منتدى الدوحة للبيانات

من أجــــل الابتكــار في التنميــــة المستدامـــة

23-22 أكتوبر 2024

# DOHA DATA FORUM

## FOR INNOVATION IN SUSTAINABLE DEVELOPMENT

October 22-23, 2024

# Modernisation of NSOs in OIC countries through Digitalisation, Machine Learning and Artificial Intelligence

ONUR CAGLAR

DIRECTOR OF STATISTICS AND INFORMATION DEPARTMENT

SESRIC

## Surveys

**PAPI (Paper Pencil Interview)**

**CAPI (Computer Assisted Personal Interview)**

**Staff**
➢ Proficient interviewers
➢ More IT staff

**Software**
➢ Specialized software
  - Real-time data entry
  - Automatic validation
  - GPS tracking

**Hardware**
➢ Tablets or laptops

# Evolution of Statistical Production- Data Collection

## Surveys

**PAPI (Paper Pen Interview)**

**CAPI (Computer Assisted Personal Interview)**

**CATI(Computer Assisted Telephone Interview)**

**Staff**
➢ CATI operators
➢ More IT staff

**Software**
➢ Integrated telephone and survey

**Hardware**
➢ Robust telecommunications system

# Evolution of Statistical Production- Data Collection

## Surveys

PAPI (Paper Pen Interview)

CAPI (Computer Assisted Personal Interview)

CATI (Computer Assisted Telephone Interview)

CAWI (Computer Assisted Web Interview)

Mixed Method

### Staff
➢ More IT staff

### Software
➢ Advanced online survey platforms
  ❑ Data validation
  ❑ Real-time analytics
  ❑ Responsive design for mobile devices

### Hardware
➢ Servers
  ❑ To host surveys
  ❑ Manage high traffic
➢ Reliable internet connections

# Evolution of Statistical Production- Data Collection

## Surveys

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➢ Reliable internet connections

## Administrative Data

### Steps

Data Source Identification

Formal Agreements and Legal Frameworks

Data Collection Infrastructure

Data Validation and Quality Checks

Data Integration and Standardization

Metadata Management

Data Storage and Security

### Staff

Data Analysts and Statisticians
IT Specialists
Data Governance Officers

### Software

Data Management Systems
Data Quality Assessment Tools
APIs and Automation



### Data Quality

Validation and Error Checking
Metadata and Documentation
Continuous Monitoring

### Hardware

Secure Servers and Databases
Cloud Storage
Data Encryption and Secure Networks

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الأسـرة

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State of Qatar · دولـة قطـر

# Evolution of Statistical Production- Data Collection

## Big Data

### Steps

➢ Data Source Identification

➢ Legal and Regulatory Framework

➢ Data Infrastructure Setup

➢ Data Processing and Cleaning

➢ Data Analysis and Modeling

➢ Data Quality Assurance

➢ Big Data Governance

### Staff

- Data Scientists and Analysts
- IT Specialists
- Geospatial Analysts
- Data Engineers
- Data Governance Officers

### Data Quality

- Data Quality Assurance Frameworks
- Automated Data Validation
- Metadata Management
- Sampling and Representativeness
- Anonymization and Data Protection

### Software

- Data Management Platforms
- Data Processing and Analysis
- Big Data Visualization
- Data Quality Tools
- Security and Privacy

### Hardware

- High-Performance Servers
- Cloud Infrastructure
- Data Backup
- Networking Infrastructure
- Workstations for Analysts

