# Supplementary File 7. Implementation fidelity measurement manual

*Definition, components, scoring, responsibilities, tools and records*

Version 1.4 - 17 August 2026

*Companion to: Implementing a competency-based Advanced Field Epidemiology Training Programme in Sierra Leone: protocol for a mixed-methods pilot evaluation (JIEPH-D-26-00266).*

## 1. Purpose

Implementation fidelity is the primary outcome of this pilot. This manual defines fidelity, states how every component is measured, specifies the independent team responsible for extraction, scoring, verification and adjudication, identifies each source and tool, and states where each result is recorded. A person outside programme delivery can reproduce the Month-24 estimate from the source-evidence register and locked I07 dataset.

## 2. Definition and scope

Implementation fidelity in this study means the extent to which the Advanced FETP intervention and its implementation strategies are delivered, received and documented as prespecified in the version-controlled intervention and implementation manual while approved adaptations preserve defined core functions. It is a property of programme delivery. Resident competency, satisfaction and programme effectiveness remain separate outcomes.

Fidelity is assessed across six dimensions carried by the 20 components rather than scored as separate scales:

- Adherence and content: whether the specified structures, activities and core functions were delivered.
- Dose and timeliness: how much of the planned instruction, mentorship, supervision and governance activity was delivered, and when.
- Reach and coverage: whether every resident, site and programme actor received the required opportunity or support.
- Quality of delivery: whether delivery met the stated operational standard rather than only occurring.
- Participant responsiveness: whether residents and programme actors engaged with required delivery processes; survey ratings remain separate implementation outcomes.

Adaptation: whether departures from specification were approved, recorded and fidelity-preserving. Resident competency and portfolio quality remain educational outcomes, and acceptability, appropriateness and perceived feasibility remain separate key secondary implementation outcomes. Mixing them into fidelity could make a poorly delivered programme appear faithful because stakeholders were satisfied with it.

## 3. Measurement rules

### 3.1 Unit and scoring

- The unit of measurement is the component, not the resident, the site or the session.
- Each due and applicable component receives a recorded status: met, partial, not met, unknown or disputed. Not due and not applicable are separate administrative states. Met scores 1; partial, not met, unknown and unresolved disputed status score 0 in the primary analysis. There is no partial numerical credit.
- A component whose operational standard contains a percentage is met only when the computed value reaches or exceeds that percentage. A value of 79% against an 80% standard is not met.
- Components receive no numerical weight. Critical status operates as a separate non-compensatory gate: failure of any unresolved critical component prevents a green classification regardless of the aggregate percentage.

### 3.2 Applicability

- A component is assessed when it is due. Prelaunch requirements such as financing and site accreditation are reassessed at Month 24 against their continuing status and whenever a material change occurs.
- Not-due components are excluded from interim denominators. Not-applicable status is rare, requires a written Independent Research and Evaluation Team (IRET) adjudication and rationale, and is listed in every report. All 20 components are due and applicable at the Month-24 primary assessment.
- The report always states the number due, applicable, met, partial, not met, unknown, disputed, not due and not applicable, so no percentage can rise because the denominator shrank without explanation.

### 3.3 Missing or disputed evidence

- During extraction, absent or conflicting evidence is coded unknown or disputed. Before each quarterly lock, the IRET reviews official primary sources, accepted corroborating evidence and programme factual responses. Self-report alone cannot establish a critical component.
- An expected record that is absent does not count as met unless a prespecified alternative source independently establishes the numerator, denominator, date and quality standard. A verbal statement alone is insufficient. Documentation failure is reported separately from activity failure.
- At the locked Month-24 assessment, any due and applicable component not independently verified as met by the deadline counts as not met in the primary analysis. Later corrections require a dated new dataset version and retained audit trail.
- Sensitivity analyses report unknown or disputed components as excluded, but the primary denominator includes them as failures. This prevents missing evidence from increasing the fidelity percentage.

