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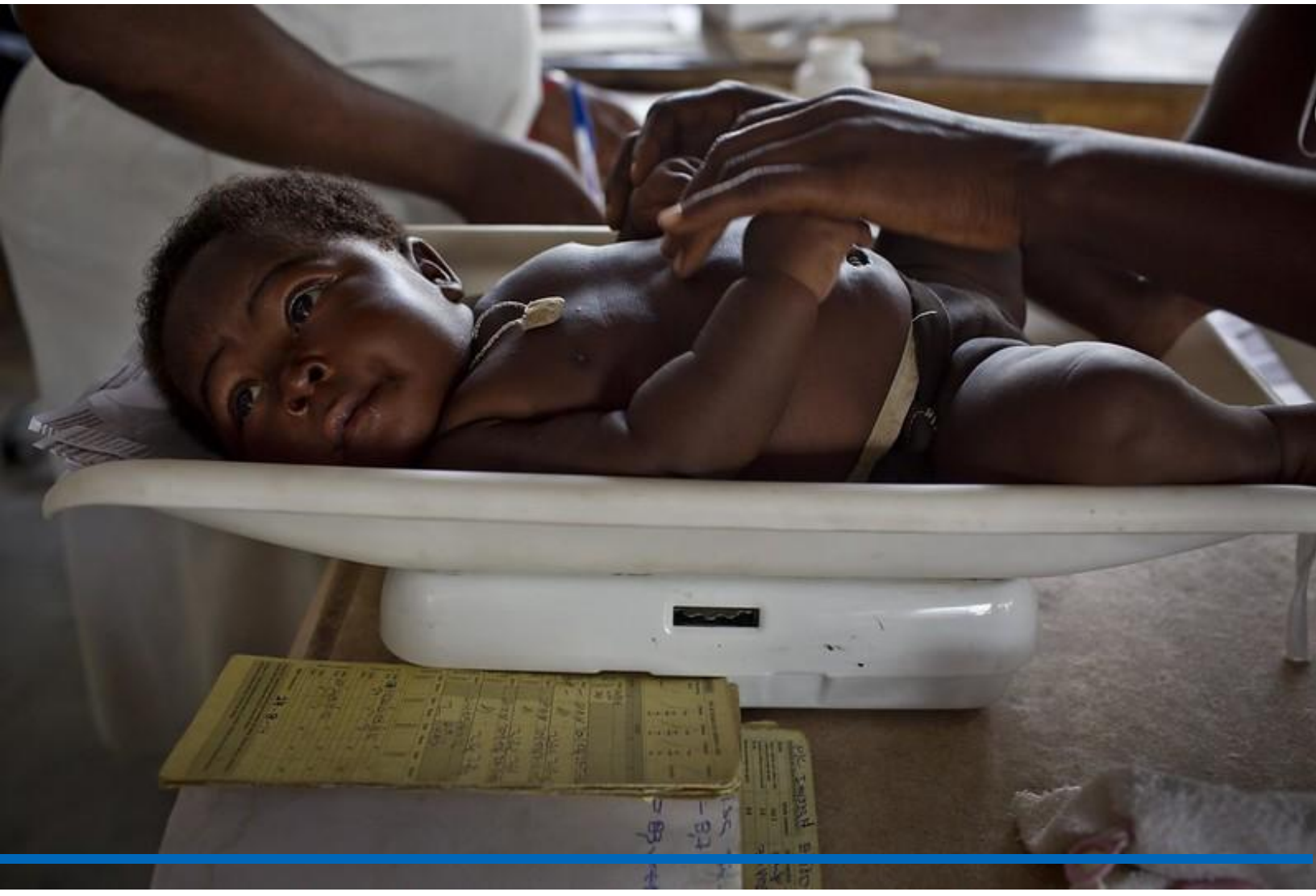
A Guidance Package for Developing Digital Tracking and Decision-Support Tools for Growth Monitoring and Promotion Services



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Disclaimer

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Acronyms

BMI	body mass index
BPMN	Business Process Modeling Notation
C	conditional on answers from other data responses
CDC	Centers for Disease Control and Prevention
CE	conditional, but can be left empty
CHW	community health worker
cm	centimeter
CMAM	community-based management of acute malnutrition
DAK	Digital Adaptation Kit
DSL	decision-support logic
DT	decision-support table
DTDS	digital tracking and decision-support
FANTA	Food and Nutrition Technical Assistance III Project
FHIR	Fast Healthcare Interoperability Resource
g	gram
GM	growth monitoring
GMP	growth monitoring and promotion
HAZ	height-for-age z-score
HIV	human immunodeficiency virus
HKI	Helen Keller International
HMIS	health management information system
ID	identification
IMCI	integrated management of child illness
ISCO	International Standard Classification of Occupations
IYCF	infant and young child feeding
JSI	JSI Research & Training Institute, Inc.
kg	kilogram
LMICs	low- and middle-income countries
MAMI	Management of small and nutritionally At-risk Infants under six Months and their Mothers
MC	multiple choice
mm	millimeter
MNP	micronutrient powder

MUAC	mid-upper arm circumference
n/a	not applicable
O	optional
R	required
RE	required, but can be left empty
RCEL	responsive care and early learning
RUTF	ready-to-use therapeutic food
SD	standard deviation
UHC	universal health coverage
UID	unique identifier
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
WASH	water, sanitation, and hygiene
WAZ	weight-for-age z-score
WHO	World Health Organization
WHZ	weight-for-height z-scores

1. Overview

Background

Growth Monitoring and Promotion

The measurement of weight and height is a standard component of pediatric care for assessing the overall well-being of children. Growth monitoring (GM)[1]—the comparison of a child's growth trajectory with reference curves—was a key component of child survival programming beginning in the early 1980s (Mangasaryan, Arabi, and Schultink 2011). GM helps determine whether a child is growing "normally," has a growth problem, or has a growth trend suggesting a potential growth problem that a health worker should address (WHO 2008a).

However, GM alone cannot improve children's growth. Recognizing this, in the mid-1980s, the concept of growth monitoring and promotion (GMP) was introduced to detect growth faltering through regular and periodic anthropometric measurements; analyze the causes of growth faltering; promote appropriate actions for improving growth and development; and serve as an entry point for or increase access to other health and nutrition services. GMP leverages GM as an opportunity for health workers to communicate with caregivers, promote appropriate activities to maintain healthy growth, and prevent or address identified growth problems before they advance to the state of undernutrition (Mangasaryan, Arabi, and Schultink 2011; Mason et al. 2006). Typically, children under two years of age should be measured by health workers once per month and children two to five years of age every three months.

GMP has been regarded as a critical service to identify and address (through counseling) growth problems and prevent children from progressing into malnutrition (Mangasaryan, Arabi, and Schultink 2011; Mason et al. 2006) and many low- and middle-income countries (LMICs) implement it. However, GMP has demonstrated varied results (Bégin et al. 2020).

The type and magnitude of the challenges vary by country. Many countries struggle with measuring children's weight and height/length routinely and accurately as well as recording, plotting (on growth charts), and interpreting indicators of nutritional status and growth (comparing against standards and previous measurements). The focus is often on nutritional status on the day of the visit rather than on the growth trend.

Challenges also exist with the implementation of the promotion component. Counseling seeks to increase caregivers' understanding of their children's growth, and encourage the adoption of appropriate infant and young child feeding (IYCF) and care practices, and use of other services, as needed (GFF and Manoff Group 2020). According to the World Health Organization (WHO)'s *Training Course on Child Growth Assessment,* investigating the causes of malnutrition (both undernutrition and overweight) is an essential component of quality counseling or growth promotion (2008a). However, counseling during GMP often does not take place at all or is too generic—health workers do not tailor suggested actions to the child's specific characteristics that may be causing the growth problem or are not feasible for the caregiver to try (GFF and Manoff Group 2020). For this reason, countries and programmers are paying closer attention to the "P" in GMP.

Digital Solutions for Improving GMP Services

According to the U.S. Agency for International Development (USAID)'s recent Vision for Action in Digital Health 2020–2024, digital health is the "application of information and communications

[1] It is important to distinguish GM from the one-time measurement of anthropometry and the calculation of z scores, which reflects a child's nutritional status at a specific point in time. Growth monitoring looks at growth over time by measuring anthropometry more than once (ideally multiple times and regularly—every month or several months) to identify a failure to grow along the ideal trajectory or growth faltering before the child reaches the status of undernutrition (Mangasaryan, Arabi, and Schultink 2011).

technologies and the data they generate to support informed decision-making and engagement by individuals, health providers, and health systems to increase demand, access, coverage, quality, and affordability of health and wellness for all" (USAID 2020, 7). Examples of digital health tools include, but are not limited to, mobile phones (mHealth), health information systems, health informatics, and artificial intelligence. Increased availability and accessibility of mobile phones propelled digital health in LMICs into the 21st century. WHO classifies digital health solutions by the type of digital health intervention they are designed to deliver and the end user for whom they are designed (health workers, children, health system managers, and data managers) (WHO 2018). Over the last 10 years, health practitioners, technology providers, and other stakeholders have explored innovative approaches to digital health, developing an evidence base of success in improving the quality of care.

In 2020, USAID Advancing Nutrition completed a landscape analysis of digital tools used to strengthen the delivery of nutrition services in LMICs (USAID Advancing Nutrition 2020). Of the digital tools we identified, 29 supported health workers in nutrition counseling or promotion and 28 aided health workers in nutritional status assessments. We also found 19 that supported GM and 14 of them mentioned GMP. Forty tools enabled longitudinal tracking of a child's health status and services received, and 37 provided prompts and alerts to the health worker to guide the provision of care (referred to as decision-support tools). Despite having several similarities, most of these applications were developed independently, requiring significant upfront investment in time and resources (USAID 2020).

Given the challenges with delivering good quality GMP services, digital decision-support tools for health workers that track child care longitudinally have the potential to improve the quality of GMP services. Studies indicate that digitizing GMP services may improve the accuracy of GM, timeliness of reporting, feedback on growth status, and referrals for additional services and/or counseling (Barnett et al. 2016). Research shows that the shift to digitized GMP services is generally acceptable to health workers and clients, with clients reporting more individualized support from and greater confidence in health workers who use digital applications to conduct home visits (van Heerden et al. 2017).

Outside of GMP, digital applications have been shown to improve antenatal care, including the quality of counseling provided during antenatal care visits (Dimagi 2021; McNabb et al. 2015); delivery support, including the use of the partograph (Dimagi 2021; Schweers 2015); adherence to integrated management of acute malnutrition guidelines, including the calculation of weight-for-height z-scores (WHZ) (Keane et al. 2018); and adherence to integrated management of child illness (IMCI) guidelines, especially completion of tasks and accuracy of disease classification (Dimagi 2021; Sarrassat et al. 2021; Mitchell et al. 2013; DeRenzi et al. 2008). Client confidence in the guidance or information provided and the perceived authority of the health worker have also improved with the use of digital counseling aids (Ifunya 2013; van Heerden et al. 2017; Coetzee et al. 2018; Gopalakrishnan et al. 2020; Dimagi 2021). Ensuring digitized GMP services have a robust counseling component could be a way to improve the promotion element of GMP.

WHO and other global health bodies provide guidelines and protocols to guide the provision of care in various health domains. Countries can use these guidelines and protocols to develop digital tracking and decision-support (DTDS) tools, which WHO defines as "job aids that combine an individual's health information with the health-care provider's knowledge and clinical protocols to assist health-care providers in making diagnosis and treatment decisions" (WHO 2018, 12). However, it can be very time-consuming to translate guidelines into the requirements and specifications needed to develop a DTDS tool (WHO 2021c). For this reason, WHO began an initiative several years ago to develop SMART (Standards-based, Machine-readable, Adaptive, Requirements-based, and Testable) guidelines and Digital Adaptation Kits (DAKs), which translate guidelines and protocols into a common format for the development of DTDS tools that program implementers, program managers, and software developers can understand (WHO n.d.[f]). To date, WHO has published DAKs for antenatal care (WHO 2021c), family planning (WHO 2021d), and human immunodeficiency virus (HIV) (WHO 2022).

