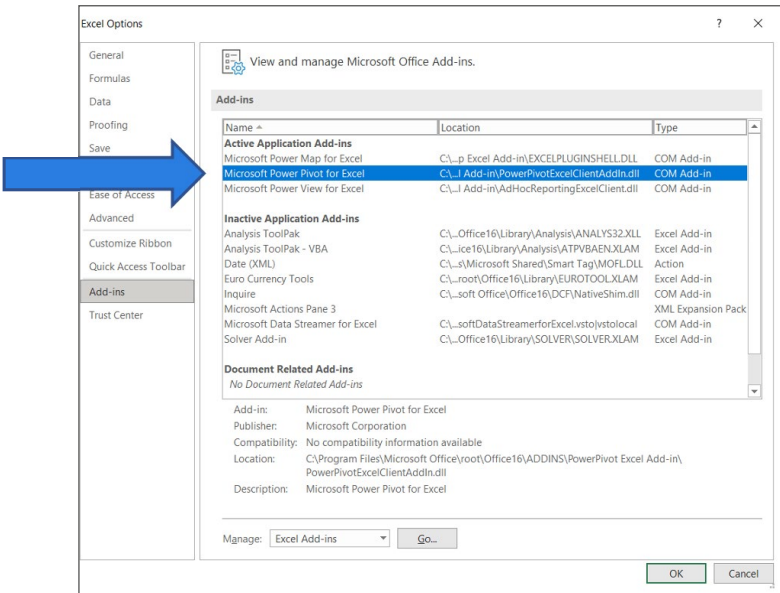
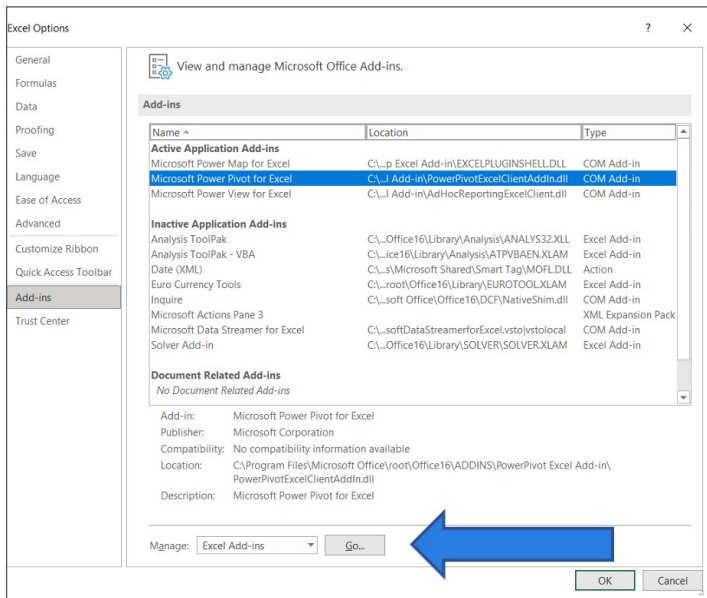# Enabling pivot functionality

1. Go to File/Options

2. Select "Add-ins"

3. Check whether Microsoft Power Pivot for Excel is listed under "Active Application Add-ins".

4. If the Power Pivot add-in is not listed under active add-ins, click on the "Go" button to manage Excel add-ins. This will open a window with a list of available add-ins where you can activate the Power Pivot add-in. If Power Pivot is not listed, it is possible that this functionality has been disabled by your organization system requirements. In this case, you may need to request help from your organization's IT department.

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