### 3.4 Calculation

Overall fidelity is 100 multiplied by the number of due and applicable components independently adjudicated as met divided by the number due and applicable. The 20 components are the complete prespecified set, not a sample from a wider population, so the aggregate percentage receives no sampling confidence interval. Every critical component is reported separately.

Worked example. At Month 24, all 20 components are due and applicable. Sixteen meet standard, two are partial, one is not met and one remains unknown. Overall fidelity is 16/20 = 80.0%; the partial, not-met and unknown components score as failures. A green classification also requires every critical component to be met. A sensitivity analysis may exclude the unknown component, but it does not replace the primary result.

## 4. The twenty components: measurement specification

The table below is the operational specification. Every column must be completed for every component at every assessment point. The instrument column refers to the instruments catalogued in Supplementary File 2.

| ID | Component | Class | Numerator: what counts as met | Denominator | Source evidence required | Instrument or register | Who holds the source evidence | Who scores the component | Frequency | Where recorded |
|---|---|---|---|---|---|---|---|---|---|---|
| F01 | Governance active | Critical | Bodies with approved terms of reference that met at least quarterly | Four governance bodies (steering, assessment, research and thesis, safeguarding and evaluation) | Signed terms of reference; dated minutes and attendance | Governance register; I07 | Programme administrator | Fidelity assessor (independent team) | Quarterly | Governance register; fidelity record F01 |
| F02 | Ethics and institutional authorization | Critical | Written SLESRC determination, NPHA authorization and approved amendments held before the relevant data collection | All research data collection activities initiated in the period | Approval letters; amendment log; dated correspondence | Regulatory file; I07 | Programme regulatory focal point | Independent principal investigator | Prelaunch and on amendment | Regulatory file; fidelity record F02 |
| F03 | Financing and operational readiness | Critical | Committed first-12-month programme and evaluation budget with an approved continuity plan | Required first-12-month budget | Signed funding commitments; approved continuity plan; budget ledger | Finance ledger; I07 | Programme finance officer | Independent health economist | Prelaunch; annually | Finance ledger; fidelity record F03 |
| F04 | Field sites accredited | Critical | Sites meeting every critical criterion and at least 80% of scored readiness criteria | Eight placement sites | Completed accreditation checklists with evidence and site visit notes | I06 site readiness and accreditation checklist | Site accreditation team | Fidelity assessor (independent team) | Prelaunch; on site change | Site register; fidelity record F04 |
| F05 | Resident and host agreements | Core | Residents and host institutions with completed protected-time, data-access, deployment, supervision and publication agreements | All enrolled residents and their host institutions | Signed agreements held on file | Enrolment file; I01 | Programme administrator | Fidelity assessor (independent team) | Prelaunch; on enrolment change | Enrolment file; fidelity record F05 |
| F06 | Faculty and mentor preparation | Core | Assigned faculty, mentors, supervisors and assessors completing required preparation before role assumption (standard 90%) | All assigned faculty, mentors, supervisors and assessors | Attendance and completion records; calibration certificates | Preparation register; I07 | Training coordinator | Fidelity assessor (independent team) | Prelaunch; on new appointment | Preparation register; fidelity record F06 |
| F07 | Modules delivered | Core | Modules receiving planned facilitated, practice and field-transfer components, or an approved fidelity-preserving adaptation | Seventeen modules | Delivery records; adaptation approvals | Session and exercise register; I12 adaptation log | Module leads | Fidelity assessor (independent team) | Quarterly | Session register; fidelity record F07 |
| F08 | Sessions delivered | Core | Planned sessions delivered within the permitted schedule (standard 85%) | Seventy planned facilitated sessions | Session register with dates, facilitator and attendance | Session and exercise register | Programme administrator | Fidelity assessor (independent team) | Monthly; reported quarterly | Session register; fidelity record F08 |
| F09 | Exercises delivered | Core | Planned practical exercises completed with documented feedback (standard 85%) | Thirty-six planned exercises | Exercise register; feedback records | Session and exercise register | Module leads | Fidelity assessor (independent team) | Monthly; reported quarterly | Exercise register; fidelity record F09 |
| F10 | Field-practice opportunity and supervision delivered | Critical | Active resident-placement months with accredited placement, protected field time, qualifying assignments, named supervision and a verified field-week recording system; gaps trigger documented programme corrective action | All active resident-placement months due in the period | Placement and workplan records; assignment letters; field-week-system audit; supervisor logs; corrective-action records | Placement register; verified field-week system; I07 | Programme management and field-site leadership | Fidelity assessor (IRET) | Monthly; reported quarterly; full Month-24 verification | Placement and field-week-system file; fidelity record F10 |
| F11 | Named mentorship and supervision | Critical | Active residents holding a named technical mentor and workplace supervisor throughout placement | Active residents in the period | Mentor and supervisor assignment records; gap register | Mentor log; assignment register | Programme management team | Fidelity assessor (independent team) | Continuous; reported quarterly | Assignment register; fidelity record F11 |
| F12 | Mentor contacts | Core | Planned monthly mentor contacts and quarterly formal reviews documented (standard 80%) | Planned contacts and reviews for active residents | Mentor log entries with date, duration, focus and agreed actions | Mentor log and portfolio system | Named mentors | Fidelity assessor (independent team) | Monthly; reported quarterly | Mentor log; fidelity record F12 |
| F13 | Progression reviews | Core | Due progression reviews occurring within four weeks of the planned month, recording evidence, decision and actions (standard 90%) | Progression reviews due in the period | Progression records with panel composition, evidence list and decision | Progression records | Assessment committee secretary | Fidelity assessor (independent team) | Months 6, 12, 18, 24 | Progression records; fidelity record F13 |
| F14 | Portfolio assessment | Critical | Residents receiving rubric-based assessment for all products due by each | Products due for assessment by the | Completed rubrics; remediation plans | I08 common field-product rubric; rubric | Calibrated assessors | Fidelity assessor (independent | Continuous; at each review | Rubric database; fidelity record F14 |

