# International Journal of
## Engineering Research and Science & Technology

**IJERST**

www.ijerst.com

Email: editor@ijerst.com or editor.ijerst@gmail.com

# MODELING AND EVOLUTIONARY AND COMPARATIVE ANALYSIS OF ACCESS AND COVERAGE INDICATORS IN NIGER'S EDUCATION SECTOR FROM PRIMARY TO SECONDARY 1 AND 2 UNDER THE DHIS2 PLATFORM: CASE OF COMMUNES IN THE REGIONS OF AGADEZ AND TAHOUA OVER THE PERIOD 2018 TO 2023

**Harouna Dan Djari[1], Sidi Zakari Ibrahim[2], Kadri Chaibou[3], Bachir Moussa Idi[4], Harouna Naroua[5]**

[1,2,3,4,5] DEPARTEMENT DE MATHEMATIQUES ET INFORMATIQUE, FACULTE DES SCIENCES ET TECHNIQUES, UNIVERSITE ABDOU MOUMOUNI, B.P.10662, NIAMEY, NIGER.

*E-Mails: *harouna83@yahoo.fr, ibrahim.sidi@uam.edu.ne, kadrichaibou73@gmail.com, bachir.moussaidi@yahoo.fr, hnaroua@yahoo.com*

## *Abstract*

Education is the fundamental and indisputable foundation of a country's development. To achieve our objectives in this sector at national and regional level, so specific, user-friendly tools are essential. Thus, the Gross Admission Rate (GAR) and Gross Enrolment Rate (GER), which are performance indicators of access and coverage, need to be monitored. In addition, their level of disaggregation by gender enables targeted interventions for better planning and allocation of resources to keep girls in school. This article illustrates an evolutionary and comparative analysis of girls' GAR and GER rates in the Agadez and Tahoua regions of Niger from 2018 to 2023. To achieve this, these indicators were modeled and then implemented in DHIS2 in order to draw up the various analyses. Their evolution was monitored and compared with actual data collected in the field, and analyzed using different types of diagrams.

   **Key words**: Modeling, Design, Analysis, DHIS2, Education.

## *Introduction*

Achieving remarkable progress in favor of a targeted population category inevitably involves setting up a value chain of relevant, accurate data to enrich advocacy and guide governmental or non-governmental organization (NGO) interventions. In many countries, particularly in Africa, many socio-professional sectors do not have the technical means to make timely decisions.

In Niger, efforts remain to be made in terms of the appropriation, adoption and integration of new information and communication technologies (ICT) in the education sector, as illustrated by several scientific works such as

Adamou B. [2018], Agaissa A. and Jean-C. [2023], Yousfi S. and Ihssane Y., (2023), etc. Added to this problem is the crucial lack of tools or platforms for making appropriate decisions at the right time, particularly in favor of young girls and women.

This article focuses on a productive approach to value chains for primary, secondary 1 and secondary 2 educational data. Gross admission rate (GAR) and gross enrolment rate (GER), which are important indicators of performance in terms of access and coverage, were studied. In addition, their level of disaggregation by sex was taken into account in the study to enable targeted interventions, particularly at commune level, for better planning and allocation of resources relating to keeping girls in school.

These indications were modeled, prototyped and analyzed in dhis2 version 2.38.3.1-SNAPSHOT in order to study their evolution from 2018 to 2023 at the level of all communes in the Agadez and Tahoua regions.

## *Materials and methods*

In this work, the dhis2 platform was used to model, prototype and interpret the indicators monitored. The DHIS2 platform is a tool for collecting, modeling, implementing, validating, analyzing and presenting aggregated statistical data from an information system. Today, there are several scientific works based on dhis2, including Mantangelo et al. (2023), Farnham et al. (2023), Fofana et al.(2023), Matin et al.(2023) and Keita and Corvil. (2023), etc.

