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CENTER FOR DIETARY ASSESSMENT

**SURVEY GUIDANCE DOCUMENT**

# **Recommended Specifications for Dietary Scales for Use in Quantitative 24-Hour Dietary Recall Surveys in Low- and Middle-Income Countries**

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## About *Intake*

*Intake* is a Center for Dietary Assessment that aims to strengthen policies and programs to improve nutritional status by increasing the availability, quality, comparability, and use of reliable dietary data in low- and middle-income countries (LMICs). We hope that the availability of valid, concise, effective diet-related metrics, along with *Intake* technical assistance for the planning, design, collection, analysis, and use of dietary data, can play an important role in helping actors in LMICs to develop evidence-based nutrition and agriculture policies and programs to ensure high-quality diets for all.

## User Feedback

At *Intake*, we aim to make our technical assistance tools, templates, and guidance materials as useful as possible. We therefore welcome input and feedback from users of our technical assistance documents, so that we can continue to improve the materials and the technical assistance we provide. If you have suggestions or feedback related to this document that you would like to share with *Intake*, please contact us via email at [feedback@intake.org](mailto:feedback@intake.org).

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# Introduction

*Intake* recommends the use of high-quality dietary scales in quantitative 24-hour dietary recall surveys in low- and middle-income countries (LMICs). High-quality scales are essential for accurately weighing foods and proxy materials<sup>1</sup> used to estimate the portion size of foods,<sup>2</sup> ingredients, and mixed dishes reported by respondents during 24-hour dietary recalls, as well as for obtaining the weight of ingredients and mixed dishes during standard recipe<sup>3</sup> data collection.

*Intake* recommends using electronic scales with a digital readout (referred to as “digital” scales) rather than mechanical scales because digital scales tend to be easier to use and offer better readability of the weight measurements.

Dietary scales must be sufficiently accurate<sup>4</sup> and precise<sup>5</sup> across the full range of weights expected to be encountered for foods, ingredients, and mixed dishes during the collection of survey data and standard recipe data. In addition, dietary scales must be sturdy enough to last for the duration of the survey without breakage or loss of accuracy or precision.

Investing in high-quality dietary scales for survey-related data collection in LMICs is well-justified given the high cost of designing, implementing, and analyzing a quantitative 24-hour dietary recall survey.

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<sup>1</sup> Proxy materials, such as playdough and dry rice, can be used to estimate the portion size of foods, ingredients, and mixed dishes.

<sup>2</sup> For simplicity in language, in this document, we use the term “foods” to refer to both foods and beverages.

<sup>3</sup> Standard recipes are “average” recipes that aim to reflect the way that mixed dishes are usually prepared by respondents in a survey area. Standard recipes can be used for mixed dishes that are known to be prepared similarly across a defined survey area and can also be used for mixed dishes prepared outside the home. When a mixed dish is reported by a respondent and a standard recipe is available for that mixed dish, the detailed information on the preparation of that mixed dish does not need to be collected uniquely from the respondent during the 24-hour dietary recall interview, as an average (standard) recipe for that mixed dish has already been compiled.

<sup>4</sup> The accuracy of a dietary scale refers to how close the weight measurement provided by the scale is to the true weight of the object.

<sup>5</sup> The precision of a dietary scale refers to how consistent weight measurements provided by the scale are when the same object is weighed multiple times.

# Recommended Specifications for Dietary Scales

The specifications that *Intake* recommends for scales used in dietary surveys in LMICs are provided in Table 1. The specifications recommended for the collection of standard recipe data are slightly different from the specifications recommended for the collection of 24-hour dietary recall data. In practice, however, the same type of scale is often used for both purposes.

Dietary scales used for collecting standard recipe data need to be able to weigh the entire quantity of a prepared mixed dish in the cooking pot; therefore, they require a large weighing platform with a maximum weight capacity ranging from 10 kg to 15 kg. Dietary scales used for collecting 24-hour dietary recall data with respondents need a maximum weight capacity of just 5 kg. However, if non-standard recipes<sup>6</sup> are being collected during the 24-hour dietary recall interview with survey respondents (which is typically the case), the larger capacity scale should ideally be used.

It is also essential that the scales used to collect 24-hour dietary recall data with survey respondents are extremely portable and able to withstand field conditions. Unfortunately, it can be difficult to identify a high-quality dietary scale that is both portable and durable, which also has a maximum weight capacity ranging from 10 kg to 15 kg. When selecting a suitable dietary scale, *Intake* recommends prioritizing portability, durability, and acceptable accuracy and precision over a higher maximum weight capacity.