| ID | Component | Class | Numerator: what counts as met | Denominator | Source evidence required | Instrument or register | Who holds the source evidence | Who scores the component | Frequency | Where recorded |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | progression point, with remediation triggered by critical failures | progression point | | database | | team) | | |
| F15 | Outbreak opportunity and evidence | Critical | Residents receiving two distinct authentic investigation opportunities or a documented programme-led corrective placement, with at least one permitting analytic leadership | Enrolled residents | Deployment records; investigation evidence map; corrective placement decisions | FP2 evidence map; deployment register | Outbreak lead | Fidelity assessor (independent team) | Continuous; reported quarterly | Deployment register; fidelity record F15 |
| F16 | Research governance by Month 12 | Core | Active residents holding protocol-defence approval and ethics or data-governance authorization by Month 12 or an approved recovery deadline (standard 80%) | Active residents at Month 12 | Defence outcome records; approval letters | I09 research, thesis and publication milestone form | Research and thesis committee secretary | Fidelity assessor (independent team) | Month 12; recovery deadline | Milestone record; fidelity record F16 |
| F17 | Year-2 research protection | Core | Residents receiving the planned protected time and access for implementation, analysis and writing during Months 13 to 23 | Active residents in Months 13 to 23 | Protected-time returns; access confirmations; employer correspondence | I04 resident experience and workload survey; host agreements | Programme management team | Fidelity assessor (independent team) | Quarterly in year 2 | Workload record; fidelity record F17 |
| F18 | Publication pathway | Core | Residents receiving publication mentorship, access to approved internal channels, journal-legitimacy screening and editorial tracking | Active residents from Month 8 | Mentorship records; screening decisions; editorial tracker entries | I09 milestone form; editorial tracker | Publication mentor and editorial focal point | Fidelity assessor (independent team) | Quarterly from Month 8 | Editorial tracker; fidelity record F18 |
| F19 | Assessment calibration | Core | High-stakes assessors completing calibration, with every thesis and at least 25% of other products independently double rated | High-stakes assessors; products requiring double rating | Calibration records; paired rating records | I08 rubric; calibration register | Assessment committee secretary | Fidelity assessor (independent team) | Before live rating; quarterly thereafter | Calibration register; fidelity record F19 |
| F20 | Adaptation, cost and quality tracking | Core | Quarterly adaptation logs, cost ledgers, data-quality audits and feedback cycles complete for the period | Four required quarterly tracking outputs | Adaptation log; cost ledger; data-quality report; feedback minutes | I12 adaptation log; I15 time and cost log; data-quality dashboard | Programme management team | Fidelity assessor (independent team) | Quarterly | Tracking file; fidelity record F20 |