## Evolution of Requirements and Data Governance

**Governance and Oversight**

- Governance Framework
- Data Governance Committee
- Data Stewards

**Integration and Data Sharing**

- Data Quality
- Lifecycle Management
- Integration
- Data Sharing

**Data Security and Privacy**

- Access & Security
- Privacy & Compliance

**Capacity Building and Training**

- Capacity Building

## Requirements of Evolution and Organization

**Governance and Oversight**

- Governance Framework
- Data Governance Committee
- Data Stewards

**Integration and Data Sharing**

- Data Quality
- Lifecycle Management
- Integration
- Data Sharing

**Data Security and Privacy**

- Access & Security
- Privacy & Compliance

**Capacity Building and Training**

- Capacity Building

## Requirements of Evolution and Organization

| Category | Survey Data | Administrative Data | Big Data |
|---|---|---|---|
| Staff | | | |
| Software | | | |
| Hardware | | | |
| Stakeholders | | | |

## Requirements of Evolution and Organization

| Category | Survey Data | Administrative Data | Big Data |
|---|---|---|---|
| **Staff** | Statistician | Data Scientists | Data Scientists |
| | Proficient interviewers | IT Specialists | AI/ML Experts |
| | | Legal Officers | Data Engineers |
| **Software** | SPSS, Stata, R etc. | Oracle, PostgreSQL | Hadoop, Spark |
| | Survey Software (In-House/ Outsourced) | Talend for data integration | Python etc. for analytics |
| **Hardware** | Mobile devices for data collection | Secure servers for structured data | High-performance servers |
| | Basic servers for storage | VPN for secure transfers | Cloud infrastructure (AWS, Azure, GCP) |
| **Stakeholders** | Survey respondents | Government agencies | Big data providers |
| | | Legal and regulatory bodies | Cloud service providers |
| | | | Data privacy regulators |

# Key Experiences from OIC Member Countries

| | | |
|---|---|---|
| Indonesia (BPS) | Poverty Mapping | Using satellite imagery |
| Malaysia (DSOM) | Trade by Enterprise Characteristics (TEC) | Fuzzy matching technique |
| | Public Maturity Assessment on Official Statistics (PMAOS) | Uses text mining technique for sentiment analysis |
| | Earth Observation (EO) | Using satellite imagery |
| Türkiye (TurkStat) | CPI | Web Scraping and Scanner Data |
| | CPA Classification in E-Invoices | Machine Learning Technique |
| | Job Vacancies Classification (ISCO-08) | Neural network |

54 statistical activities organized successfully **since 2007** with the participation of more than **1800** experts from NSOs and other relevant national institutions of the OIC member countries.



- **Inclination survey** to identify the themes of common **interest in modernization of the NSOs through digitalization**