Only access and coverage indicators are studied. For access, the Gross Admission Rate (GAR) was used, disaggregated by gender. This rate is the ratio between the number of pupils newly admitted to the first year of the cycle and the population of official admission age for this cycle. It is calculated using the following formula (MEN/AEP/PLN, 2023):

$$\frac{New\ admissions}{Population\ of\ legal\ admission\ age} * 100$$

As for coverage indicators, by disaggregating by gender, the Gross Enrolment Ratio (GER) was analyzed. This indicator shows the ratio between the total number of pupils enrolled in a given study cycle and the school-age population in that cycle. It can be determined using the following formula (MEN/AEP/PLN, 2023):

$$\frac{all\ cycle\ students}{legal\ age\ population} * 100$$

## Modeling and design

In order to analyze our selected indicators, we carried out a general modeling exercise, with a view to adapting it to any indicator. This modeling assumes that each indicator has a source, a production attendance, a genre, a sector, a domain, a sub-domain and an aggregation level.

The modelling carried out was integrated into dhis2 using the maintenance module, adapting it to dhis2's technical architecture. Following prototyping, all the communes in the two regions and their GAR and GER rate data were deployed in the developed prototype. Tables 1 to 3 show summaries of the various statistics from the implementation.

*Table 1: Communes by department of Agadez region*

| Department | Number of Communes |
|---|---|
| Aderbissinat | 1 |
| Arlit | 3 |
| Bilma | 4 |
| Iférouane | 2 |
| Ingall | 1 |
| Tchirozérine | 4 |
| Agadez | 15 |

*Table 2: Communes by department of Tahoua region*

| Department | Number of Communes |
|---|---|
| Abalak | 5 |
| Bagaroua | 1 |
| Birni N'Konni | 4 |
| Bouza | 7 |
| Illéla | 3 |
| Keita | 4 |
| Madaoua | 6 |
| Malbaza | 2 |
| Tahoua-Département | 8 |
| Tassara | 1 |
| Tchintabaraden | 2 |
| Tillia | 1 |
| Tahoua | 44 |

***Table 3:*** *Statistics on data entered in the developed dhis2*

| Object type | Number |
|:---:|:---:|
| Maps | 43 |
| Data elements | 83 |
| Data sets | 71 |
| Data element groups | 25 |
| Organization unit groups | 5 |
| User groups | 4 |
| Periods | 108 |
| Dashboards | 4 |
| Indicator types | 1 |
| Organization units | 81 |
| Users | 17 |
| Data values | 32213 |
| Visualization | 262 |

## *Results and discussion*

Figures 1 to 3 illustrate the analyses carried out on GAR rates in Agadez's communes. Disparities can be seen between the communes studied. At primary level, the commune of Djado recorded the highest GAR rate compared with other communes in the region, especially in 2021 (see figure 1). In secondary 1, on the other hand, the commune of Agadez had the