Purpose of the Guidance Package

Given the promise of digital tools to improve the quality of GMP services, USAID Advancing Nutrition developed this guidance package to facilitate the development of country-specific DTDS tools[2] for the delivery and supervision of GMP services to save time and resources; reduce the duplication of effort, errors, and inconsistencies; and ensure adherence to global guidance. Following the example of WHO's DAKs, the guidance package provides a common language and understanding of the role and content of digital tools for GMP and the basic requirements for developing such tools. The content is intentionally generic and users will need to contextualize it to local policies and requirements.

Ultimately, it is our hope that the digital tools developed using this guidance package will improve the quality of GMP services by providing instructions and reminders, guiding assessment procedures, and assisting in decisions about which children to refer, treat, or counsel and, if indicated, how to counsel them appropriately.

Components of the Guidance Package

Consistent with the requirements for developing DTDS tools, this guidance package has six components:

1. **Interventions and Recommendations:** An overview of globally recognized GMP interventions and relevant recommendations included in this guidance package.
2. **User Personas:** Descriptions of relevant stakeholders or "end users" of the digital GMP tools (e.g., health workers, supervisors, data managers). End users will need to assist in developing the tools to ensure that they fit their needs and contexts (e.g., roles and responsibilities, motivations, and challenges).
3. **Business Processes and Workflows:** A business process is a set of related activities or tasks conducted together to produce a defined result (i.e., setup, registration, assessment of nutritional status and growth, counseling, and referral). Workflows are diagrams that visually depict the progression of activities required to provide a service, combined with decision points performed in the business process (Object Management Group 2023).
4. **Data Elements and Indicators:** This section provides detailed tables of variables or data elements captured throughout GMP business processes and used to calculate, categorize, and prompt follow-up actions. This section also discusses standardized indicators that digital GMP tools can calculate (using the data elements) and report so that program managers at various levels and health can use them for decision-making.
5. **Decision-Support Logic:** The algorithms of triggers and inputs (e.g., the data input by the end user of the application) used by the digital tool to make internal decisions to guide the health worker through GMP service delivery.
6. **Data Use:** Suggestions for how to make the most out of data collected with digital GMP tools for broader promotion of growth promoting actions, reporting, program monitoring, supervision, mentoring, and/or coaching.

This guidance package **does not** provide guidance on how to train health workers and supervisors in their use of DTDS tools. There are many resources available on implementation considerations. (See **Annex 5: Additional Resources**.)

[2] Throughout this document, we use the terms "tool" and "application" interchangeably.

Audience for this Guidance Package

The primary audience for this guidance package is health and/or nutrition program managers in Ministries of Health, Ministries of Social Protection, or other implementing agencies who oversee GMP services and, therefore, would oversee the development of a digital application to support GMP service delivery. These individuals will work with key stakeholders and end users (i.e., health workers and managers) to determine the content requirements (processes and guidance) for a GMP DTDS system, taking into consideration national priorities, policies, systems, protocols, practices, and other contextual realities.

Digital or health information system counterparts represent a secondary audience. They will translate health system processes and guidance into digital systems business requirements, in partnership with the aforementioned stakeholders, in a standards-compliant manner and in alignment with other health information systems in the country.

Finally, the guidance package contains information, such as workflows, data dictionaries, and decision-support algorithms, that the software development teams will need to develop a GMP DTDS system, making them the final audience of this guidance package.

Collaboration among these actors is critical to ensure consistency with local practices and interoperability with existing systems, whenever possible.

For simplicity, we refer to the audience or user of this guidance package as "program managers and/or software development teams" throughout this document.

When to Use This Guidance Package

This guidance package supports the development of DTDS tools for the delivery and/or supervision of GMP services. Health and/or nutrition program managers may use it in several scenarios, including—

Scenario 1: Health Workers Lack Job Aids

To improve the quality of GMP services (e.g., the accuracy of measurements, the calculation of nutritional status, or the interpretation of growth; the appropriate identification of problems and actions to address those problems), some countries may wish to develop a digital job aid for health workers. Typical job aids provided to and used by GMP service providers include growth charts and paper-based counseling cards with key messages. Service providers who participate in an in-service training on GMP or a related package of services may also receive a participant's manual that provides suggestions or reminders for growth measurement and counseling techniques. However, these job aids are typically in short supply and not specifically designed for GMP service delivery. This guidance package can serve as a starting point for developing DTDS tools to remind health workers to follow a care protocol and provide them with instructions and reminders on how to provide appropriate high-quality GMP services.

Scenario 2: Supervisory Visits Are Not Helping

Countries may also try to improve the quality of GMP services through supportive supervision. Many countries have developed national policies or guidance on supportive supervision; however, they may not provide specific guidance or tools for supervising GMP services. In this scenario, the data collected when health workers use the digital job aid can inform supervisors of areas in need of attention. In addition, the guidance package can inform the development of a complementary digital tool for supervisors and/or peer mentors to use when observing GMP services.

Scenario 3: Country is Moving from Paper to Digital

Most countries use paper-based systems for tracking the delivery of GMP services. However, countries are increasingly adopting electronic medical record systems and are developing digital systems for aggregate reporting and health management information systems (HMIS). This guidance package can

guide the development of a DTDS tool for reporting key indicators that operates at the point of care and is interoperable with the existing HMIS. We describe the importance of the interoperability of systems in greater detail below.

In this scenario, program managers and/or software development teams can review the guidance package as a starting point for defining data elements and decision support. Program managers and/or the software development teams should also refer to the paper-based tools to determine whether there are data elements or decision logic that they should also include in the final DTDS tools for GMP.

Scenario 4: Country Is Updating Its Health Strategy

Reliable, relevant, timely, and complete data on the coverage of services, cases of growth faltering, and the provision of relevant counseling are essential. Without such data, quality improvement teams and supervisors will find it challenging to identify specific areas in need of improvement, and nutrition champions will find it challenging to make decisions about resource allocation or to advocate for additional resources.

Possible Benefits of Using DTDS Tools for GMP Services

The DTDS tools described have several potential benefits listed below; however, it is important to note that the tools cannot address all challenges faced by health systems. They cannot directly address caregivers' understanding of the importance of GMP; increase child attendance at GMP visits; increase human resources or the time health workers have available to provide GMP services; or improve the equipment, supplies, and infrastructure for the provision of GMP services. DTDS tools can—

- **Improve the accuracy of nutritional assessment** by reminding health workers of appropriate techniques and identifying improbable measurements (done by comparing measurements with previous measurements and flagging those outside a specified range) in real time so that they can measure children again, if needed. In addition, the DTDS calculates z-scores by integrating formulas and automatically reporting classifications to health workers.
- **Increase the focus on growth and improve the interpretation of growth** by plotting measurements (weight, age, and sometimes height/length) from multiple time points (pulling from previous and current GMP visits) on growth charts to illustrate growth trends.
- **Encourage health workers to tailor counseling** to children's and caregivers' situations by reminding health workers about problems, questions, concerns, and child care practices mentioned during the previous and current GMP visits; providing a list of appropriate counseling topics for the health worker to select from; and linking the health worker to digitized versions of counseling cards, posters, and possibly even videos. Such information in paper-based forms is rarely available and is cumbersome to manage.
- **Ensure that health workers appropriately treat or refer children to specialized services** by flagging those requiring immediate referral (e.g., those who are wasted, severely stunted, severely underweight, or obese) and reminding the health worker of other conditions that may require treatment and/or referral.
- **Facilitate the rollout of national guidelines** by integrating changes in the DTDS software. Many countries periodically update policies, protocols, guidelines, and tools. Rolling them out and ensuring that health workers follow them, however, is not so easy. DTDS tools can easily integrate updates.

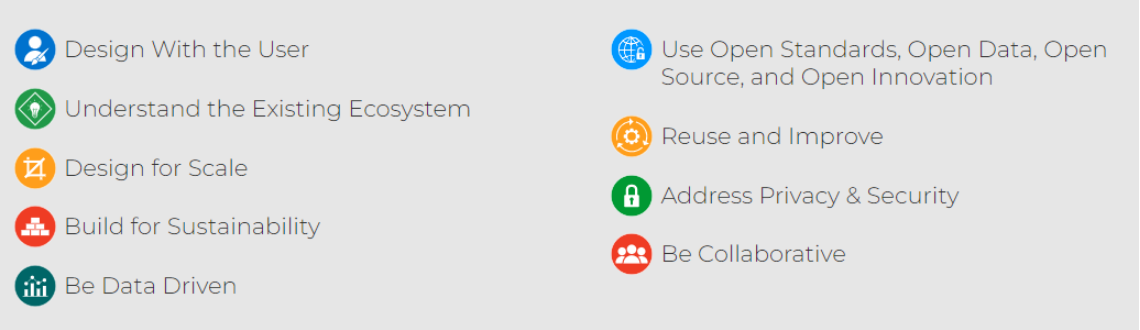
How to Use This Guidance Package

The information in this guidance package is the starting point for developing digital GMP service delivery and supervision tools. It aims to reflect commonalities across different settings. It includes guidance on all scale types, measurements of nutritional status and growth, and a wide range of topics that service providers will need to explore as potential causes of a growth problem.

Applying Best Practices in Digital Health

Program managers and/or the software development teams using this guidance package to develop a DTDS tool for GMP will want to follow best practices in design, adaptation, and implementation of digital health solutions. The Principles for Digital Development (figure 1) website includes guidance and/or resources for each principle.

Figure 1. Principles for Digital Development



Source: Principles for Digital Development (n.d.).

In addition, program managers and/or the software development teams may wish to consult the following resources, which summarize best practices:

- USAID's Vision for Action in Digital Health 2020–2024 (2020)
- WHO's *Handbook for Digitizing Primary Health Care: Optimizing Person-Centered Tracking and Decision-Support Systems Across Care Pathways* (n.d.[i])
- WHO's Digital Implementation Investment Guide (2020a)
- WHO's Monitoring and Evaluating Digital Health Interventions (2016)
- PATH's Defining and Building a Data Use Culture (Arenth et al. 2017)
- MEASURE Evaluation's data demand and use and health informatics webpages, which include a variety of related content

Adapting the DTDS Tools

During the development process, program managers and/or software development teams should consult extensively with end users to adapt the generic DTDS tools described in this guidance package. Throughout this document, we highlight areas that will need particular attention for adaptation. Find a list of detailed adaptations that program managers and/or software development teams may need to make in **Annex 7: Adaptations**.

Service Delivery Policies, Protocols, Practices, and Other Characteristics

The DTDS tools need to reflect national policies and protocols as well as key characteristics of health systems, such as internet connectivity/bandwidth; health worker/supervisor digital literacy; health facility

infrastructure, equipment, and supplies; health worker and supervisor competencies, workload, time, and motivation; and the availability of support services and referral facilities. DTDS tools for GMP services should consider other services, such as immunization, IMCI, or early childhood development services, and the information they collect to avoid asking caregivers for the same information. They should also refer to context-specific resources or support for caregivers' questions or concerns that the health worker cannot address directly. For example, if a caregiver mentions violence in the home or food shortages, the DTDS tool should provide the health worker with guidance on where the caregiver can find additional support, if such services exist. If health facilities provide such services together with GMP services, program managers and/or software development teams should adapt the workflows to reflect how the services are integrated.

Socio-Cultural and Political Characteristics

Program managers and/or the software development teams should adapt the DTDS tools to sociocultural, climatic, political, and socioeconomic conditions. Of particular importance for the delivery of GMP services is counseling that is tailored to a child's age, conditions, and circumstances. The guidance package includes counseling topics and a list of resources with illustrative counseling content (see **Annex 6: Generic Counseling Cards/Topics**); however, it does not include those counseling cards, key messages, technical content, or suggested actions for caregivers to try/adopt because they require significant adaptation to context. We highly recommend that developers integrate nationally-approved digital counseling cards or posters (images and key messages) and, if available, links to relevant videos.