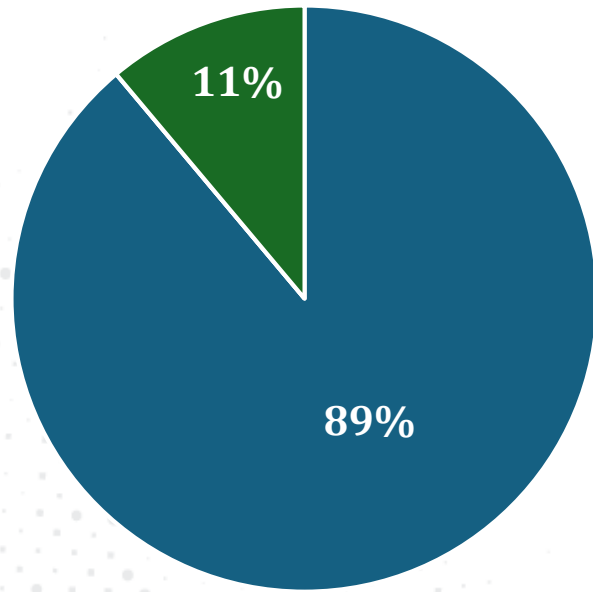- Circulated in August 2024

**Distribution of Statistical Activities**



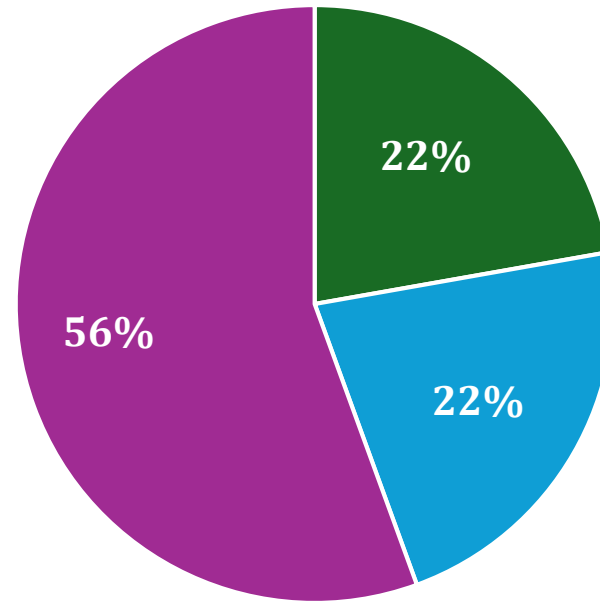| Data Analysis | Survey Techniques | Big Data | GIS | Metadata | Data Dissemination | Administrative Data |
|---|---|---|---|---|---|---|
| 11 | 5 | 9 | 5 | 10 | 7 | 7 |
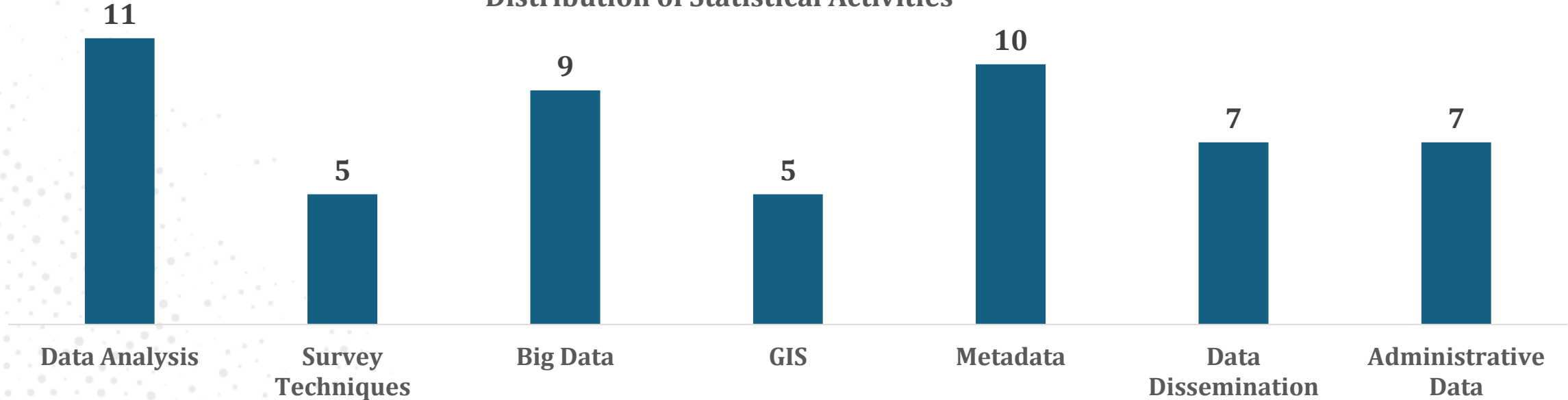
# INCLINATION SURVEY

### Does your institution currently have any digitalization strategies in place?
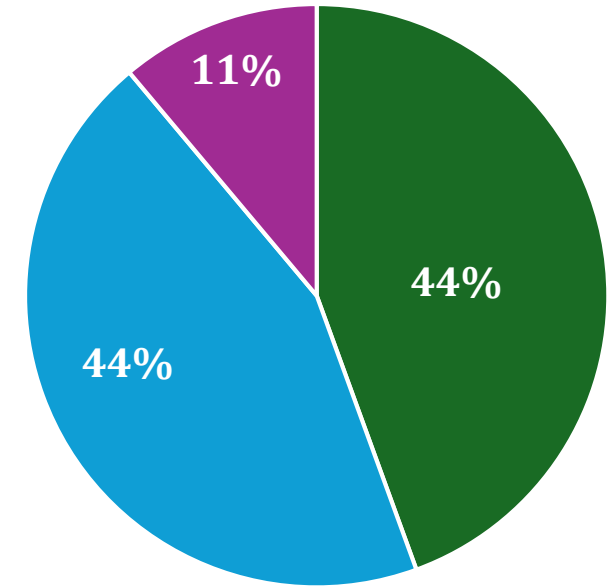
11%
89%