highest GAR rate (see figure 2). As for secondary 2, the commune of Bilma had the highest GIR rate (see figure 3).
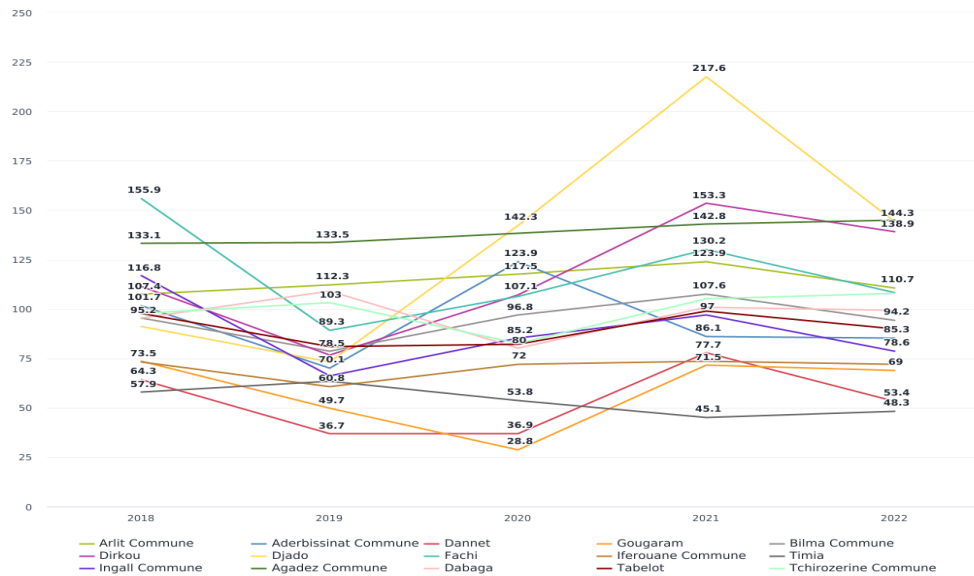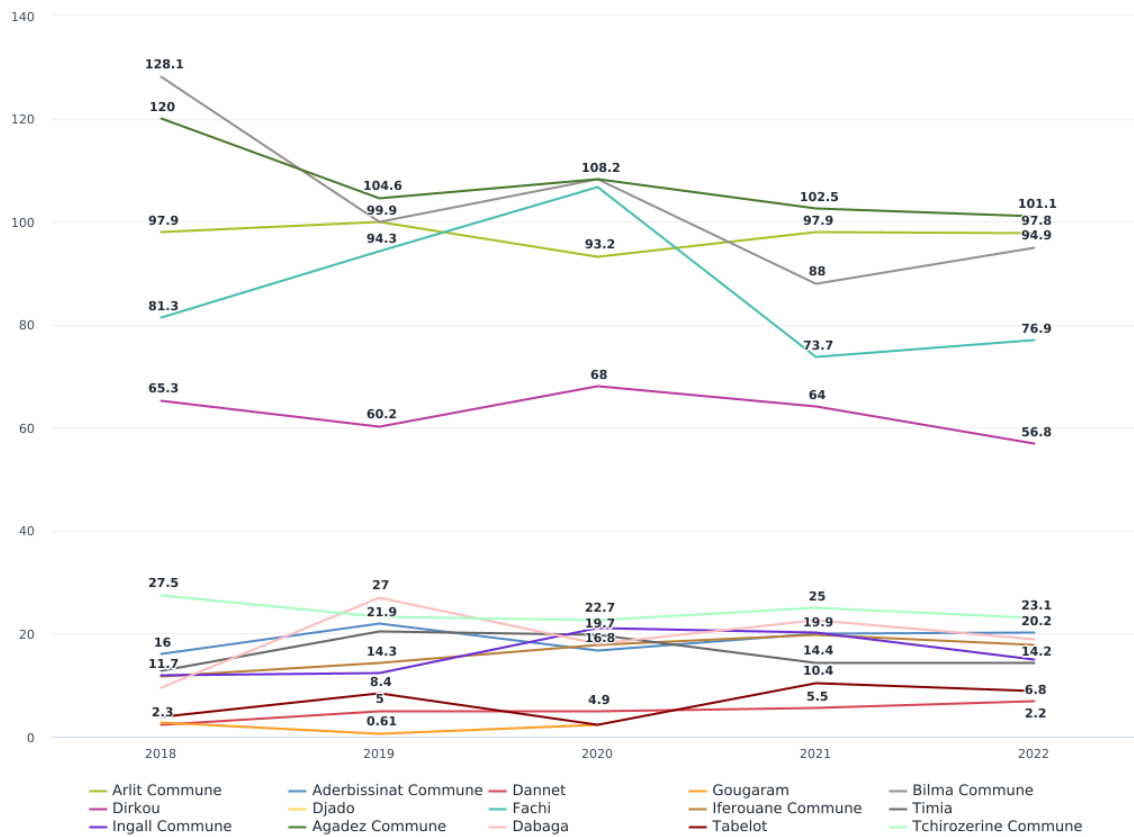