**Table 1. Recommended Specifications for Dietary Scales for Use in Dietary Surveys**

	For Use During Standard Recipe Data Collection	For Use During 24-Hour Dietary Recall Data Collection
<b>Scale type</b>	Electronic scales with tare (zero) function	
<b>Maximum weight capacity</b>	10 kg to 15 kg	5 kg; if collecting non-standard recipes, 10 kg to 15 kg <sup>7</sup>
<b>Display increments</b>	Weighs to the nearest 1 gram	
<b>Precision</b>	Weighs at a precision of 1% (across load range)	
<b>Size of weighing platform</b>	Must accommodate cooking pots (at least 20 x 15 cm)	Must accommodate serving cups, plates, bowls. If collecting non-standard recipes, must accommodate cooking pots (at least 20 x 15 cm)
<b>Digital readout visibility</b>	Easy to read when cups, plates, bowls, and cooking pots are placed on the weighing platform	
<b>Portability</b>	Ideally weighing less than 2 kg	Ideally weighing less than 1 kg
<b>Durability and construction</b>	Must withstand frequent use and extremes of temperature, dust, wind, and moisture. Must withstand large, heavy, and hot cooking pots.	Must withstand frequent use and daily transport, as well as extremes of temperature, dust, wind, and moisture. If collecting non-standard recipes, must withstand large and heavy cooking pots.
<b>Batteries</b>	Must be battery-operated and the batteries required should be easily replaceable	
<b>Power adapters</b>	Should be used if power outlets are available	Should not be used at households during data collection
<b>Warranty</b>	A minimum of a two-year warranty should be purchased. The scale packaging material should provide manufacturer contact information and local service locations (when available) for repair and recalibration.	
<b>Certification</b>	Should be inspected and certified as to their accuracy (see details provided by the manufacturer).	
<b>Extra features</b>	Extra features (e.g., weight unit conversions and volume estimation) should be avoided, as these can cause confusion and errors if functions change unnoticed during data collection. <sup>8</sup>	

<sup>6</sup> A non-standard recipe is derived from data collection at the household, where the respondent (or the household cook of the mixed dish) provides the details of the mixed dish consumed by the respondent.

<sup>7</sup> In practice it may be difficult to procure a high-quality scale with a maximum weight capacity higher than 5 kg that performs robustly in field conditions (e.g., not sensitive to wind).

<sup>8</sup> Although these extra features are not desirable for scales used in dietary surveys, several high-quality scales include these extra features. It is acceptable for scales for use in dietary surveys to have these features, but field teams must be well-trained to check for and detect the incorrect use of these features.

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# Procurement of Dietary Scale Models that Meet Recommended Specifications

*Intake* has identified five dietary scale models produced by large-scale manufacturers that meet the specifications listed in Table 1. These scale models and their manufacturer-provided technical specifications are shown in Box 1. These dietary scales are only meant as examples of models that meet *Intake*'s recommended specifications; we recognize that there may be other suitable models available that also meet our recommended specifications.

*Intake* recommends the procurement of high-quality dietary scales through reputable procurement organizations to ensure the purchase of reliable, high-quality products. In some contexts, dietary scales will need to be ordered from outside the country where the survey will be carried out. International procurement can be complicated by longer than expected shipping time and delays at customs. This possibility should be accounted for in the timeline planned for any data collection that requires the use of dietary scales.

Often the choice of scale will be limited to models available through in-country providers. When selecting a model that meets the technical specifications, key characteristics to check for include:

- A maximum weight capacity of 10 kg to 15 kg (although a maximum weight capacity of 5 kg may be acceptable);
- A large weighing platform so that the digital readout is easily visible when weighing foods on large plates or pots;
- Portability and robustness (i.e., light to carry, small enough to slip easily in a backpack, and durable);
- Readily available battery type appropriate for the model of scale selected; and
- At least a two-year warranty from time of purchase (i.e., ideally covering the full duration of the planned data collection activities).

Before purchasing the full quantity of dietary scales needed for survey-related data collection activities, *Intake* recommends field-testing the scale model selected to ensure that the scale is robust and functions accurately and precisely in the specific field conditions (e.g., not sensitive to wind, humidity, etc.) where the scale will be used.

Besides high-quality dietary scales, *Intake* recommends the use of high-quality batteries that meet the specifications of the scale manufacturer. Poor quality batteries can cause digital dietary scales to malfunction or report inaccurate weight measurements. Some digital dietary scales use a battery type that may not be readily available within the country where the survey will be carried out; therefore, it is important to check the type of batteries required and order a large supply in advance, especially if the batteries must be purchased from outside the country.