## 5. The independent research team

The evaluation is conducted by an independent research team, not by the staff who deliver the programme. Fidelity is a judgement about whether delivery met specification, so a delivery team scoring its own delivery would place the primary outcome inside the body with the strongest interest in its value. The programme keeps the operational records; the independent team scores them.

### 5.1 Composition and appointment

| Member | Function in fidelity measurement |
|---|---|
| Independent principal investigator | Accountable for the fidelity estimate and its release. Signs the quarterly fidelity record and the Month 24 primary outcome. |
| Fidelity assessors (two) | Extract component evidence from programme records and score each component against its operational standard. The second assessor independently re-scores as set out in Section 8. |
| Independent study coordinator | Manages the assessment schedule, the data-access requests and the audit trail. |
| Data manager | Holds the fidelity record, applies the quarterly lock and maintains version control and the correction log. |
| Study statistician | Computes the exact aggregate fidelity percentage and component-level tables from the locked export; no sampling confidence interval is attached to the 20-component census score. |
| Independent health economist | Scores the financing and cost-tracking components (F03, F20) and conducts the economic analysis. |
| Qualitative analysts (two) | Conduct and analyse interviews and focus groups, including the accounts that explain why a component was or was not met. |

Members are appointed by the National Public Health Agency on the recommendation of the safeguarding and evaluation function, and report to that function and to the Agency executive sponsor. None reports to the programme director.

### 5.2 Conditions of independence

- No member of the research team holds a teaching, mentoring, workplace supervision, assessment, progression or graduation role in the programme, and none may take one during the study.
- No member is line managed by, or appraised by, any person accountable for programme delivery.
- Programme staff have no authority to alter a component score, to withhold a finding, or to delay release of the fidelity record.
- The team's appointment cannot be terminated, and its funding cannot be withdrawn, on the basis of an unfavourable finding. Any proposal to change the team's composition during the study requires approval by the safeguarding and evaluation function and is reported with the results.
- Team members declare interests at appointment and annually, including prior involvement in designing the curriculum or the programme. A declared interest does not by itself disqualify a member, but it is published with the results and the member does not score components that their prior work shaped.
- Access to programme records is governed by a written data-access agreement, so access does not depend on the goodwill of the people being assessed.

### 5.3 What the programme does and does not do

| Body | Role in fidelity measurement |
|---|---|
| Programme management team | Maintains the operational registers as activities occur and provides the research team with access and source documents on request. Does not score any component. |
| Programme director | May submit a written comment on the draft quarterly fidelity record within ten working days. Cannot change a score. Any unresolved disagreement is recorded in the fidelity record and reported with the results, stating both positions. |
| Assessment committee | Supplies programme documentation or clarification on academic processes when requested. It does not determine missing-evidence status, adjudicate fidelity or score any component. |
| Field-site leadership | Certifies site-level source evidence and countersigns the field-week log. Does not score. |
| Safeguarding and evaluation function | Holds the IRET reporting line and protects independence. It does not score components. It may appoint a conflict-free external quality reviewer and receives unresolved integrity concerns. |
| Steering committee | Receives the fidelity record and applies the progression classification at Month 24. Does not amend component scores. |
| Agency executive sponsor | Takes the final scale-up decision on the evidence presented, and protects the independence of the research team. |

## 6. Data flow and records

Fidelity is compiled from records the programme keeps anyway, which prevents a parallel dataset that could diverge from operational reality. The extraction and scoring steps sit with the independent team.