**Figure 1**: *GAR at Girls Primary from 2018 to 2022*



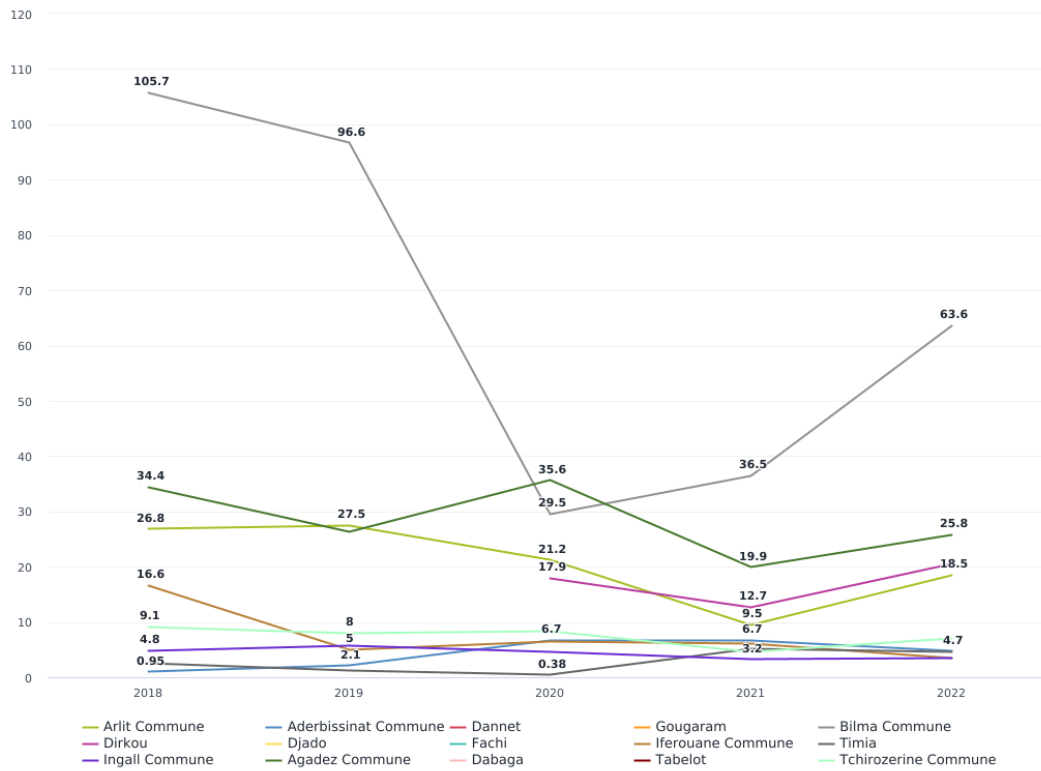**Figure 2**: *GAR in Secondary 1 for girls from 2018 to 2022*