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## Maintenance of Dietary Scales

Dietary scales are precision instruments that should be carefully used under very specific conditions to ensure that accurate weight measurements are taken. To avoid potential damage from impact or weather-related conditions (e.g., rain), care should be taken to package digital dietary scales appropriately during all transport. The weighing platform and digital readout of the scales should always be kept clean.

To take accurate weight measurements, the dietary scale should always be set up on a flat, vibration-free surface that is not exposed to direct sunlight or wind. In some settings, it may be challenging to find an adequate flat surface on which to place the scale during dietary data collection with a respondent at the household. To help address these field challenges, wooden boxes can be designed and locally made. These boxes can then be used for carrying the dietary scales, but enumerators can also place the scale on top of the box to provide a flat surface for taking weight measurements or can place the scale inside the box to block the wind while taking weight measurements.

To ensure that scales are functioning with acceptable accuracy and precision, *Intake* recommends that dietary scales be tested regularly for accuracy and precision during relevant pre-survey activities and throughout survey data collection. Detailed guidance on the recommended routines and procedures for testing dietary scales for accuracy and precision are available at [Intake.org](https://intake.org).<sup>9</sup>

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<sup>9</sup> See Vossenaar et al. (2020). *Routines and Procedures to Test the Accuracy and Precision of Digital Dietary Scales Used in Quantitative 24-hour Dietary Recall Surveys*.

## Box 1. Specifications for Five Dietary Scale Models

Specifications and retail prices provided by the manufacturers in February 2020; in due time, these models are likely to be discontinued and replaced by new models.



<b>Manufacturer</b>	Salter®	HBI EUROPE GmbH®	Salter®	Soehnle (Leifheit)®	Soehnle (Leifheit)®
<b>Model description</b>	Glass Kitchen Scale	My Weigh	Glass Kitchen Scale	Page Comfort 400	Page Profi 200
<b>Model number</b>	1150 BKDR	KD 7000	1160 BKDR	61505	61509
<b>Maximum capacity</b>	5,000 g	7,000 g	10,000 g	10,000 g	15,000 g
<b>Display increments</b>	1 g	1 g	1 g	1 g	1 g
<b>Precision</b>	1%	1%	1%	1%	1%
<b>Approximate scale weight</b>	800 g (with box)	2,000 g (with box)	700 g (with box)	1,000 g (without box)	1,100 g (without box)
<b>Scale dimension (L x W x H)</b>	20 x 16.7 x 1.8 cm	25 x 20.5 x 10 cm	20 x 16.5 x 2 cm	22 x 22 x 1.8 cm	24 x 17.5 x 1.6 cm
<b>Platform dimension</b>	20 x 16.7 cm	16.5 x 16.5 cm	20 x 16.5 cm	22 x 22 cm	24 x 17.5 cm
<b>Batteries</b>	2 x 1.5V AAA	3 x 1.5V AA	2 x 1.5V AAA	2 x 1.5V AAA	3 x 1.5V AAA
<b>Features</b>	<ul style="list-style-type: none"> <li>▪ Bright red easy-to-read LCD display</li> <li>▪ Large ultra-slim platform</li> <li>▪ Weigh directly on the platform or with bowl</li> <li>▪ 'Add &amp; Weigh Zero' function allows measuring multiple ingredients in the same bowl</li> </ul>	<ul style="list-style-type: none"> <li>▪ Large removable washable stainless steel tray</li> <li>▪ Protective removable LCD* cover</li> <li>▪ Adjustable backlit LCD display</li> <li>▪ Last unit used memory</li> <li>▪ Stable reading indicator</li> </ul>	<ul style="list-style-type: none"> <li>▪ Bright red easy-to-read LCD display</li> <li>▪ Large ultra-slim glass platform</li> <li>▪ Weigh directly on the platform or with bowl</li> <li>▪ 'Add &amp; Weigh Zero' function allows measuring multiple ingredients in the same bowl</li> </ul>	<ul style="list-style-type: none"> <li>▪ Large weighing surface</li> <li>▪ Large, easy-to-read LCD display</li> <li>▪ Extra-thin design</li> <li>▪ Add-weight function (tare)</li> <li>▪ Patented Sensor-Touch</li> </ul>	<ul style="list-style-type: none"> <li>▪ Extra-large weighing surface, ideal for pots and large bowls</li> <li>▪ Large, easy-to-read LCD display</li> <li>▪ Extra-thin design</li> <li>▪ Add-weight function (tare)</li> <li>▪ Patented Sensor-Touch</li> </ul>
<b>Warranty</b>	15 years	30 years	15 years	5 years	5 years
<b>Approximate retail price</b>	26 US\$	50 US\$	40 US\$	33 US\$	44 US\$

\* LCD, liquid crystal display.



 [intake.org](https://intake.org)   