Data Definitions and Standards

To be interoperable with existing health information systems, program managers and/or software development teams should ensure that the indicators and data elements used to create them align with national data standards and data dictionaries that include information about data elements and indicators generated by the DTDS tool. For example, the data element for the location of where a GMP visit takes place will vary across contexts. In some countries it may include a facility name and district name, in other locations it may also include a street address and community name. Whatever existing information systems use, program managers and/or the software development teams should use in the GMP DTDS tools. This "alignment" is referred to as *structural interoperability*—the data syntax and format are the same.

They will also need to use standardized models and coding systems for data for what is referred to as *semantic interoperability* (HIMSS 2023). Many countries have published standards for formatting, codifying, and exchanging data. Program managers and/or software development teams will need to review definitions of indicators, data elements, and data standards before developing the application to ensure that the GMP DTDS tool complies.

Existing Health Information Systems

Any DTDS tool built to support service delivery will not exist in a silo, but rather, in an ecosystem of related information systems in a country. Program managers and/or software development teams should design GMP DTDS tools for interoperability with existing health information systems. Program managers and/or software development teams should consult with local plans for health information systems in the early stages of system planning to determine how the tool will fit in the country's health information system architecture. Examples of these systems include—

- A **HMIS** collects, stores, and reports aggregate routine data about health services provided. Any DTDS tool for the provision of GMP services will need to feed into the HMIS to avoid duplication.
- A **client registry** is a national registry of clients receiving health services in a country (OpenHIE n.d.). Client registries store a unique identifier for a client to use across many systems to link the

client's multiple health records together. Creating interoperability between the GMP application and the client registry could ensure that the child's GMP record can link with other health records through use of a standardized unique identifier. Even in the absence of a client registry, it is important that the digital GMP tool uses the same unique identifier used to track clients in other parts of the health system to facilitate linking records across facilities and systems.

Reporting Requirements and Needs

Program managers and/or software development teams should ensure that the DTDS tool provides the data to meet national reporting requirements. Once again, they will need to follow national data standards and use national definitions of relevant indicators.

2. Application Guidance Content

Interventions and Recommendations

In the absence of WHO guidelines specifically for GMP services, we relied on globally recognized recommendations, instructions, and tools to develop this guidance package, including the following:

- Food and Nutrition Technical Assistance III Project (FANTA)'s Guide to Anthropometry: A Practical Tool for Program Planners, Managers, and Implementers (Cashin and Oot 2018)
- FANTA's Training Guide for Community-Based Management of Acute Malnutrition (2018)
- Management of small and nutritionally at-risk Infants under six months and their mothers (MAMI) Care Pathway Package, Version 3 (2021) produced by the MAMI Global Network, Emergency Nutrition Network, and the London School of Hygiene and Tropical Medicine
- Nurturing Care for Early Childhood Development: A Framework for Helping Children Survive and Thrive to Transform Health and Human Potential, which was produced by WHO, UNICEF, and the World Bank Group (2018)
- The Responsive Care and Early Learning (RCEL) Addendum (USAID Advancing Nutrition 2021)
- UNICEF's Community Infant and Young Child Feeding Counselling Package (2012)
- WHO's Training Course on Child Growth Assessment (2008a)
- WHO and UNICEF's Infant and Young Child Feeding Counselling: An Integrated Course (2021b; 2021c; 2021d; and 2021e)
- WHO and UNICEF's joint statement on the WHO Child Growth Standards and the Identification of Severe Acute Malnutrition in Infants and Children (2009)

We have also attempted to align this guidance package with WHO's Compendium of Health Interventions for Universal Health Coverage (UHC) (n.d.[g]), which includes the following interventions relevant to GMP services:

- health promotion and prevention
- approach to diarrhea
- longitudinal assessment of growth and development
- support for healthy growth and development
- prevention of anemias
- prevention of overweight and obesity
- screening and diagnosis of nutritional status
- longitudinal assessment of parenting relationships
- support for healthy parenting.

The health worker may also decide to refer a child or caregiver for the following UHC health interventions (WHO n.d.[g]):

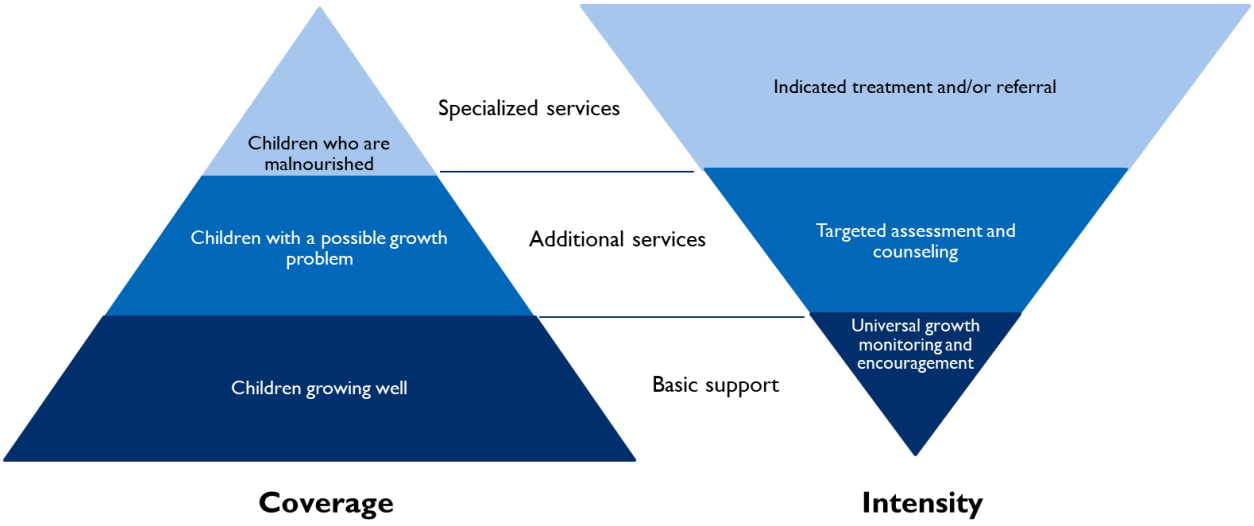
- routine postnatal care of the mother
- initial management of acute altered mental status
- preventive micro- and macronutrient supplementation
- management of micronutrient deficiencies
- management of moderate wasting
- management of severe wasting.

Based on the resources we consulted and the feedback we received from reviewers, we made several important assumptions regarding the delivery of GMP services. First, health workers will triage sick children from the start. They will not enter the GMP service delivery workflow because health workers will send them to another department in the first step of registration.

Second, health workers will only conduct the more in-depth counseling for those with a growth problem or possible growth problem, not for children growing normally. In figure 2, we illustrate the coverage of three levels or intensities of services: universal GM and encouragement, targeted assessment and counseling, and indicated treatment and/or referral. This is important in the context of staff shortages, but it is in recognition of the fact that not all children and caregivers need the same services. Health workers need to routinely assess all children to identify growth faltering early and their caregivers need affirmation and encouragement. Some children who arrive for the routine or universally-provided GMP services—those whose growth indicates a possible problem—will need additional GMP services, a targeted assessment of questions, concerns, and care practices, as well as tailored counseling. A small proportion of children—those who are wasted, obese, severely stunted, or severely underweight—will require immediate treatment and/or referral. The guidance package takes into consideration children requiring each level of support.

Find a complete list of resources consulted for the development of this guidance package in the reference list and **Annex 5: Additional Resources**. In addition, the experience and expertise of the authors and reviewers have also played a critical role in finalizing this guidance package (see Acknowledgements).

Figure 2. Coverage of Services



Source: Adapted from WHO, UNICEF, and World Bank Group 2018

User Personas

A *user persona* is a stakeholder or end user of the DTDS tool. We designed this guidance package to support both the delivery and supervision of GMP services. Therefore, the primary or targeted user personas are health workers who provide GMP services and their supervisors. Other user personas who will benefit from the data collected and tracked by the digital GMP tools include the child, caregiver, community members, data managers, program managers, and policymakers. We present generic descriptions of these personas below.

It is important to review and revise these user personas for the specific setting and the final country-specific DTDS tool by reflecting on the following:

- background and demographics (e.g., gender, age, whether they are from the community, familiarity with digital devices, whether they own a mobile phone/smartphone)
- local environment and any relevant contextual information about their surroundings (e.g., worksite characteristics; rural or urban setting; facility- or community-based service delivery; availability of electricity, water, internet; distance from nearest referral facility)
- expected roles and responsibilities according to national policy
- actual roles and responsibilities based on reports and/or interviews with the user personas themselves and from those with whom they interact (managers, supervisors, caregivers, community leaders, etc.)
- human resources (number of staff and their competencies), catchment area, and workload
- other challenges user personas may face in completing their tasks
- motivations of the user personas (e.g., incentives, targets, compensation).

Health Workers Providing GMP Services

The health worker is one of the primary user personas of the digital GMP tool.[3] Health workers use the digital application while setting up GMP, registering the child for GMP services, assessing the child's nutritional status and growth, counseling the caregiver, and then treating and/or referring the child and/or caregiver. They are responsible for recording data in the digital tool. They benefit from the prompts, instructions, and reminders organized by the tool's business processes and internal decision logic.

Types of Health Workers Providing GMP Services

The occupational titles of the health workers who provide GMP services will depend on where they provide services (in a health facility or in the community), the characteristics of the health system, the human resources system, and the human resources available. Health workers are often community health or nutrition volunteers, community health workers (CHWs), nursing associates, and nurses. Dietitians or nutritionists and doctors may also provide GMP services; however, this is less common. Table 1 presents generic descriptions of these health workers, along with corresponding codes from the International Standard Classification of Occupations (ISCO) (WHO 2021d; WHO 2019b; WHO 2012; ILO 2008).

[3] For the purposes of this guidance package, we refer to the health worker as the person carrying out the tasks during the GMP visit. We acknowledge that in some contexts, administrative staff and various health workers may divide these tasks. Program managers and/or software development teams should consider this during the adaptation process.

Table 1. Description of Types of Health Workers Who Provide GMP Services

Occupational Title	Description	Different Names	ISCO Code
Health volunteer	Health volunteers are individuals who perform functions or provide services (generally preventive and promotive) related to health, nutrition, and/or child care. They are not paid for their services. They are usually trained in some way in the context of the intervention, but have not received a formal professional or paraprofessional certificate or tertiary education degree.	Community health volunteer, CHW, village health worker, health promoter, early childhood development leader	3259 (Health associate professionals not elsewhere classified)
Community health worker	CHWs provide health education, referral, and follow-up, case management, basic preventive health care, and/or home visiting services to specific communities. They are paid for their services. They receive training and refresher training, are usually supervised, and may or may not have a professional certification.	CHW, community health aide, community health promoter, village health worker	3253 (CHW)
Nursing associate	Nursing associate professionals provide basic nursing and personal care. They provide health advice to patients and families; monitor patients' conditions; and implement care, treatment, and referral plans usually established by medical, nursing, and other health professionals. They are paid for their services. Nursing associate professionals typically study nursing; however, in some cases, extensive on-the-job training may substitute for formal education.	Nursing associate, auxiliary nurse, nurse assistant, assistant nurse, enrolled nurse, practical nurse	3221 (Nursing associate professional)

Occupational Title	Description	Different Names	ISCO Code
Nurse	Nursing professionals provide treatment, support, and care services, according to the practice and standards of modern nursing. They plan and manage the care of patients. They work autonomously or in teams in the practical application of preventive and curative measures in clinical and community settings. They may supervise other health workers. They are paid for their services. Nursing professionals are legally authorized (registered) to practice after examination by a board of nurse examiners or similar regulatory authority. Education includes three, four, or more than four years in nursing school, and leads to a university or postgraduate university degree, or the equivalent.	Professional nurse, registered nurse, licensed nurse, diploma nurse, nurse clinician, clinical nurse, advance practice nurse, specialist nurse, nurse practitioner, district nurse, operating theater nurse, public health nurse, nurse anesthetist, nurse educator	2221 (Nursing professional)

Goals of the Health Worker Providing GMP Services

As it relates to GMP services, health workers seek to improve the growth and development of children by achieving the following performance goals:

- Meet coverage goals.
- Collect and record information efficiently and accurately.
- Report data and information efficiently and accurately.