■ Yes  ■ No  ■ In Progress

### How important is digitization for your institution?

22%
22%
56%

■ Very Low  ■ Low  ■ Moderate  ■ High  ■ Very High

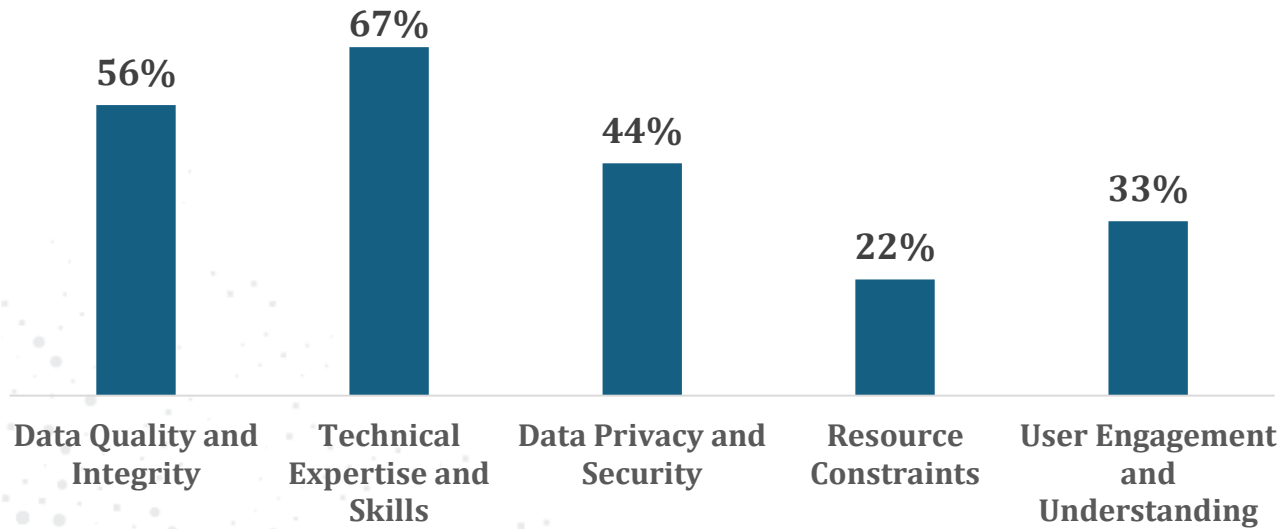### How would you evaluate the level of digitalization at your institution?