***Figure 3****: GAR in Secondary 2 for girls from 2018 to 2022*

For all the communes in the Agadez region, the results of analysis of the various GER rates are shown in Figures 4 to 6. At primary and secondary 1 levels, the urban commune of Agadez recorded the highest GAR and GER rates respectively (see Figures 5 and 6). At secondary 2 level, the commune of Bilma performed best in terms of GER coverage.
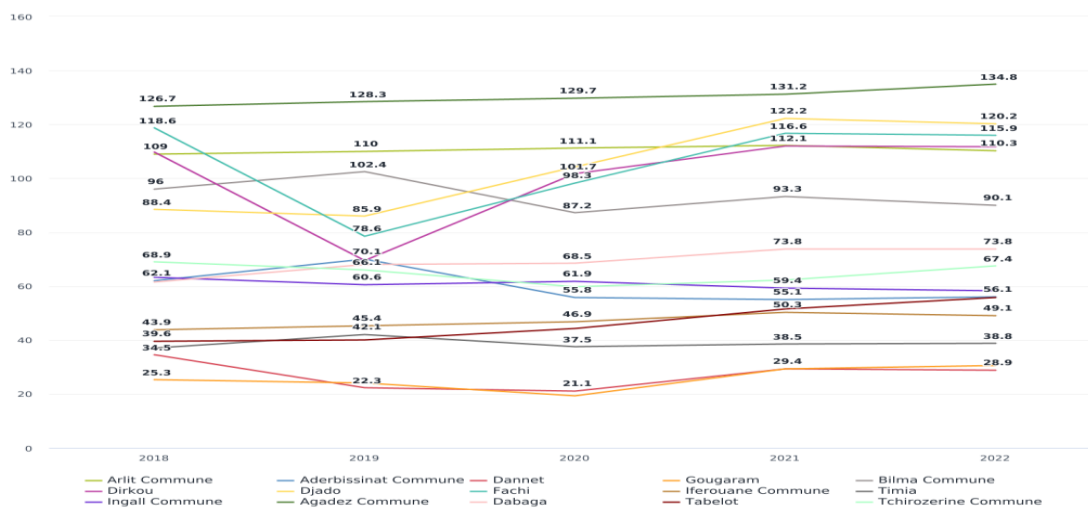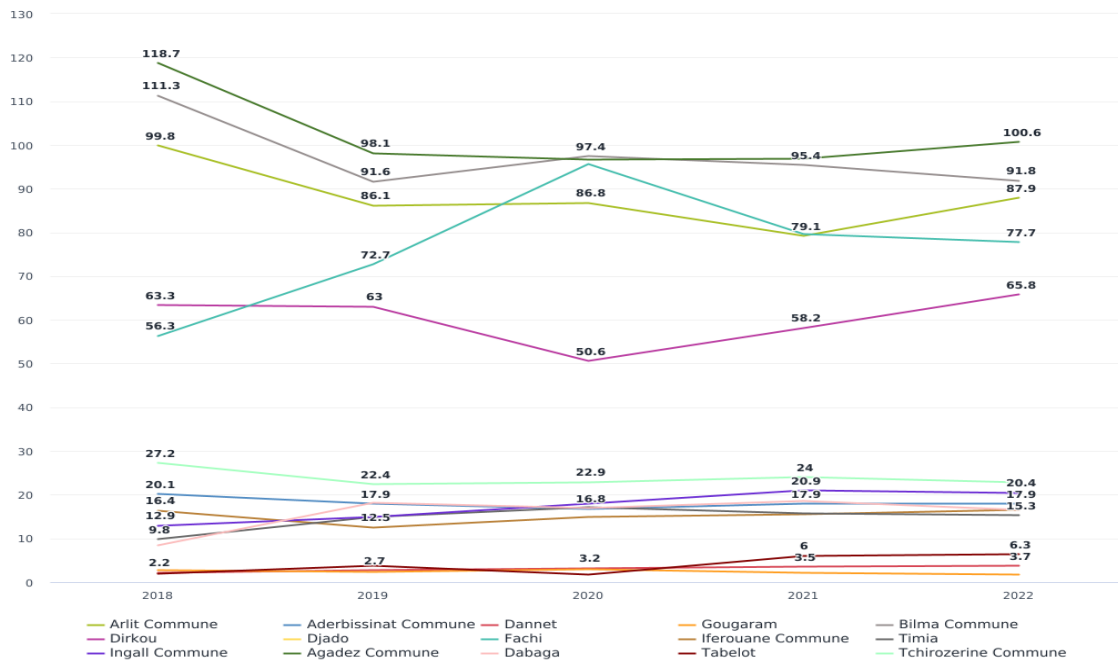


***Figure 4****: GER at the Girls Primary from 2018 to 2022*

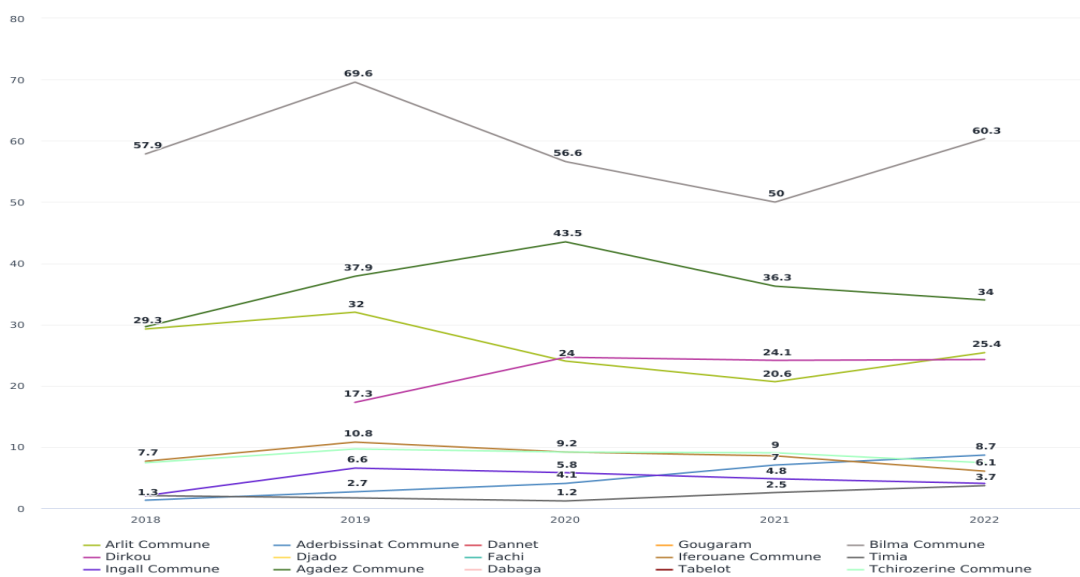***Figure 5:*** *GER in Secondary 1 girls from 2018 to 2022*



