

SUPPLEMENTARY MATERIAL S4

# Budget Templates, Financing, and Value-for-Money

## *Cost Drivers, Financing Transition, and Value-for-Money Assessment*

**Purpose:** Provide budgeting tools for Preparedness Intelligence Unit (PIU) pilots, explain key cost drivers, outline financing transition steps, and support value-for-money assessment.

**Audience:** Ministries of Health and Finance, Public Health Emergency Operations Centre (PHEOC) leadership, planners, and partners supporting costed implementation plans.

## 1. Budget Structure (Annual Pilot Budget)

Budget categories align with the manuscript estimate of United States Dollars (USD) 200,000–500,000 per year and can be adapted to country salary scales and existing infrastructure. This is a planning estimate, not a formal health economic analysis; it should be validated through pre-implementation costing in each pilot setting.

**Table 1. PIU Annual Budget Categories**

Category	Typical Share	Notes
Personnel	50–60%	PIU core team (4 staff) + limited support staff; government salary scales where possible
Data systems	15–20%	Hosting, software, maintenance, security, integration tooling; open-source preferred
Exercises and AAR	10–15%	Quarterly simulations, facilitation, documentation, corrective action follow-up
Connectivity and operations	10–15%	Internet, power backup, field communications, transport
Contingency	0–5%	Small buffer for unplanned needs (equipment failure, surge activities)

The USD 200,000–500,000 annual range is driven primarily by national salary scales and whether staff sit on civil service or project pay scales. Countries with established DHIS2 infrastructure and government salary structures tend toward the lower bound.

## 2. Budget Templates by Country Income Level

### 2.1 Low-Income Setting (Illustrative)

Assumptions: government salary scales; open-source analytics platforms; shared hosting; limited paid software licensing.

Focus: prioritize personnel, connectivity, and exercises; keep tooling simple and avoid proprietary systems that require ongoing license fees.

Category	Estimated USD/year	Notes
Personnel (4 staff)	100,000–140,000	Government civil service scales; FETP-trained PIU Lead

Category	Estimated USD/year	Notes
Data systems	20,000–30,000	Open-source stack (R/Python, PostgreSQL, DHIS2 analytics)
Exercises and AAR	20,000–30,000	2–4 district-level simulations per year
Connectivity and operations	20,000–30,000	Internet, power backup, basic transport
Contingency	5,000–10,000	
TOTAL	165,000–240,000	Lower bound of manuscript estimate

### 2.2 Lower-Middle-Income Setting (Illustrative)

Assumptions: mixed government and project staffing; improved connectivity; some managed cloud services.  
 Focus: stronger integration tooling, improved monitoring and resilience, broader district coverage.

Category	Estimated USD/year	Notes
Personnel (4 staff)	140,000–220,000	Mix of government and project pay; competitive with WHO/NGO junior technical staff
Data systems	40,000–70,000	Managed cloud hosting, improved integration tooling, some licensed software
Exercises and AAR	30,000–50,000	National multi-sector simulations; external facilitator
Connectivity and operations	30,000–50,000	Improved redundancy, district connectivity
Contingency	10,000–20,000	
TOTAL	250,000–410,000	Mid-range of manuscript estimate

### 2.3 Upper-Middle-Income Setting (Illustrative)

Assumptions: stronger domestic financing; dedicated hosting; expanded analytics and model development.  
 Focus: more advanced forecasting capabilities, stronger cybersecurity, broader system interoperability, Geographic Information System (GIS) analytics.

Category	Estimated USD/year	Notes
Personnel (4–5 staff)	220,000–320,000	Competitive government salaries; PhD/DrPH-level PIU Lead
Data systems	60,000–100,000	Dedicated hosting, advanced analytics, licensed tools, security hardening
Exercises and AAR	50,000–60,000	National + regional simulation exercises
Connectivity and operations	40,000–60,000	High-availability infrastructure
Contingency	15,000–20,000	
TOTAL	385,000–560,000	Upper bound of manuscript estimate

### 3. Cost Drivers

The following factors most significantly drive PIU costs up or down:

Cost driver	How it affects budget
Salary bands	Whether posts sit on civil service scales (lower) vs project pay (higher). Civil service scales reduce costs but may limit talent pool.
Licensing vs open-source	Licensed analytics platforms (Tableau, PowerBI, ArcGIS) can add USD 15,000–40,000/year vs near-zero for open-source equivalents.
Connectivity redundancy	Low-connectivity settings need backup systems (satellite internet, power generators) adding USD 10,000–25,000/year.
Exercise scope	District-only simulations cost far less than national multi-sector exercises with external facilitators.
Integration complexity	Each additional data source (laboratory, climate, CRVS) requires ETL development and maintenance; more sources = higher Information Technology (IT) costs.
Security and compliance	Audit logging, encryption, penetration testing, and access recertification add to data systems cost.