11%
44%
44%
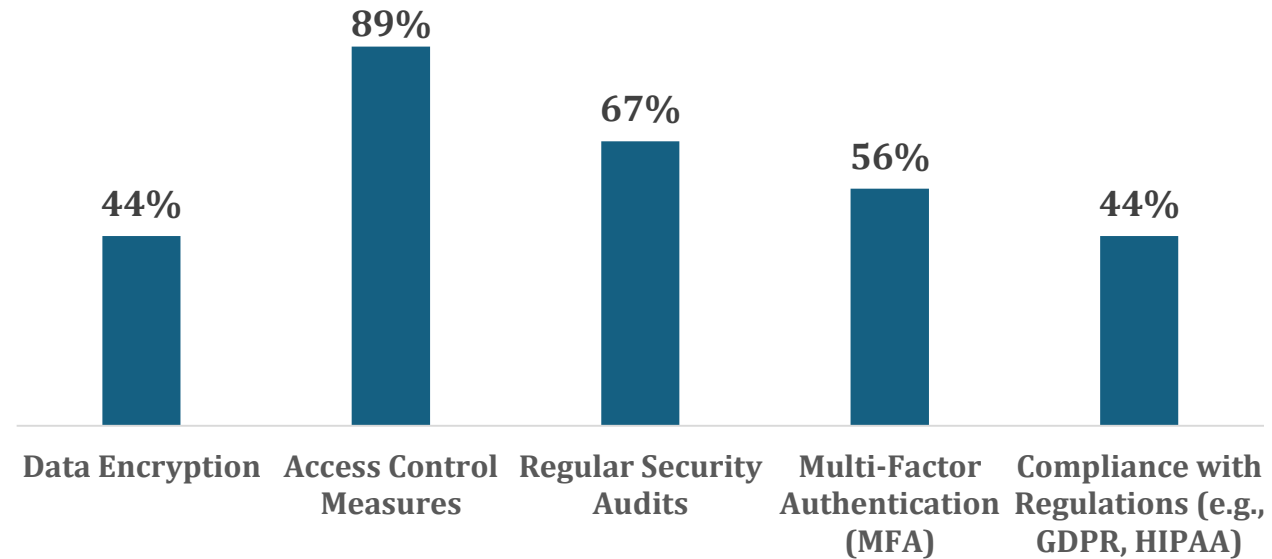
■ Very Low  ■ Low  ■ Moderate  ■ High  ■ Very High

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National Planning Council
دولــة قطــر • State of Qatar

# INCLINATION SURVEY

## What types of security challenges does your institution face?



- Data Quality and Integrity: 56%
- Technical Expertise and Skills: 67%
- Data Privacy and Security: 44%
- Resource Constraints: 22%
- User Engagement and Understanding: 33%

## How does your institution ensure the security of the statistical data?



- Data Encryption: 44%
- Access Control Measures: 89%
- Regular Security Audits: 67%
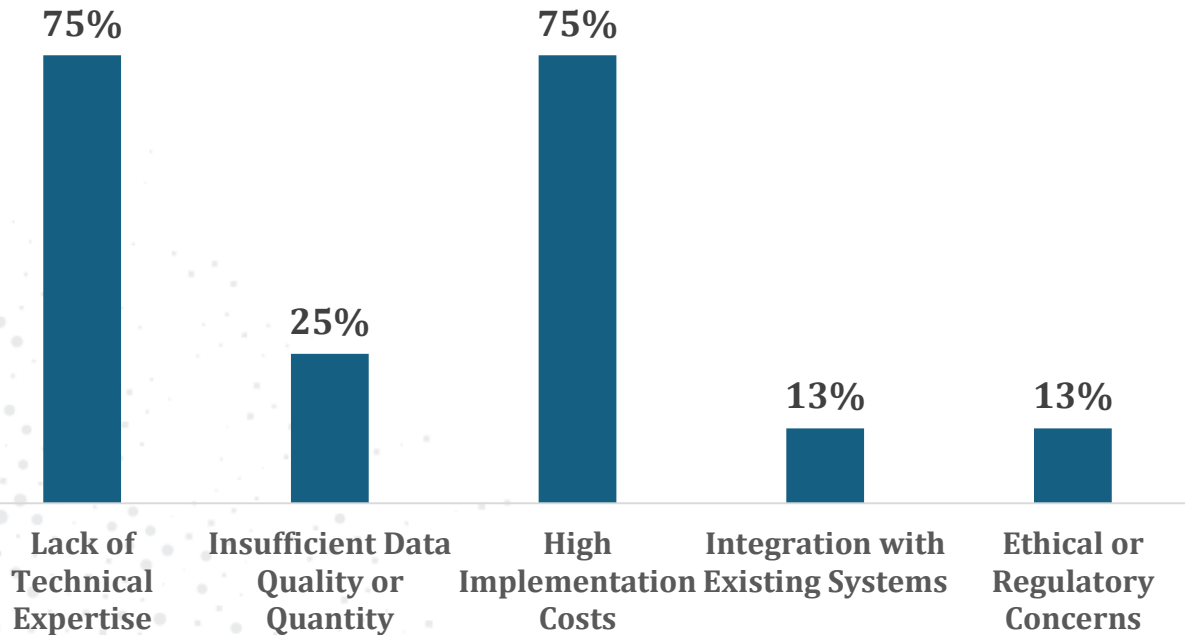- Multi-Factor Authentication (MFA): 56%
- Compliance with Regulations (e.g., GDPR, HIPAA): 44%