| Step | Action | Who | Timing | Record produced |
|---|---|---|---|---|
| 1 | Operational registers updated as activities occur (session register, mentor log, field-week log, rubric database, deployment register, milestone form, adaptation log, cost ledger, incident log) | Programme management team | Continuous | Source records with entry date and author |
| 2 | Research team requests and receives the period's source records under the data-access agreement | Independent study coordinator | Monthly | Dated access log |
| 3 | Component evidence extracted and each component scored against its operational standard on Instrument I07 | Fidelity assessor 1 | Monthly | Draft fidelity checklist |
| 4 | Independent re-scoring of all 20 components without sight of the first assessor’s classifications | Fidelity assessor 2 | Quarterly | Second-assessor score sheet |
| 5 | Scores compared; disagreements reconciled against source evidence; unresolved cases go to a third conflict-free IRET adjudicator | Independent principal investigator | Quarterly | Reconciliation note with agreement statistics |
| 6 | Draft fidelity record shared with the programme director for written comment | Independent study coordinator | Quarterly | Comment received, with any disagreement recorded |
| 7 | Quarterly dataset locked and exported; no retrospective edit without a dated correction entry | Data manager | Quarterly | Locked export with version identifier and checksum |
| 8 | Exact overall fidelity percentage, due/applicable count, component statuses and critical-component results computed from the locked export; no sampling confidence interval for the component census | Study statistician | Quarterly | Fidelity score and component-level tables |
| 9 | Fidelity record signed and released to the steering committee and the safeguarding and evaluation function | Independent principal investigator | Quarterly | Signed fidelity record |
| 10 | All 20 components extracted, independently re-scored, adjudicated and locked to produce the Month-24 primary outcome | Research team | Month 24 | Primary outcome record |

## 7. Reporting

- Every fidelity report states the number of components due, applicable, met, partial, not met, unknown, disputed, not due and not applicable, so the denominator and classification are visible.
- The component-level table is reported in full at Month 24, with the standard, the computed value, the classification and any adaptation for each of the twenty components. A single overall percentage is never reported alone.
- Critical components are reported as a named list with their status, not as a count only, so a reader can see which one failed.
- Quarterly estimates are reported as a trajectory alongside the Month 24 primary estimate, since a programme that reaches 80% only in the final quarter is a different finding from one that held 80% throughout.
- Adaptations recorded under F20 are reported beside the components they affected, so that a component met through approved adaptation is distinguishable from one met as originally specified.
- Any unresolved disagreement between the research team and the programme is reported with the fidelity estimate, stating both positions and the evidence each relies on.

## 8. Quality assurance and amendment

- Double scoring: the second assessor independently re-scores all 20 components each quarter without sight of the first assessor’s classifications. Exact agreement and the disagreement table are reported. Kappa is calculated only when the distribution of statuses permits stable estimation.
- Source verification: every component scored as met must be traceable to a dated source document. A score that cannot be traced is downgraded to unknown at the reconciliation step.

- Before enrolment the two assessors calibrate on archived records from the frontline and intermediate tiers, and the calibration outcome is recorded. Assessors who cannot reach agreement on the calibration set are not deployed until the standard wording is clarified by amendment.
- All twenty component definitions, standards and classes are fixed before enrolment. Any change requires a dated protocol amendment approved before the relevant data are examined, and the amendment log is reported with the results.
- The audit trail retains every superseded value with the date, the author and the reason for change, and records who requested the change.
- An external reviewer nominated by the safeguarding and evaluation function may audit the fidelity record against source evidence once during the study, and the audit finding is reported whether or not it agrees with the team's scores.

**9. Version record**

1.4 - 17 August 2026: consolidated final measurement manual. The revision defines six fidelity dimensions, applies a no-partial-credit status rule, counts unresolved evidence as failure in the primary Month-24 analysis, removes a sampling confidence interval from the 20-component census, separates programme delivery of field practice from resident attainment, and requires independent scoring, full second review, adjudication, locking and audit records.