***Figure 6:*** *GER in Secondary 2 for girls from 2018 to 2022*

For the Tahoua region, due to the unavailability of GAR and GER rate data in 2020, analyses have only been carried out for the years 2018, 2019, 2021 and 2022. Figures 7 to 9 illustrate the evolution of the various GAR rates for all 44 communes. At the end of the analyses, it emerged that in primary school (see figure 7), Tassara commune outperformed all the other communes, while in secondary 1 and secondary 2, it was Tahoua commune1 that performed best (see figures 8 and 9).
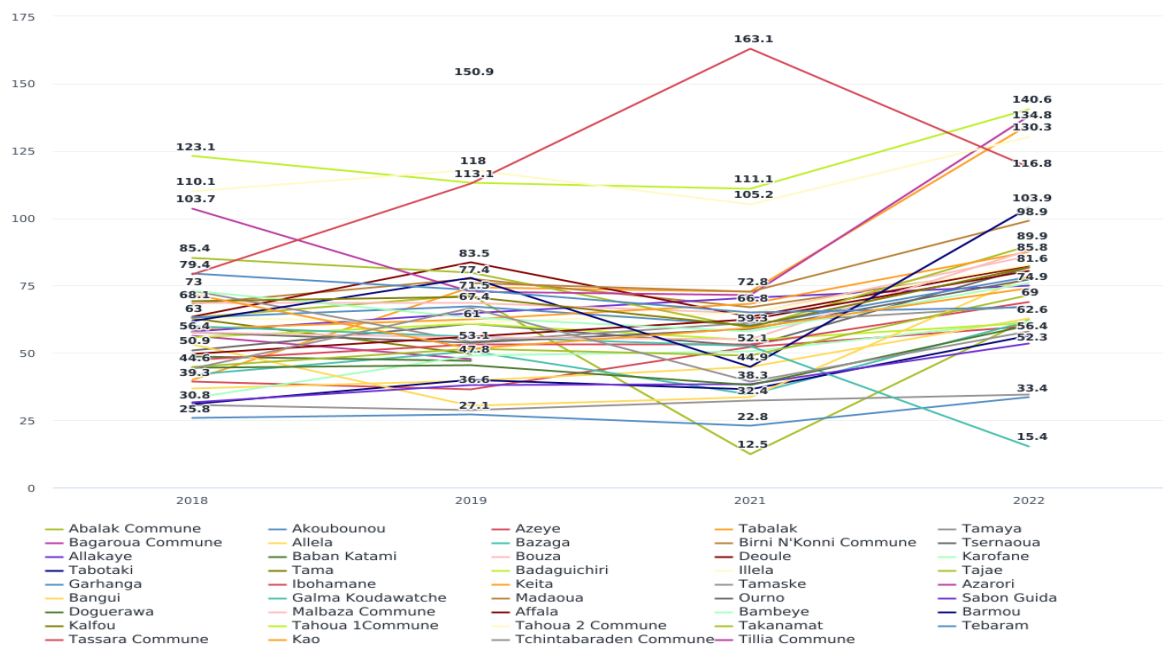
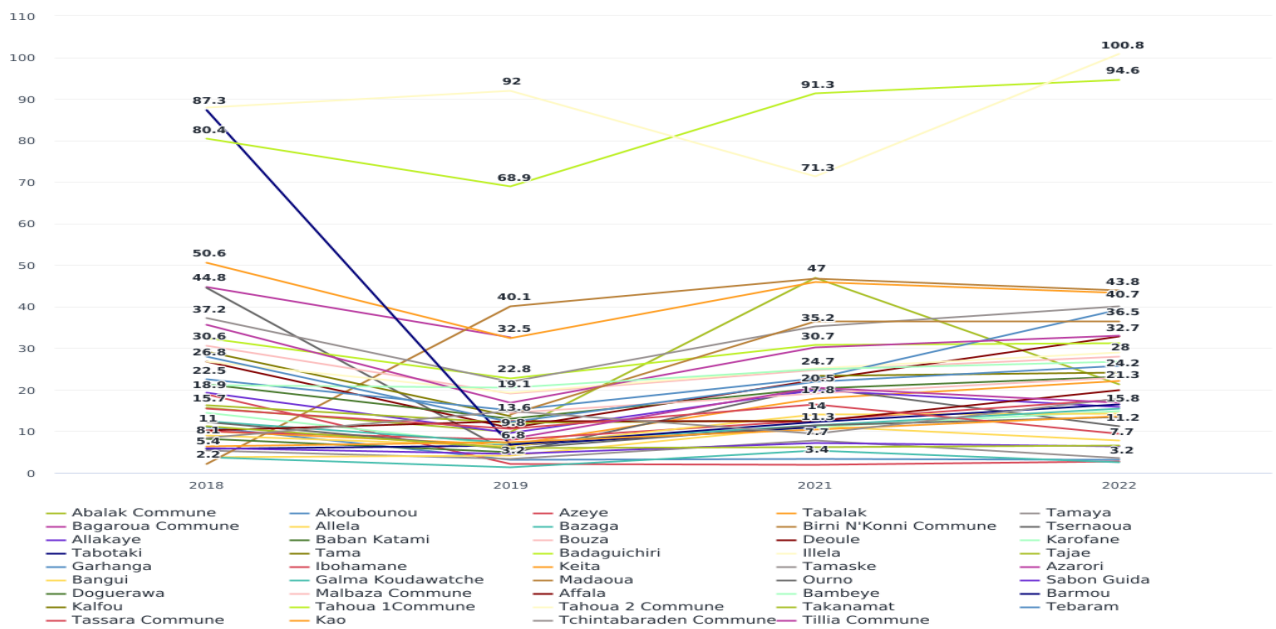**Figure 7**: *GAR for girls at primary school in the communes of Tahoua from 2018 to 2022*