Tasks of the Health Worker Providing GMP Services

Health workers are often responsible for many tasks. The following are the tasks of the health worker related to the delivery of GMP services using a DTDS tool:

- Use a smartphone, tablet, or computer to conduct the GMP visit and record information.
- Set up, maintain, and calibrate measurement instruments.
- Recognize danger signs or other signs and symptoms of illness requiring immediate treatment by another health worker at the same location or referral to another health facility.
- Establish a child's birth date then determine and record the child's age. (The application will determine whether a child is eligible for GMP services.)
- Assess a child for clinical signs of wasting.
- Measure a child's mid-upper arm circumference (MUAC), if included in the national protocol.

- Weigh a child using the appropriate techniques.
- Measure a child's height/length using the appropriate equipment and technique.
- Interpret a child's growth charts to determine whether that child is growing normally, shows early faltering (is at risk of a problem), or has a growth problem. (The application will calculate weight-for-height, body mass index [BMI]-for-age, height-for-age, and weight-for-age z scores [WAZ] and plot them on growth charts.)
- Plot a child's nutritional status on the child's paper-based health card for the caregiver to take home.
- Start a new growth card for a child if that child does not have one or update the growth card if the child already has one.
- Explain a child's growth to the caregiver in a way that the caregiver can understand. If a child's nutritional status has only been measured once, the health worker will explain the child's current nutritional status.
- Build the confidence of caregivers, praising them for what they are doing well. (The application will suggest topics based on reported care practices.)
- Investigate care practices (e.g., breastfeeding, complementary feeding, handwashing, physical activity, responsive care) to identify possible causes of the child's growth problem. (The application will suggest questions to ask, based on the child's age and nutritional status.)
- Show kindness and respect to children and their caregivers.
- Listen to and learn from caregivers.
- Select appropriate counseling topics. (The application will suggest topics based on the child's age, care practices, and questions and concerns raised by the caregiver.)
- Demonstrate breastfeeding techniques/positions.
- Demonstrate the preparation of complementary foods (i.e., hygiene, ingredients, portions, consistency).
- Work with the caregiver to identify small, doable actions for the caregiver to try at home; discuss how the caregiver can overcome challenges practicing these actions; and agree on a plan for trying them.
- Have the caregiver "teach back" (say what he or she understands the small, doable actions to be), then clarify any misconceptions.
- Follow up on the plan (actions the caregiver agreed to try).
- Refer a child and/or caregiver for additional treatment or services, as needed and in accordance with national referral protocols. (The application will suggest reasons for the treatment and/or referral.)

Needs of the Health Worker Providing GMP Services

To fulfill their tasks related to the provision of GMP services using a DTDS tool, health workers will need the following:

- competencies to perform their role related to GMP services, according to existing protocols and best practices
- ability to use a smartphone, tablet, or computer
- equipment and supplies
  - equipment for using the digital tool (smartphone, tablet, or computer)
  - scale for weighing children
  - height/length board, if applicable
  - MUAC tape, if applicable
  - equipment for demonstrating food quantities and food preparation (locally used/recognized cooking and eating utensils rather than generic ones)
  - a breast model and doll to demonstrate proper positioning
  - job aids to assist with counseling (Program managers and/or software development teams could design the DTDS tool to include counseling cards, videos, and/or key messages.)
  - job aids to assist with interpretation (The application includes guidance on how to interpret nutritional status and growth.)
  - up-to-date and accurate data on children eligible for GMP services, GMP services delivered, and care practices
- infrastructure
  - internet access for syncing the DTDS tool
  - adequate space for weighing and counseling
  - space for observing breastfeeding with the appropriate amount of privacy (i.e., private room or sheet/material to create privacy)
- health systems
  - policies, protocols, and guidelines for GMP service delivery
  - time for conducting GMP visits, sharing findings with community members, and visiting children who do not return for their next GMP visit
  - feedback, guidance, and support from supervisors/mentors to improve their performance
  - transportation for conducting follow-up visits
  - opportunities to share findings with community members
  - adequate remuneration, recognition, compensation, and incentives
  - appropriate referral facilities and support services
- children and caregivers who attend GMP visits.

Supervisor of GMP Services

Supervisors can be peers or more senior health workers.

Goals of the Supervisor of GMP Services

As it relates to GMP services, supervisors seek to improve the growth and development of children by achieving the following performance goals:

- Meet coverage goals (e.g., 20 health workers supervised in the past month).
- Identify challenges with GMP service delivery in a timely fashion so that they can be addressed.
- Support health workers to improve their performance and the quality of the GMP services they provide.

Tasks of the Supervisor of GMP Services

Using the DTDS tool, supervisors are responsible for the following tasks:

- Observe health workers providing GMP services objectively and without interfering unnecessarily.
- Assess health workers' overall rapport with caregivers and the appropriateness, correctness, and acceptability of their services.
- Record observations.
- Provide supportive, constructive feedback to health workers after completing the observations.
- Work with the health worker to identify actions for the health worker to try to improve performance and develop a plan for trying them.
- Follow up on the performance improvement plan (actions the health worker agreed to try).
- Fix issues that may be impeding accurate recording or use of tools.

Needs of the Supervisor of GMP Services

To fulfill their role, supervisors of GMP services will need the following:

- competencies to perform their role related to the supervision of GMP services, including the ability to recognize aberrant data
- clear policies, protocols, and guidelines for GMP service delivery
- equipment for using the digital tool (smartphone, tablet, or computer)
- up-to-date and accurate data on children eligible for GMP services, GMP services delivered, common care practices, and health workers responsible for delivering GMP services
- internet access for syncing the digital tool
- tools for supervising health workers
- easy access to timely and reliable aggregated data/dashboards to assess health worker productivity and effectiveness, celebrate successes, and identify challenges
- transportation to attend GMP sessions/visit communities or health facilities
- time to attend GMP sessions/visit communities or health facilities.

Data Manager of GMP Services

A data manager collects and collates GMP data first collected by health workers then reports these data to health managers at various levels of the health system.

Goals of the Data Manager of GMP Services

The goals of the data manager are to—

- Fulfill the reporting requirements in an accurate and timely manner.
- Collect data from all health facilities in their catchment area.
- Provide evidence of progress (successes or failures) in achieving goals related to health service delivery and health outcomes.
- Make sure that data are useful and used appropriately.

Tasks of the Data Manager of GMP Services

The roles of the data manager as it relates to GMP services are as follows:

- Efficiently collect and collate data from all health workers in their catchment area.
- Follow up with health workers who are late in submitting data or who submit incomplete or dubious data.
- Prepare and submit reports in an accurate and timely manner and support their use.

Needs of the Data Manager of GMP Services

To fulfill their role, data managers will need the following:

- understanding of the purpose of GMP services, and the type of information/data that will be most useful for improving the coverage and quality of GMP services
- competencies to perform their role analyzing and reporting GMP data collection using a DTDS tool
- equipment for analyzing and reporting GMP data (smartphone, tablet, or computer)
- reporting forms or tools
- easy access to timely and reliable data (e.g., completed records from GMP services provided)
- guidance/instructions on reporting requirements and the calculation of indicators.

Caregiver of Children Eligible for GMP Services

The caregiver brings the child for a GMP visit and actively participates in the measurement, counseling assessment, investigation, prioritization of causes of growth problems, selection of goals, and development of plans.

Goals of the Caregiver of Children Eligible for GMP Services

As it relates to GMP services, the goal of the caregiver is to ensure that their child is growing and developing in a healthy way and, if not, to understand what to do to improve their child's growth and development.

Tasks of the Caregiver of Children Eligible for GMP Services

Regarding GMP services, the caregiver is responsible for the following:

- Accompany the child to all scheduled GMP visits so that a health worker can monitor his/her growth.

- Listen, ask, and share ideas about the health and development of the child, including reasons for positive growth and/or growth problems.
- Work with the health worker to determine ways to continue good practices and/or improve practices for better growth outcomes.
- Work with the health worker to identify small, doable actions to try at home, discuss possible challenges to practicing those actions, and agree on a plan for trying them.
- Try actions agreed-on with the health worker and included in the plan to improve the child's growth and development.
- Receive and fulfill any referrals given.

Needs of the Caregiver of Children Eligible for GMP Services

To fulfill their roles, caregivers will need the following:

- competencies (knowledge, skills, and attitudes, such as confidence and self-efficacy) to take the child to GMP visits
- permission from family members to attend GMP visits
- transportation to attend GMP visits, as necessary
- time to attend GMP visits on the specified date and at the specified time
- competencies, confidence, and self-efficacy to try actions agreed-on with the health worker and included in the plan to improve the child's growth and development.

Business Processes and Workflows

A business process is a set of related activities or tasks conducted together to produce a defined result. Workflows are diagrams that visually depict the progression of activities required to provide the service, combined with decision points performed within the business process (Object Management Group 2023).

This guidance package includes business processes and workflows for the following program areas: registration, growth measurement and interpretation, counseling, and referral. The guidance package also includes a business process and workflow for the supervision of GMP services, called supportive supervisory visits, which are observations of caregiver-provider interactions. Table 2 contains descriptions of each business process, followed by annotations that provide more details about the activities or tasks, and references to any pertinent decision logic. Not all activities or tasks in the workflows have additional annotations. **Annex I: Business Process Workflows** contains the detailed workflows for each business process identified in this guidance package.

GMP business processes and workflows will vary by context and service delivery location. Because this package serves as generic global guidance, countries and programs will have to tailor these business processes and workflows to their contexts based on national policies and protocols, and the realities of service delivery. In addition, if countries integrate GMP services in well-child visits, software developers may need to separate the business processes and workflows described below and weave them into a larger workflow. For example, they may need to integrate the measurement of weight and height into a workflow for a more comprehensive assessment of a child's vital signs or they may add sections of the **Counseling Workflow** to the delivery of immunization, IMCI, community-based management of acute malnutrition (CMAM), or integrated community case management services.

Table 2. Business Processes Overview

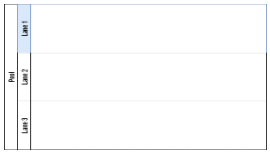
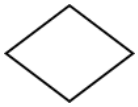
Process (short title)	Process ID	User Personas	Objectives	Tasks
Setup	GMP.1.	Health worker	To ensure that measuring equipment, including scales, height/length boards, and MUAC tapes are available, functional, and properly set up	*Starting point: Health worker or administrative staff member arrives at the location where the GMP event will take place.* ● Indicate the type of measuring equipment that he/she will use. ● Provide instructions for setting up the equipment to the health worker.
Registration	GMP.2.	Child, caregiver, health worker	To ensure that basic information about the child is in the application database with updated personal details, or if not in the database, to enter the child's information in the system	*Starting point: Caregiver and child arrive at the location for a GMP visit and the child is not sick, which would require someone else at the location treating the child and/or a referral elsewhere.* ● If a health worker previously registered the child, the application provides basic information about the child and caregiver to the health worker. ● If the child was not previously registered, the application will prompt the health worker to ask about and record basic information about the child and caregiver to create the child's record.
Assessment of Nutritional Status and Growth	GMP.3.	Child, caregiver, health worker	To measure the child's weight, height/length, and MUAC (if applicable) to determine growth status	*Starting point: A health worker calls a registered child in for GMP.* ● Measure the child's weight, height, MUAC (if applicable), and clinical signs of wasting (bilateral pitting edema). ● Describe each growth chart. ● Explain a child's growth to the caregiver in a way that the caregiver can understand. ● Decide whether to provide counseling.
Counseling	GMP.4.	Child, caregiver, health worker	To provide appropriate, relevant, quality counseling	*Starting point: Health worker or application determines that the child is eligible for counseling (does not require immediate referral).* ● Investigate possible causes of the growth problem, asking caregivers about their questions and concerns and appropriate questions about breastfeeding, feeding, handwashing, physical activity, and responsive care.