### 4. Financing Transition Plan (24 Months)

#### 4.1 Principle

Start with co-financing where needed and transition progressively to domestic budget lines for all recurrent costs. Donor dependence for recurrent PIU costs is a structural sustainability risk — the PIU's value rests on continuous operation, and any financing gap disrupts the learning cycle.

#### 4.2 Step-by-Step Pathway

Period	Action
<b>Months 1–3</b>	Agree on budget structure and assign owners (Ministry of Health (MoH), PHEOC, Ministry of Finance (MoF)). Map each budget line to a financing source.
<b>Months 4–6</b>	Establish a budget line for PIU recurrent costs (salaries, connectivity, maintenance) in the national budget. Do not treat recurrent costs as project costs.
<b>Months 6–12</b>	Use partner/donor funds for one-off setup and capacity building (hardware, training, dashboard development); keep recurrent costs on a domestic trajectory from the start.
<b>Month 12</b>	Review performance and adjust budget based on measured outcomes and workload. Use the Month 12 evaluation results to justify continued domestic financing.
<b>Months 13–24</b>	Progressively expand domestic financing share; reduce partner coverage to targeted technical assistance only (model development, evaluation support, cross-country learning).
<b>Month 24</b>	Confirm sustainability plan; embed PIU costs fully in routine preparedness financing. Donor exit should be complete or on a clear timeline.

Ministerial-level commitment to domestic budget lines — established during the pilot phase, not deferred to scale-up — is a prerequisite, not an optional aspiration. This is referenced in the manuscript as a primary sustainability risk.

## 5. Value-for-Money (VfM) Approach

### 5.1 VfM Questions

- Does the pilot reduce hours to response for priority diseases? (Primary: alert-to-response time (ART))
- Does earlier action reduce outbreak size or resource demand? (Secondary: case count trajectory comparisons)
- Does After-Action Review (AAR) closure improve over time and reduce repeated failures? (AAR closure rate trend)
- Do dashboard and forecasting products reduce duplication and meeting burden? (Staff time surveys)

### 5.2 Practical VfM Indicators

Indicator	Calculation
Cost per hour of ART saved	Annual PIU cost ÷ total ART hours saved (compared to pre-pilot baseline)
Cost per district covered	Annual PIU cost ÷ number of districts receiving PIU analytics and briefs
Reduction in late activations	Count of events where ART exceeded 48 hours: compare pre-pilot vs pilot year
AAR closure rate gain	Percentage point improvement in AAR closure rate from Quarter 1 to Quarter 4

### 5.3 VfM Reporting

Include VfM indicators in the Month 12 and Month 24 evaluation summaries and link results to budget decisions for scale-up. VfM reporting should be presented to the Data Governance Committee and to the MoF to justify continued domestic financing.

For the performance metrics framework that underpins VfM measurement, see Supplementary Material S6. For the implementation timeline within which financing milestones are embedded, see Supplementary Material S5.

## List of Abbreviations

Abbreviation	Full Term
AAR	After-Action Review
Africa CDC	Africa Centres for Disease Control and Prevention
ART	Alert-to-Response Time
FETP	Field Epidemiology Training Programme
GIS	Geographic Information System
IT	Information Technology

Abbreviation	Full Term
<b>MoF</b>	Ministry of Finance
<b>MoH</b>	Ministry of Health
<b>PHEOC</b>	Public Health Emergency Operations Centre
<b>PHEM</b>	Public Health Emergency Management
<b>PIU</b>	Preparedness Intelligence Unit
<b>USD</b>	United States Dollars
<b>VfM</b>	Value-for-Money
<b>WHO</b>	World Health Organization