**Figure 1** : *GAR for girls in Secondary 1 in Tahoua communes from 2018 to 2022*
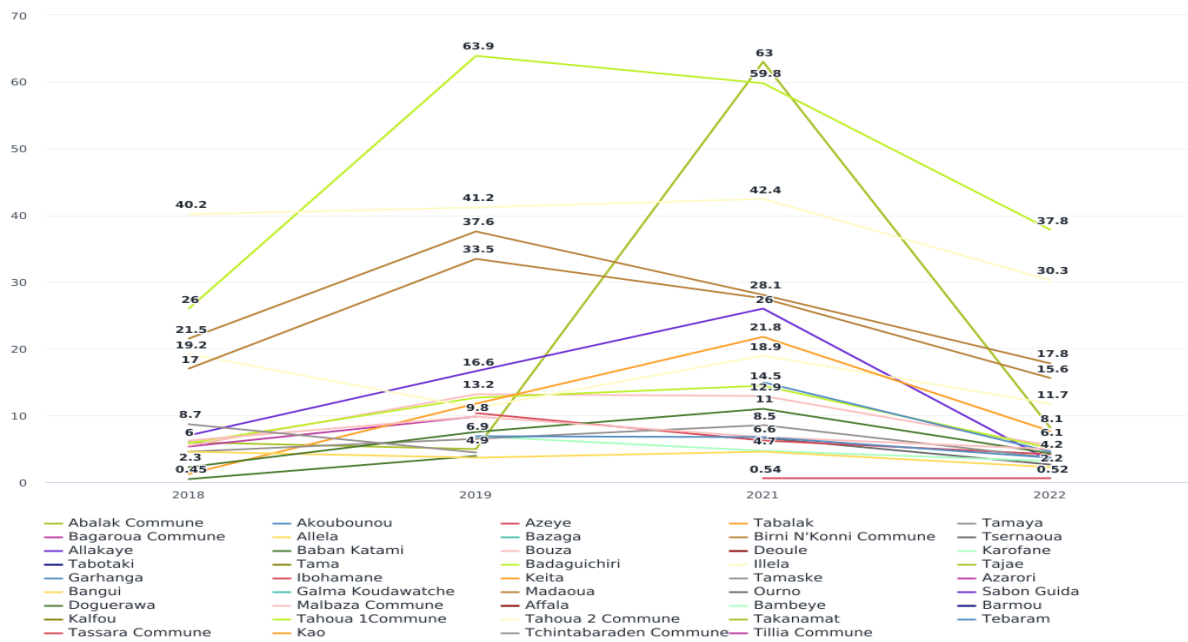
*Figure 9: GAR for girls in Secondary 2 in the communes of Tahoua from 2018 to 2022*