Process (short title)	Process ID	User Personas	Objectives	Tasks
				• Praise the caregiver for what she/he is doing well. • Discuss and prioritize the questions, concerns, and practices affecting the child's nutritional status and growth. • Counsel the caregiver on relevant topic(s). • Suggest small, doable actions for the caregiver to try. • Work with the caregiver to develop a plan for trying the actions and overcoming challenges to doing so. • Decide whether to provide treatment and/or referral for the child and/or caregiver. If the child/caregiver will not receive treatment or referral: • Agree with the caregiver on the day and time when the child should return for the next GMP visit. • Explain to the caregiver the importance of regularly attending GMP visits to identify problems before they become more serious. • Thank the caregiver for bringing the child for the GMP visit. • Update the child's paper-based health card (if the country uses them) with the relevant measurements.
Referral	GMP.5	Child, caregiver, health worker	To treat and/or refer the child/caregiver to additional services. These services may or may not be available at the current location	*Starting point: Health worker or application indicates that the child/caregiver requires treatment and/or referral for additional services.* • Indicate whether (a) you will provide a referral to the child/caregiver, (b) you will treat the child, or (c) you will provide a referral to the child/caregiver and the health worker will treat the child. • Treat and/or refer the child/caregiver. • Agree with the caregiver on the day and time when the child should return for the next GMP visit. • Explain to the caregiver the importance of regularly attending GMP visits to identify problems before they become more serious. • Thank the caregiver for bringing the child for the GMP visit.

Process (short title)	Process ID	User Personas	Objectives	Tasks
				• Update the child's paper-based health card (if the country uses them) with the relevant measurements.
Supervision	GMP.6. Supervision	Health worker, supervisor	To observe and assess the provision of GMP services	*Starting point: Supervisor plans a supervisory visit to observe the health worker providing GMP services.* The application prompts the supervisor to record the child's age, health status, nutritional status, and selected caregiver practices. The application uses that information to provide the supervisor with appropriate observation questions.

We developed the workflows in this guidance package using an adapted version of the Business Process Modeling Notation (BPMN) 2.0. Table 3 below contains a description of the symbols used in the workflow diagrams. Each workflow has a set of annotations following the diagram that describes additional details for the task or event. Note that not every task has an annotation.

Table 3. BPMN 2.0 Symbols

	Each individual or type of end user enters a **swimlane**, a designated area for noting the activities performed by or expected from that specific actor. For example, the health worker may have one swimlane; the child would be classified in another swimlane.
	A **pool** consists of multiple swimlanes that depict all individuals or types of end users who are involved in carrying out the business process or workflow.
	A **start or trigger** event defines the beginning of the business process.
	**End** event: The workflow diagram should contain an end event, which defines the completion of the business process. There can be multiple end events depicted across multiple swimlanes in a business process diagram. However, for diagram clarity, there should be only one end event per swimlane.
	**Activity, process, step, or task**: Each activity should start with a verb (e.g., "Register client," "Measure and record weight"). Between the start and end of a business process, there should be a series of activities noting the successive actions performed by the actor for that swimlane.
	This is the **decision symbol** in BPMN convention. It depicts a conditional operation that dictates which direction the data or process will take. There should be only Yes/No or True/False decisions made here.
	**Throw-link** indicates that the current process continues on another page or in another workflow. It is associated with a catch-link at the beginning of the next page or workflow.
	**Catch-link** indicates resuming a process cut off due to page constraints that resumes in another workflow. A catch-link is associated with a throw-link.
	An **activity, process, step, or task that uses a set of business rules or decision logic**. See **Annex 4**.

Data Elements and Indicators

Data Elements

A data element describes each variable that the digital tools capture. Health workers record data elements throughout each business process and used to inform decision logic and create indicators. **Annex 2: Core Data Dictionary** presents the data elements collected and used by the digital GMP tools. They are grouped by the business process with which they are primarily associated. Illustrative data elements in each GMP business process include the following:

- **Setup:** date of the GMP visit, location of the GMP visit, types of scale(s) available and functional, height/length board available and functional, MUAC tape available and functional
- **Registration:** primary caregiver's name, phone number, address, date of birth, age, and unique ID; child's name, unique ID, date of birth, age, sex, address, birth weight, size at birth, length at birth, head circumference at birth, gestational age at birth, whether child is a multiple, birth order, birth spacing, previous diagnoses of malnutrition, and visit ID
- **Assessment of Nutritional Status and Growth:** presence of bilateral pitting edema in both feet, location of other bilateral pitting edema present, grade level of bilateral pitting edema, diagnosis of severe wasting based on bilateral pitting edema, clinical signs of wasting, MUAC, weight, height/length, WHZ, BMI-for-age z-score, height-for-age z-score (HAZ), WAZ, classifications of z-scores, diagnosis of severe wasting based on z-scores, determination that urgent referral is required based on nutritional status, description of growth charts, determination of whether growth is normal or indicates possible problem, indication of whether counseling will be provided, date and time of the next GMP visit (if not providing counseling)
- **Counseling:** questions and concerns regarding child's and caregiver's well-being, information on prior recent illness, breastfeeding status and practices, feeding status and practices, physical activity, handwashing practices, responsive care practices, counseling topics covered, goals set, indication of whether treatment and/or referral will be provided, date and time of next GMP visit (if not providing treatment or referral)
- **Referral:** reasons for referral, referral facility, reasons for treatment, treatment the health worker will provide, indication of whether the health worker will provide treatment and/or referral, date and time of next GMP visit
- **Supervisory Visit:** date and location of supervisory visit, health worker ID, indication of scale available and functional, indication of height/length board available and functional, indication of MUAC tape available and functional, indication of correct registration procedures being followed, indication of correct assessment of nutritional status and growth procedures being followed, indication of correct counseling procedures being followed, indication of correct referral procedures being followed

Additional information regarding data elements is described in the "Read Me" tab of **Annex 2: Core Data Dictionary**.

Indicators

Data elements collected by the digital GMP tools can be used to calculate real-time outcome and process indicators, which, in turn, supervisors, managers, and policymakers can use for reporting and use at the facility, subnational, and national levels.

In collaboration with WHO, UNICEF has compiled a set of resources and guidance related to nutrition information systems and data, which include National Nutrition Information Systems Guidance (UNICEF

and WHO 2021), Recommendations for Data Collection, Analysis and Reporting on Anthropometric Indicators in Children Under Five Years Old (WHO and UNICEF 2019), a guidance document on the analysis and use of nutrition data from routine health information systems (forthcoming), and a District Health Information System (DHIS2) Standard Nutrition Module (UNICEF and WHO 2023). The nutrition module, like other DHIS2 metadata packages, provides implementers with pre-configured, installable files that practitioners can download and install on new or existing DHIS2 information systems.

This guidance package includes indicators from the aforementioned list of maternal and child nutrition indicators that practitioners can calculate using the data collected with the DTDS GMP tools (see **Annex 3: Illustrative Indicator Tables**). Program managers and/or the software development teams can integrate data on these and other indicators from the DTDS GMP tools into routine data monitoring reports and produced on a monthly or quarterly basis, in alignment with the program's monitoring and reporting schedule. If program managers and/or the software development teams wish to have data from the DTDS tool for GMP feed directly into the national HMIS, they should ensure that these indicators, the operational definitions of them, and any associated codes also align with the national HMIS and other reporting requirements.

However, one of the benefits of using digital GMP tools is that managers, supervisors, health workers, and even community members can monitor any number of indicators included in the DTDS tools. Program managers and/or the software development teams may wish to track the percentage of health workers who set and record goals with caregivers, the frequency (or infrequency) of specific counseling topics being addressed, the percentage of children at least six months of age who eat (or do not eat) eggs and/or flesh foods, or even the percentage of previously ill children who were counseled on feeding after illness. Program managers at various levels and health workers could then use such information to improve service delivery or focus community events and social and behavior change campaigns.

Decision-Support Logic

Decision-support logic (DSL) and algorithms guide the end user through the delivery and/or supervision of GMP services, based on globally recognized clinical guidelines and training curricula from WHO and others. The application provides decision-support logic by using information previously entered into or calculated by the application (e.g., type of scale used, the child's WHZ, the child's breastfeeding status) to make decisions about the appropriate next steps in the delivery or supervision of GMP services. More specifically, the DSL uses tasks or triggers and inputs (i.e., the data inputted by the end user of the application) to determine specific outputs and required actions. For example, in the **Counseling Workflow**, certain answers to assessment questions trigger suggestions of topics the service provider can praise or discuss during counseling that are relevant to that child and caregiver. In the **Assessment of Nutritional Status and Growth Workflow**, the application uses decision-support logic to provide instructions for measuring a child's weight, based on the type of scale the health worker is using. The application uses the health worker's assessment to flag children who require an immediate referral (e.g., those with bilateral pitting edema, those with a WHZ < -2) or have a growth problem (e.g., those whose growth is stagnant or faltering, has sharply inclined or declined, or who are at risk of wasting or overweight).

Table 4 below provides a list of these decisions made throughout the GMP business processes. The decision logic tables follow the Object Management Group's Decision Model and Notation document, which is an industry standard for modeling decision logic (2023). Table 5 below depicts the decision logic table template and **Annex 4: Decision Logic** contains the decision logic tables for GMP service delivery. Each decision logic table is referenced in a specific task in the Business Process Workflows (**Annex 1: Business Process Workflows**).

Table 4. Decision Logic Overview

Task (Trigger)	Decision-Support Table (DT) ID	Description (Business Rule)
Step 1.2: Select Scale Type	DT.PR.01	The application provides the health worker with instructions for setting up the scale based on the type of scale(s) the health worker will use.
Step 3.2: Assess Child for Bilateral Pitting Edema	DT.GM.01	The application classifies the child's severity of bilateral pitting edema based on the health worker's assessment and notifies the health worker.
	DT.GM.02	The application determines whether the child needs immediate referral or treatment because of bilateral pitting edema.
Step 3.5: Measure and Record Weight	DT.GM.03	The application provides the health worker with instructions for weighing the child based on the type of scale the health worker will use and the child's ability to stand independently.
Step 3.8: Measure and Record Height/Length	DT.GM.04	The application provides the health worker with instructions for measuring the height/length of the child based on the type of measurement instrument the health worker will use and the child's age.
Step 3.9: Categorize Nutritional Status	DT.GM.05	The application classifies the child's nutritional status based on the child's weight-for-height z-score and notifies the health worker.
	DT.GM.06	The application classifies the child's nutritional status based on the child's BMI-for-age z-score and notifies the health worker.
	DT.GM.07	The application classifies the child's nutritional status based on the child's mid-upper arm circumference and notifies the health worker.
	DT.GM.08	The application classifies the child's nutritional status based on the child's weight-for-age z-score and notifies the health worker.
	DT.GM.09	The application determines whether the child needs immediate referral or treatment based on current nutritional status and notifies the health worker.
Step 3.11: Describe Growth Charts	DT.GM.10	For children who do not require immediate referral, the application determines whether the child is growing well or has a possible growth problem and notifies the health worker.
Step 4.4: Praise Caregiver	DT.CN.01	The application provides the health worker with a list of behaviors for the health worker to take into consideration when praising the caregiver.
Step 4.5: Review Responses	DT.CN.02	The application provides the health worker with a list of characteristics, behaviors, questions, and concerns identified during the assessments to consider discussing with the caregiver.

Task (Trigger)	Decision-Support Table (DT) ID	Description (Business Rule)
Step 4.6: Counsel Caregiver	DT.CN.03	The application provides the health worker with a list of counseling topics, using the list found in **Annex 6**, based on characteristics, behaviors, questions, and concerns identified during the assessments for the health worker to take into consideration when counseling the caregiver.