**What are the main challenges your institution faces or anticipates facing in adopting machine learning or AI technologies?**

| Lack of Technical Expertise | Insufficient Data Quality or Quantity | High Implementation Costs | Integration with Existing Systems | Ethical or Regulatory Concerns |
|---|---|---|---|---|
| 75% | 25% | 75% | 13% | 13% |

**What types of support would be most beneficial to your institution's digital transformation efforts?**

| Technical Assistance | Training | Funding |
|---|---|---|
| 100% | 89% | 67% |
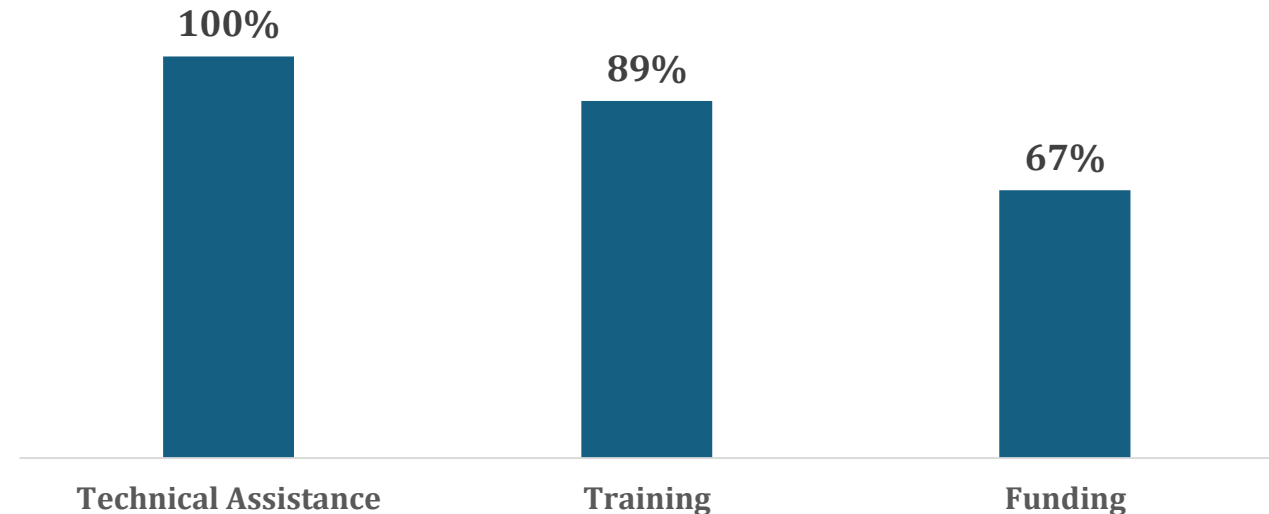
# Impressions from Statistical Activities



Training Course on 'Big Data Applications on Price Intelligence', 14-16 June 2022



Webinar on 'Transforming Administrative Registers for Statistical Data Production', 14 February 2023



Webinar on 'Modernization of NSOs through Digitalization', 26 September 2024



Webinar on 'Big Data Applications and Utilizing Non-Traditional Data Sources and Methods for Official Statistics', 10 June 2021

# Thank You

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