Final Distribution Point Coverage Analysis Tool

What Can This Tool Help You With?

The Distribution Point Coverage Tool supports planning teams in understanding and improving access to humanitarian distribution points. It can helps answer the following questions:

🚶 Beneficiaries report long and unsafe travel distances. Where are the biggest access gaps?

🗺️ I am setting up or restructuring an food or cash distribution operation. Where should distribution points be placed?

📊 How well does my current network of distribution points serving the population I'm targeting?

What This Tool Cannot Do

The Distribution Point Coverage Tool is an analytical support tool. It is not designed to replace operational judgement, field verification, or coordination with local partners. Users should be aware of the following limitations:

- ⚠️ No ground reality modelling: The tool does not account for terrain, rivers, seasonal flooding, road conditions, or physical barriers.
- 🚧 No access or transport assessment: Travel time, transport availability, and vehicle access are not included in the calculations.
- 🏘️ No validation of site suitability: Suggested locations may fall on private land, restricted areas, or locations that are socially or politically unsuitable.
- 🔒 No security or protection analysis: The tool cannot assess safety risks, conflict dynamics, or protection concerns.

Note: This tool is primarily designed to optimise existing distribution point networks. However, it can also be used to design a **completely new set of distribution points from scratch.**

If you are setting up a new operation and do not yet have any distribution point locations, simply upload an empty CSV file containing the following column headers:

- distribution_point_name
- latitude
- longitude

After loading this file, you can directly proceed to the "Add New Distribution Points" section to automatically generate an initial list of recommended distribution point locations based on the population distribution in your planning area.

Quickly jump to the sections:

Introduction and Scope

The Distribution Point Coverage Tool is designed to support humanitarian and development practitioners in analysing the spatial accessibility of service and distribution networks. It helps to visualise which parts of the population are currently served by existing distribution points, where significant coverage gaps remain, and how alternative or additional locations could improve overall access. The tool is intended as a decision-support system. It does not replace operational planning, field assessments, or local coordination mechanisms. All results must therefore be interpreted as analytical guidance rather than final recommendations.

🎯 Purpose of the Analysis

The analysis is based on limited secondary data sources, primarily population estimates and geographic coordinates. It is meant to provide an additional perspective to help implementing partners, local authorities, and community structures review and refine existing distribution point allocations.

It is particularly useful for:

- Cross-checking current distribution points.
- Identifying underserved areas
- Supporting evidence-based discussions with field teams and community representatives.

⚠️ GPS and Location Recommendations

All suggested locations for new or relocated distribution points are algorithm-generated approximations.
They indicate areas where population coverage could be improved, but they do not account for operational constraints such as:

- Local access conditions
- Infrastructure quality
- Land ownership or land use
- Safety and security considerations

🔄 Relocation Considerations

Recommendations to relocate existing distribution points are intended as data-driven improvement options, not as final decisions.
Moving an established distribution point can have significant operational, social, and logistical implications and should always be preceded by detailed field checks and stakeholder consultations.

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1. Data Preparation & Upload

Preparation Before Starting: Add a background map in QGIS to provide geographic context.

1.2 Required Data Sources

File	Format	Source	Description
Distribution Point Data	CSV	Your organisation	Existing or planned distribution points The CSV must contain columns: Name of distribution point, latitude, longitude
WorldPop Data	GeoTIFF (recommended) or CSV	worldpop.org	Population distribution (use most recent year)
Planning Area	Shapefile	Many resources avalibale on: data.humdata.org	Boundary of analysis area (Ensure that .shp, .shx and .dbf files are stored in the same folder.)

1.6 Upload Data to QGIS

Open Plugins → **Distribution Point Coverage Tool**.
Select the three input files and click **Load Layers**.

It is strongly recommended to limit the planning area to the actual region of interest. The WorldPop layer will be clipped to the planning area to avoid long loading times. Very large planning areas may overload the tool.

2. Buffer Generation

2.1 Creating Buffers

Enter buffer distance (km) and click **Create Buffer**. The buffer distance represents the **diameter**, not the radius.

Diameter	Radius	Typical Use
5 km	2.5 km	Walking access
10 km	5 km	Bicycle or motorbike
20 km	10 km	Vehicle access

These values are rough estimates and not final guidance.

3. Explore Covered Area

This section calculates how much of the population is currently served by existing distribution points.

Click **Analyze Uncovered** to calculate total population, covered population, and coverage percentage. Because circular buffers do not tile perfectly, 100% coverage is mathematically impossible.

4. Population Hotspots

Identifies high-density population clusters to support prioritisation of new distribution points.

WorldPop values are ranked and classified using percentiles:

- Top 10–5% → blue points
- Top 5% → orange points (highest priority)

Ensure WorldPop and Planning Area are loaded.
Click **Create Hotspots** to generate the **Population_Hotspots** layer.

Using 100 m population data will generate many points and may slow rendering. Zoom in to analyse local clusters.

5. Optimize Existing Distribution Point Positions

This function identifies overlapping or poorly positioned distribution points and proposes improved locations to maximise population coverage. Outputs are analytical suggestions only and must always be field-verified.

How Points Are Selected

- Nearest-neighbour distances and buffer overlaps are analysed.
- Only up to 30% of problematic points are relocated to preserve network stability.

Optimized_Distribution_Points

- Blue points: fixed
- Green points: relocated

Manual Editing

Select **Optimized_Distribution_Points**, toggle editing, move green points, save edits and exit editing mode.

6. Add New Distribution Points

This section identifies uncovered population clusters and proposes new distribution points using a greedy placement algorithm.

Why 100% Coverage Is Not Realistic

Even with many points, circular buffers always leave gaps. A practical target is 80–85%.

How to Use

Set the number of new distribution points and click **Add New Points**.
A new layer **New_Distribution_Points** is created.

6.7 Manual Editing of New Distribution Points

Select **New_Distribution_Points**, toggle editing, move the green star points, save edits, and exit editing mode.