Sources: Cashin and Oot 2018; WHO 2008a

Table 5. Decision Table Template*

Decision ID	**The Decision Identification (ID) corresponds with the number in Table 4. Decision Logic Overview.**			
Business Rule	**The description of the decision made based on IF/THEN statements with the appropriate data element name for the variables. The rule should demonstrate the relationship between the input variables and the expected outputs and actions in the decision support logic (e.g., if a child's WHZ is < -3, the application notifies the health worker that the child is severely wasted and will need immediate treatment or referral for treatment).**			
Trigger	**The event that would indicate when this decision support logic should appear in the workflow, such as the activity that would trigger this decision to be made.**			
Inputs		**Output**	**Action**	**Annotations**
These are the variables or conditions that health workers need to input for the system to help determine the consequent actions or outputs. They are often phrased as an **"IF"** statement. Examples of an input may include the child's age.	If there are multiple conditions to consider at the same time (e.g., "**IF x AND y**"), the additional inputs are recorded in separate columns. All conditions need to be in place at the same time for the resulting output. An example of an additional condition could be whether the child is exclusively breastfeeding.	The resulting action or decision based on the combination of input entries. This statement follows the **"THEN"** statement. An example of an output could be a determination of whether the practice is or is not ideal, depending on the child's age.	Concrete measures to take based on the output. In some cases, output and action may be the same. In this case, the application may notify the health worker of this determination about the child's breastfeeding status.	Additional explanations or descriptions, including possible pop-up alert messages and relevant background information. This section can also include the written content that would appear in the pop-up messages notifying the health worker about the appropriate next steps, which may include counseling, case management approach, or referral.

Decision ID	**The Decision Identification (ID) corresponds with the number in Table 4. Decision Logic Overview.**
Business Rule	**The description of the decision made based on IF/THEN statements with the appropriate data element name for the variables. The rule should demonstrate the relationship between the input variables and the expected outputs and actions in the decision support logic (e.g., if a child's WHZ is < -3, the application notifies the health worker that the child is severely wasted and will need immediate treatment or referral for treatment).**
Trigger	**The event that would indicate when this decision support logic should appear in the workflow, such as the activity that would trigger this decision to be made.**

Inputs		**Output**	**Action**	**Annotations**
Inputs placed on different rows are **"OR"** conditions that can be considered independently of the inputs in other rows.				

*This decision-logic template is adapted from WHO 2020

Data Use

Although the DTDS tools described in this guidance package are for health workers and their supervisors, first and foremost, they also facilitate the recording, collection, aggregating, and reporting of a wide range of indicators that can be useful to a wide range of stakeholders at various levels. This section provides suggestions for how to use data from a DTDS tool for GMP to support robust program monitoring and high-quality supervision. As you consider how data are aggregated and used, it would be worth considering the following resources:

- UNICEF's Guidance on National Nutrition Information Systems: The Fundamental Series, Modules 1–5 (2021b)
- UNICEF and WHO's DHIS2 Standard Nutrition Module (Nutrition Aggregate Package) (2023)
- WHO's Analysis and Use of Health Facility Data: Guidance for Reproductive, Maternal, Newborn, Child, and Adolescent Health Programme Managers (2019a)
- WHO and UNICEF's Indicators for Assessing Infant and Young Child Feeding Practices: Definitions and Measurement Methods (2021a)

Monitoring Thresholds and Targets

Program managers at various levels as well as health workers can compare data against thresholds (table 6) and use it to alert local health authorities if rates reach a certain level (e.g., high, very high). They may also wish to use this information to target prevention activities before rates reach "high" and "very high" levels of concern. In addition, they could design reports to track program performance targets.

Table 6. WHO Public Health Prevalence Thresholds

Anthropometric Indicator	Prevalence Thresholds (%)			
	Very Low	Medium	High	Very High
Stunting: Percentage of children ages 0–59 months (height-for-age < -2 z-score)	< 2.5	10–< 20	20–29	≥ 30
Wasting: Percentage of children ages 0–59 months (weight-for-height < -2 z-score)	< 2.5	5–< 10	10–14	≥ 15
Overweight: Percentage of children ages 0–59 months (weight-for-height > +2 z-score)	< 2.5	5–< 10	10–14	≥ 15
	Public Health Significance Level (%)			
	Low	Medium	High	Very High
Percentage of adults with low BMI (< 18.5)	5–9	10–19	20–39	≥ 40
	Public Health Trigger Point for Action (%)			
Percentage of newborns with low birthweight (< 2,500 grams)	≥ 15			

Source: de Onis et al. 2018

Ensuring the Quality of GMP Services

Digital tools significantly increase the amount of data available that can be used to monitor program processes. Program managers, supervisors, health workers, and even community members may wish to review key indicators from a DTDS tool for GMP services to ensure the quality of care. This may include process indicators on counseling topics covered or outcome measures on IYCF practices or growth. Program managers and/or software development teams may wish to develop several dashboards with indicators that may be of interest to a range of stakeholders at various levels.

Planning Supervisory Visits

Supervisors can also use the indicators for monitoring described above to plan supervision visits. For example, if a supervisor notices a decline in the number of children attending GMP sessions at a specific health facility, she/he may plan a supervisory visit to the health facility to investigate and address the cause of this decline. Alternatively, if the supervisor notices that the number of children health workers are referring has increased dramatically at one program site, or a specific service provider skips many questions about child feeding, the supervisor may plan a visit, paying particular attention to these aspects of services delivered.

If a supervisor notices that few caregivers are reportedly feeding their children animal-source foods compared to previous months, supervisors and program managers can investigate whether this is an error in data entry/reporting. If it is not a data entry error, such findings may indicate a more serious problem related to food insecurity and trigger an action, such as linking that site to additional services.

Identifying Areas in Need of Improvement

Supervisors and other program managers can use data from supervisory visits to monitor the performance of individual service providers and GMP program sites, and subsequently, supervisors can provide tailored feedback and performance improvement plans to service providers and/or program sites. For example, if a health worker is consistently misinterpreting growth monitoring charts (e.g.,

selecting the wrong interpretation based on the generated chart), the supervisor can support the health worker to improve this specific skill.

Informing National Priorities, Policies, and Programs

Program managers can use nutrition data from routine information systems to support many aspects of nutrition programming, including prioritizing; policies, strategies, and plans; planning processes; resource mobilization; budgeting; implementation; quality improvement; monitoring and evaluation; advocacy; and emergencies (UNICEF and WHO 2021).

The data from a DTDS tool for GMP can also aid decision-making processes to strengthen GMP programming activities. Indicators such as the percentage of children assessed for clinical signs of wasting, the percentage of children who consumed sweets the previous day, or the percentage of children 12–23 months old who are still being breastfed can help health workers improve the quality of care or to design community-based programs.

Glossary

For the purposes of this guidance package, we define key terms as follows:

Accuracy or correctness of measurements and other assessments of nutritional status depend on whether the equipment is in good working order, scales are correctly calibrated, and health workers measure or assess correctly (i.e., takes, reads, and records the measurement correctly) (WHO 2008a).

Acute malnutrition is a term that has been used somewhat interchangeably with terms such as wasting, thinness, and/or bilateral pitting edema (Cashin and Oot 2018).

Anthropometry is the measurement of the human body. The measurement of weight, height/length, and MUAC are the most common measurements used to assess the nutritional status of children (Cashin and Oot 2018).

Bilateral pitting edema is swelling due to excess fluid retention in the both feet/ankles. This indicates acute malnutrition due in particular to a lack of protein. Edema or swelling in the lower legs, hands, lower arms, and face indicates more severe bilateral pitting edema (Cashin and Oot 2018).

BMI or body mass index is a number that indicates a person's weight in proportion to height/length. It is calculated as kilogram (kg)/meter $(m)^2$ (WHO 2021e).

BMI-for-age is used to assess growth by comparing a child's BMI with the ideal BMI of children of the same age. BMI-for-age is used to determine whether a child is wasted or has acute malnutrition. It can also be used to determine whether a child is overweight or obese (WHO 2008a).

Business analysts serve as the interface between GMP content experts and software development teams. They are responsible for translating health-system processes and guidance documents for use in digital systems.

Calibrate means to check and adjust a measuring instrument (Cashin and Oot 2018).

Caregiver is used instead of "mother" in recognition of the fact that other family members—fathers, grandmothers, aunts, siblings—may take the child to the GMP session and that these family members play an important role in caring for, feeding, cleaning, responding to, stimulating, and nurturing young children. Indeed, the Participant Materials document included in UNICEF's *Community IYCF Counselling Package* (2012) makes numerous references to fathers and other caregivers and the *Infant and Young Child Feeding Counselling: An Integrated Course* (2021b; 2021c; 2021d; and 2021e) produced by WHO and UNICEF frequency refers to "mothers and caregivers" or "mothers/caregivers/families."

Child refers to the individual whose nutritional status and growth are assessed and about whom the caregiver is asked to describe care practices. Although the age of children eligible for GMP services will vary by country, we assume that health facilities provide GMP services to children 0–59 months, with an emphasis on children 0–23 months of age.

Gestational age is the amount of time between conception and birth. It is the term commonly used to describe how far along the pregnancy is. It is typically measured and reported in weeks, from the first day of the woman's last menstrual cycle to the current date. A normal pregnancy can range from 38 to 42 weeks (National Library of Medicine 2021). A full-term birth is one occurring after 37–41 completed weeks of pregnancy. A pre-term birth is early (i.e., before 37 weeks). A post-term birth is late (i.e., at or after 42 weeks) (WHO 2008a).

Growth refers to the change in a child's weight and/or height/length over time. It requires more than one measurement. It involves comparing the change in nutritional status or growth with ideal growth standards. Growth is typically plotted on a standardized growth chart (Mangasaryan, Arabi, and Schultink 2011; WHO 2008a).

Growth assessment refers to the measurement of a child's weight and/or height/length in comparison with the standard expected of a well-nourished child of the same age, sex, and height/length (i.e., weight-for-height) (WHO 2008a).

Growth monitoring involves regularly assessing a child's weight and/or height/length in comparison with a growth standard and previous measurements of the child's weight and/or height (Mangasaryan, Arabi, and Schultink 2011).

Growth standards are how healthy children grow under ideal circumstances. WHO's growth standards, which we recommend using, were developed using data collected from approximately 8,500 children from widely different ethnic backgrounds and cultural settings as part of the WHO Multicentre Growth Reference Study (WHO n.d.[h]; Cashin and Oot 2018).

Health facility is the term used in this guidance package to refer to any type of facility where health workers provide GMP services. This may include, but is not limited to, clinics, hospitals, and other health service points (e.g., health posts).

Health informatics is the use of biomedical data, information, and knowledge for scientific inquiry, problem-solving, and decision-making for improving health.

Health worker, health care worker, or service provider is defined as any person "engaged in actions whose primary intent is to enhance health." This term is not restricted to paid professionals (WHO 2006a). A wide range of health workers may deliver GMP services depending on the country, available human resources, and the location/type of health facility where they provide services. The **User Personas** section describes the primary types of health workers who may delivery GMP services in greater detail.

Height/length-for-age is a growth indicator that relates height/length (height for children two years of age and older; length for children less than two years of age) to age. It is used to measure stunting. It is primarily used at the population level. It is rarely used for treatment or diagnosis (Cashin and Oot 2018).

MUAC is used to determine whether a child is wasted or has acute malnutrition (FANTA 2018).

Nutrition assessment: Like growth assessment, nutrition assessment involves collecting detailed information through anthropometric, biochemical, clinical, and dietary assessments to identify specific nutrition problems (Cashin and Oot 2018).

Nutritional edema is another term used to refer to bilateral pitting edema that is due to malnutrition (Cashin and Oot 2018).

Nutritional status is determined based on the measurement of anthropometry—primarily height, weight/length, and MUAC—and the calculation of the corresponding z scores by comparing them with standard growth curves (Cashin and Oot 2018).

Promotion as it relates to growth monitoring has not been well defined. There has been no concrete agreed-on set of interventions or activities that define promotion. In this document, we use the term to refer to counseling tailored to the child/caregiver based on the GM results and problem-solving with caregivers. Problem-solving involves assessing concerns, questions, and practices (IYCF, hygiene, and responsive care and early learning) to identify possible causes for growth problems; praising what the caregiver is doing well; agreeing with the caregiver on small, doable actions to try; and referring the child/caregiver for additional services, if necessary (GFF and the Manoff Group 2020; Mangasaryan, Arabi, and Schultink 2011).

Overweight means that a person weighs too much for one's height/length. Among children, it is defined as having a weight-for-height/length or BMI-for-age z-score that is above the 2 z-score line.

Recumbent means lying down (WHO 2008a).

Stunted means that a child is short for their age when compared to growth standards obtained from a healthy reference population (or you could say, when compared to WHO growth standards). It is defined as having a height/length-for-age z-score that is less than -2. Severely stunted is defined as a z-score less than -3. Stunting can result from inadequate nutrition during gestation, poor living conditions, chronic undernutrition, or a combination of these (WHO and UNICEF 2019).

Tare refers to setting a scale to zero (WHO 2008a).

Taring scale is a type of scale that allows you to set the scale to zero while an adult is still standing on it. This way, when the health worker gives the caregiver a child to hold, only the child's weight appears (Cashin and Oot 2018).

Undernutrition refers to acute shortage of nutrients resulting in wasting, thinness, and/or bilateral pitting edema) and chronically deficient nutrient intake that may result in stunting and micronutrient deficiencies undernutrition (e.g., deficiencies in vitamin A, iodine, iron, and zinc) (Cashin and Oot 2018).

Underweight means that a person is thin or weighs too little for one's age in comparison with growth standards. It is defined as having a WAZ that is below the -2 z-score line. Severely underweight is below the -3 z-score line (Cashin and Oot 2018).

UNISCALE is a type of electronic scale made by UNICEF that allows tared weighing (Cashin and Oot 2018).

Wasted refers to a person who weighs too little for one's height/length in comparison with growth standards. It is defined as having a weight-for-height/length or BMI-for-age z-score that is below the -2 z-score line. Severely wasted is below the -3 z-score line (Cashin and Oot 2018).

Weight-for-age is a growth indicator that relates weight to age. It is used to measure underweight. It may reflect wasting, stunting, or both (Cashin and Oot 2018).

Weight-for-height/length is a growth indicator that relates weight to height (for children ages two years and older) or length (for children less than two years old). It is used to determine whether a child is wasted or has acute malnutrition. It is also used to determine whether a child is overweight or obese (Cashin and Oot 2018).

Z-scores indicate how far and in what direction an individual's anthropometric measurement deviates from the median of the reference population; it is expressed in standard deviations (Cashin and Oot 2018).

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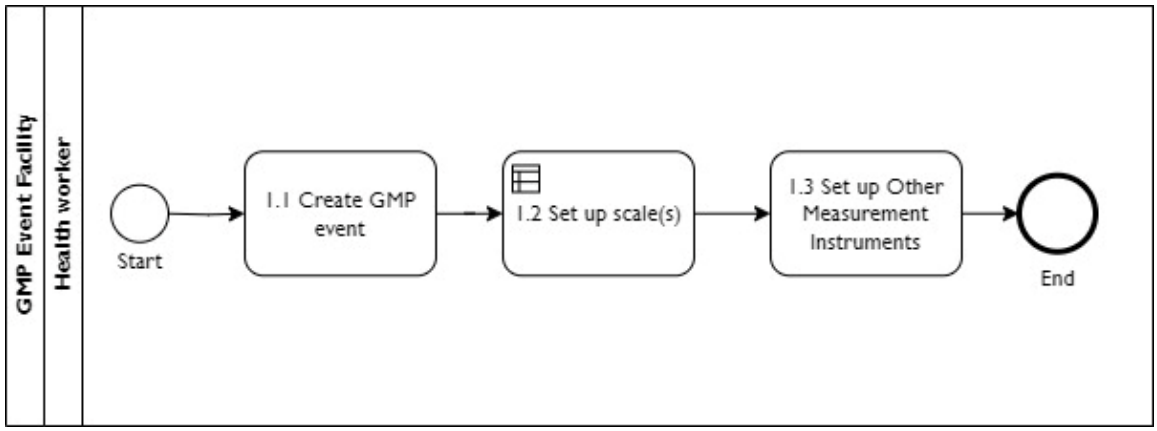
Annex 1. Business Process Workflows

READ ME

- Each business process workflow is followed by annotations that provide more details about the activities or tasks, and references to the relevant decision logic. Not all activities or tasks in the workflows have additional annotations.
- The business process workflow template was adapted from WHO's DAKs (WHO 2021c, WHO 2021d, and WHO 2022).

Setup

Figure 1. Setup Workflow



Annotations and Notes

General Notes: This workflow is optional and depends on national protocols about the frequency of setting up equipment. We suggest following this workflow at least once daily when opening the application for the first time. A GMP "event" may be a special day designated for the delivery of GMP services or it may take place during a child's routine health facility visit.

1.1 Create GMP Event

- The health worker opens the DTDS tool for GMP.
- The application prompts the health worker to record the date of the GMP event. The date will be the visit date associated with each client visit created that day.
- The application prompts the health worker to select the location where the GMP event is taking place. The event location will be the location of visits conducted that day. The GMP event may take place in a health facility or in some other location.

1.2 Set Up Scale(s)

- The application reminds the health worker to calibrate all scales periodically.
- The application asks whether the health worker would like instructions on how to calibrate the scale. If the health worker selects "yes," a **pop-up** will appear with the following information:

Annex 2. Core Data Dictionary

Digital Guidance Package for Growth Monitoring and Promotion: Core Data Dictionary

Tabs	Description
READ ME	Describes how to read the data dictionary and provides important notes before beginning
GMP.1.Setup	Data elements for the Setup of Scales and Height/Length Boards workflow
GMP.2.Registration	Data elements for the Registration workflow
GMP.3.Assessment	Data elements for the Assessment of Nutritional Status and Growth workflow
GMP.4.Counseling	Data elements for the Counseling workflow
GMP.5.Referral	Data elements for the Referral workflow
GMP.6.Supervision	Data elements for the Supervision workflow

Annex 3. Illustrative Indicator Tables

Digital Guidance Package for Growth Monitoring and Promotion: Illustrative Indicators Table

Column	Description
Indicator code	Sequential numbering of the indicator
Indicator name	Brief name of the indicator
Definition	This is a narrative description of the indicator to provide additional context.
Numerator definition	The description of numerator used to calculate the indicator.
Numerator computation	The calculation or how to derive this numerator. Any specific data elements noted here should align directly with the individual-level Data Element Code.
Denominator definition	The description of denominator used to calculate the indicator.
Denominator computation	The calculation or how to derive this numerator. Any specific data elements noted here should align directly with the individual-level Data Element Code.
Disaggregations	Are there any disaggregations that you would like to be able to do to conduct the necessary analysis?
References	If there are any national or global guidelines (e.g., WHO guidelines) that dictate how and why this indicator should be calculated or reported, note it here. If any guidelines or recommendations change, having a clear reference listed would help in updating or restructuring your data.

Key Assumptions for the Illustrative Indicators Table:

• Indicators are being prepared for a specific visit location and specified time period. Therefore, each numerator and denomintor should be counted within that time period at that location.

• Most indicators are calculated by counting the unique identifiers of the child. If a child has multiple visits in one month, the program will need to decide the best way to decide which visit they will use for the preparation of the report.

• Key data elements are required according to the data dictionary; however, there should be checks for null values when calcuating these numerators and denominators and the program should decide how to handle null values in calculations.

• For most of the indicators, the referenced UNICEF and WHO (n.d.) *Analysis and Use of Nutrition Data from Routine Health Information Systems: Guidance for Nutrition Programme Managers* has proposed two indicators—one for services provided in a health facility and another for services provided by a CHW (in the community). We have not included a data element for this type of disaggregation; however, this could be added and/or determined based on the visit_location.

Indicator table template adapted from WHO's DAKs (WHO 2021c, WHO 2021d, and WHO 2022).

Annex 4. Decision Logic

READ ME

- Much of the decision-support logic included here is based on WHO's *Training Course on Child Growth Assessment* (2008a), FANTA's *Guide to Anthropometry: A Practical Tool for Program Planners, Managers, and Implementers* (Cashin and Oot 2018), and other documents mentioned in the **Interventions and Recommendations** section **(main document)**. However, you may need to adjust actions and annotations included in these decision-support logic tables to local context. Review them with in-country experts in GMP and nutrition and key stakeholders (policymakers, program managers, and health workers) to ensure that they reflect country policies, protocols, operational guidelines, services, and programs. For example, in-country experts should first assess the categorization of nutritional status and the corresponding decisions about the health worker's response to ensure alignment with local context and policies.

- Adaptations or revisions made to the **Business Process Workflows** (**Annex 1**) or **Data Dictionary** (**Annex 2**) may require updating the decision-support logic. Likewise, revisions to these decision-support logic tables may require revisions to the **Business Process Workflows** and the **Data Dictionary** annexes.

- Consider any changes to the DSL carefully because an embedded decision-support system can greatly affect quality of care at the point of care. As helpful as decision-support logic can be to the health worker, incorrect decision-support logic can also be detrimental. Therefore, in-country experts in GMP and nutrition and key stakeholders should review the DSL to ensure that it aligns with country policies, programs, and services. Likewise, in-country experts and key stakeholders should carefully review any new DSL introduced during the software development.

- Some of the annotations include a data element name in brackets (e.g., Child has [Data_element]). This indicates that the data element value should be retrieved and inserted in the sentence.

- Throughout these DSL tables, we have included suggestions for additional information, instruction, or guidance that could be added as desired by in-country experts and key stakeholders. In the annotations column, we indicate where these could be accessed by the health worker with a statement such as, "Read more information on how to set up a hanging scale." We preface the additional text with the header, "FOR POP-UP WINDOW".

- The DSL table template was adapted from WHO's DAKs (WHO 2021c, WHO 2021d, and WHO 2022).

Annex 5. Additional Resources

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Annex 6. Generic Counseling Cards/Topics

Title of Counseling Card, by Category	Source*					
	CMAM (FANTA 2018)	MAMI (ENN 2021)	C-IYCF (UNICEF 2012)	RCEL Addendum (USAID Advancing Nutrition 2021)	Child Growth Assessment (WHO 2008a)	IYCF Counseling (WHO and UNICEF 2021b)
Maternal and Caregiver Health and Nutrition						
Nutrition for pregnant and breastfeeding women		X	X			
Delivery in facility			X			
Family planning		X	X			
Excessive crying and lack of sleep		X				
Relaxation		X				
Family and partner support to the caregiver		X		X		
Community support		X				
Child Health and Nutrition Services						
Regular growth monitoring and promotion			X			X
When to bring your child to the health facility	X		X			

Title of Counseling Card, by Category	Source*					
	CMAM (FANTA 2018)	MAMI (ENN 2021)	C-IYCF (UNICEF 2012)	RCEL Addendum (USAID Advancing Nutrition 2021)	Child Growth Assessment (WHO 2008a)	IYCF Counseling (WHO and UNICEF 2021b)
Monitoring child development				X		
Breastfeeding						
Early skin-to-skin contact						X
Good breastfeeding positioning and attachment		X	X			X
Effective suckling		X				
Exclusive breastfeeding during the first six months		X	X		X	X
Breastfeeding on demand, both day and night (eight to 12 times)		X	X		X	X
Breastfeeding Challenges						
"Not enough" breastmilk		X				
Mother lacks confidence to breastfeed		X				
Breast condition: breast engorgement		X				
Breast condition: sore or cracked nipples		X				

Title of Counseling Card, by Category	Source*					
	CMAM (FANTA 2018)	MAMI (ENN 2021)	C-IYCF (UNICEF 2012)	RCEL Addendum (USAID Advancing Nutrition 2021)	Child Growth Assessment (WHO 2008a)	IYCF Counseling (WHO and UNICEF 2021b)
Breast condition: plugged ducts and mastitis		X				
Breast condition: flat, inverted, large, or long nipples		X				
Oral thrush infant and maternal nipple thrush		X				
Relactation		X				
Feeding breast milk when separated from your baby		X	X			X
Breast milk expression and storage		X	X			X
How to heat-treat breast milk						X
Cup feeding		X	X			X
Breastfeeding if living with HIV			X			X
Replacement Feeding						
Conditions needed to avoid all breastfeeding			X			
Non-breastfeeding infants		X				

Title of Counseling Card, by Category	Source*					
	CMAM (FANTA 2018)	MAMI (ENN 2021)	C-IYCF (UNICEF 2012)	RCEL Addendum (USAID Advancing Nutrition 2021)	Child Growth Assessment (WHO 2008a)	IYCF Counseling (WHO and UNICEF 2021b)
Conditions needed for safe use of replacement feeding						X
Use of infant formula		X				
Preparing infant formula		X				
Complementary Feeding						
Start complementary feeding at six months of age		X	X			X
Feeding of non-breastfed children from six up to 24 months			X			X
Complementary feeding of children from six up to nine months			X		X	X
Complementary feeding of children from nine up to 12 months			X		X	X
Complementary feeding of children from 12 up to 24 months			X		X	X
Feeding of children from two to five years					X	
Recommended foods for babies and children ages six months to five years					X	

Title of Counseling Card, by Category	Source*					
	CMAM (FANTA 2018)	MAMI (ENN 2021)	C-IYCF (UNICEF 2012)	RCEL Addendum (USAID Advancing Nutrition 2021)	Child Growth Assessment (WHO 2008a)	IYCF Counseling (WHO and UNICEF 2021b)
Food variety			X			X
How to add micronutrient powder (MNP) to complementary foods			X			X
Feeding the Sick Child						
Feeding recommendations: When a child is sick					X	
Feeding the sick baby under six months of age			X			
Feeding the sick child older than six months of age			X			X
Special Circumstances						
Adolescent mother		X				
Multiple births		X				
Feeding difficulties				X		
Supporting children with disabilities to engage in play and learning				X		
Healthy eating practices in the context of the double burden**						

Title of Counseling Card, by Category	Source*					
	CMAM (FANTA 2018)	MAMI (ENN 2021)	C-IYCF (UNICEF 2012)	RCEL Addendum (USAID Advancing Nutrition 2021)	Child Growth Assessment (WHO 2008a)	IYCF Counseling (WHO and UNICEF 2021b)
Importance of physical activity in the context of the double burden**						
How to feed ready-to-use therapeutic food to the child	X					
Low weight infant; feeding a low birth-weight baby		X	X			X
Satisfactory slow weight gain		X				
Mother or infant has suspected or confirmed COVID-19		X				
Mother tested positive for HIV		X				
When special care or advice may be needed					X	
Responsive Care and Early Learning (RCEL)						
Responsive care/nurturing care		X		X		
Responsive feeding				X		
Communication				X		
Play				X		

Title of Counseling Card, by Category	Source*					
	CMAM (FANTA 2018)	MAMI (ENN 2021)	C-IYCF (UNICEF 2012)	RCEL Addendum (USAID Advancing Nutrition 2021)	Child Growth Assessment (WHO 2008a)	IYCF Counseling (WHO and UNICEF 2021b)
Care for development: All ages					X	
Care for development: Ages zero to four months					X	
Care for development: Ages four to six months					X	
Care for development: Ages six months to one year					X	
Care for development: Ages one to two years					X	
Care for development: Age two years and older					X	
Water, Sanitation, and Hygiene (WASH)						
Handwashing and good hygiene (cleanliness) practices to prevent disease			X			X
Recommendations for safe food preparation and hygiene					X	

* Although not listed here, the following resources also have relevant content: Guyon et al. 2015; WHO and UNICEF 2015a; WHO and UNICEF 2015b; and WHO and UNICEF 2011.

** We were not able to identify global generic counseling cards related to this topic. It would be worth reviewing WHO resources, such as the following: https://www.who.int/news-room/fact-sheets/detail/healthy-diet.

Annex 7. Adaptations

During the development process, the program manager and/or software development team should consult extensively with key stakeholders and end users to adapt the generic DTDS tools described in this guidance package. Throughout the document, we have noted areas that will need specific attention for adaptation. The following table is a list of possible adaptations that program managers and/or software development teams should consider. It is important to note that any adaptations made to workflows, the data dictionary, or decision logic should be made carefully, considering how they impact other components of the guidance package because they are all intertwined.

Table 7. Possible Areas for Adaptation of Guidance Package Content

Possible Area of Adaptation Needed	Applicable Workflow	Detailed Description
Setup workflow	Setup of scales and height/length boards	The generic setup workflow may not be applicable depending on how GMP is structured. For example, if countries integrate GMP into other services, it may not make sense to have a workflow in which the health worker only checks weighing scales and height/length board setup. Instead, the setup of equipment for integrated services may need to be broader.
Measurements used	Assessment of Nutritional Status and Growth	In the DTDS tool envisioned in this guidance package, measurement of height/length is contingent on the availability of a height/length board and, therefore, is optional. However, much of the decision logic (described in greater detail below) makes use of weight-for-height measurements. Where health workers do not measure height/length, program managers and/or software development teams will need to review and revise workflows and decision logic. This could be especially important where health workers conduct GMP in the community, at outreach clinics, or health posts.
Instructions provided during measurement	Assessment of Nutritional Status and Growth	Program managers and/or software development teams may also need to adapt weighing instructions in accordance with cultural norms about undressing. For example, add the following instructions from the Guide to Anthropometry: A Practical Tool for Program Planners, Managers, and Implementers (Cashin and Oot 2018) as a pop-up during weight measurement: ● Because of cultural preferences or climate, some parents/caregivers may not allow the health worker to measure the child without clothing. To accommodate this preference while maintaining accuracy, wrap the undressed child in a blanket while weighing them using a taring scale (discussed below) or weigh them wearing light clothing. The health worker can refer to a list of weights of common clothes to subtract from the weight. ● To use blankets and a taring scale: First ask the adult to stand on a scale with the blanket and tare the scale so that the weight of the blanket used to cover the child will not be included

Possible Area of Adaptation Needed	Applicable Workflow	Detailed Description
		when measuring the child's weight. Next, have the adult hold the child, wrapped in the blanket, while standing on the scale for measurement. To adjust for light clothing: Compile a list of the weights of common local clothes. Based on that list, estimate how much weight to subtract from the child's measured weight.
Measures for nutritional status and growth monitoring	Assessment of Nutritional Status and Growth	The guidance package includes the data elements and decision logic to use for both BMI-for-age z-scores and weight-for-height z-scores. Countries may opt to use one or the other depending on their national protocols for tracking nutritional status and growth.
Provision of counseling	Counseling	Based on extensive consultations with global GMP experts and country GMP programs, we decided that if the child's nutritional status does not require an immediate referral and if the child is growing well, the application will recommend that the health worker simply praise the caregiver for what they are doing well and schedule the child's next GMP visit. For all other children, the health worker will make the final decision regarding whether a child goes through the **Counseling Workflow**—this includes assessment of care practices to determine additional counseling, treatment, or referral that may be needed for any possible growth problems. We made this decision because many health workers do not have enough time to provide the "promotion" aspect of GMP. However, countries may decide to adapt who receives counseling, offer group counseling for children growing well, or some other alternative.
Counseling messages	Counseling	The guidance package includes decision logic to suggest counseling topics to the health worker. It will be important to align these topics with context-specific counseling messages. These counseling messages could include visual aids for health workers or provide built-in electronic counseling cards. In **Annex 5: Additional Resources**, we provide references of counseling cards and videos that program managers and/or software development teams may wish to use and/or adapt. It is important to consider whether the counseling topics suggest actions because health workers have noted it is sometimes difficult to determine next steps on their own.
Prioritization of counseling topics	Counseling	As indicated, the guidance package suggests counseling topics to the health worker based on the child's age, allowing health workers to decide which topics they will cover during counseling. This was partly by design because we want to empower health workers to make such decisions. It was also because there is no global guidance on how to prioritize counseling topics. However, as the evidence base grows, the research could develop prioritization guidelines that program managers

Possible Area of Adaptation Needed	Applicable Workflow	Detailed Description
		and/or software develop teams could convert into decision logic. In addition, if program managers find that the same topics are covered and other topics are not covered, countries may wish to build in more decision logic or add additional pop-up reminders.
Visit follow-up	Assessment of Nutritional Status and Growth, Counseling, Referral	If it is in accordance with the national protocol, the application can remind the health facility or health worker to follow up with the caregiver and child (by phone or during a home visit) before the next GMP visit and/or after a missed GMP visit.
Referral services and treatments	Referral	The options for referral and treatment in the workflows, data dictionary, and decision logic will need to be adapted based on national policy and context regarding the services that health workers can provide in the health facility and those that require a referral. The workflows, data dictionary, and decision logic for referrals will also need to be adapted based on national criteria for referral, such as z-scores and other signs of wasting.
Counter-referrals	Referral	If there is a system in the country for counter-referrals back to GMP, program managers and/or software development teams could include this option in the workflows.
Pop-up messages and instructions	All	Adapt instructions or messages for the health worker to the local context. We have included these reminders to improve the quality of counseling. However, health workers may find such reminders cumbersome and ultimately, may ignore them. Program managers and/or software development teams may need to shorten the messages based on implementation experience and what information the health worker needs from the tool. For example, the instructions for weighing scales or height/length boards may vary by brand and context, and may need to be adapted.
Supervision content	Supervision	We designed the **Supervision Workflow** in the guidance package to guide a supervisor through a visit observation. However, we acknowledge that there are other aspects of supervision that a digital tool could include, such as supervision planning, preparation, data use, and training. Without clear GMP supervision guidelines, we could not develop additional content. Countries may wish to make adaptations to include other processes as part of the supervision visit, such as— ● system analysis of the observations to suggest areas for improvement ● inclusion of resources for supervisors to coach health workers or give refresher training during supervision visits ● use of data collected and reported by the service delivery DTDS to identify health workers in need of supervision

Possible Area of Adaptation Needed	Applicable Workflow	Detailed Description
		• include tools for assessing client experience of services (client exit interviews).
Observation of counseling during supervision	Supervision	The counseling observation includes some, but not all, skills related to listening, learning, confidence-building, and giving support. In each context, the priority skills may vary. Priority skills may also change over time. Moreover, some of these skills can be broken down into smaller parts, if deemed necessary. It is important to adapt the counseling observation questions accordingly.
Measuring quality of care	Indicators table	We limited the table in **Annex 3: Illustrative Indicator Tables** to those indicators included in the UNICEF and WHO guidance on the analysis and use of nutrition data from routine health information systems (UNICEF and WHO n.d.). Countries may decide to develop additional indicators using data elements in the DTDS tools to meet national reporting requirements or to inform program decisions (e.g., measures of the quality of GMP services or specific caregiver practices).
Examples of foods	Counseling	Update examples of foods in each category of foods based on locally available and foods commonly consumed in the country. This can be done using the local Demographic and Health Survey.
Other context specific adaptations	All	Some additional areas for adaptation include— • instructions for filling out the health card used by the country • algorithms suggesting tentative dates for the next GMP session should be based on national protocols.
Internet connectivity	All	If internet connectivity is limited, developers will need to ensure that the DTDS tool can operate offline and sync later.
Digital hardware	All	If health facilities have computers, program managers and/or software development teams can design the DTDS tool for a screen wider than a tablet, or if health facility staff prefer using their own smartphones, secure logins and guidelines will need to be developed.
Digital literacy	All	If digital literacy of health workers and supervisors is low, program managers and/or software development teams must address this during development and roll-out of the DTDS tools.
Literacy of the health workers providing GMP services	All	If those who provide GMP services are low literacy volunteers in remote areas, program managers and/or software development teams may need to lower the expectations set in the DTDS tool for the scope of GMP services and modify the instructions and reminders.

Possible Area of Adaptation Needed	Applicable Workflow	Detailed Description
Time and workload	All	If workload is heavy, health workers' time for delivering GMP services will be limited and task-shifting and task-sharing may be more common or necessary. This is an important consideration during the adaptation process.

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Web: advancingnutrition.org

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USAID Advancing Nutrition is the Agency's flagship multi-sectoral nutrition project, addressing the root causes of malnutrition to save lives and enhance long-term health and development.

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