With regard to GER rates, the analyses carried out are illustrated in figures 10 to 12. From primary through secondary 1 to secondary 2, Tahoua commune 1 dominates in terms of GER performance.
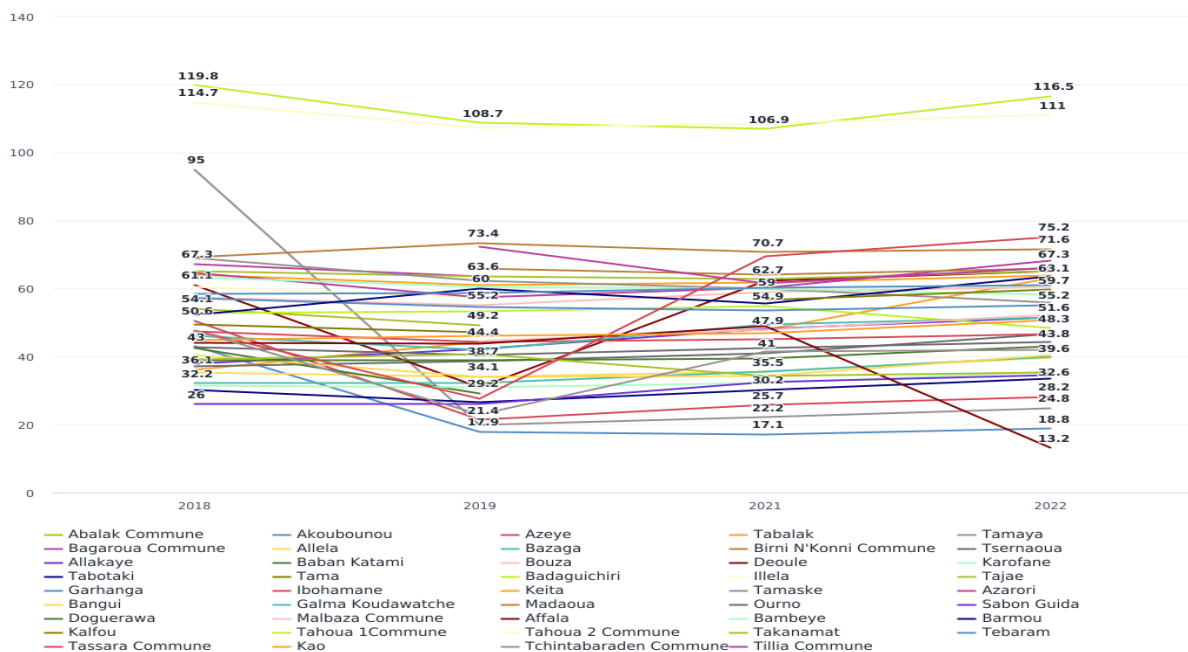


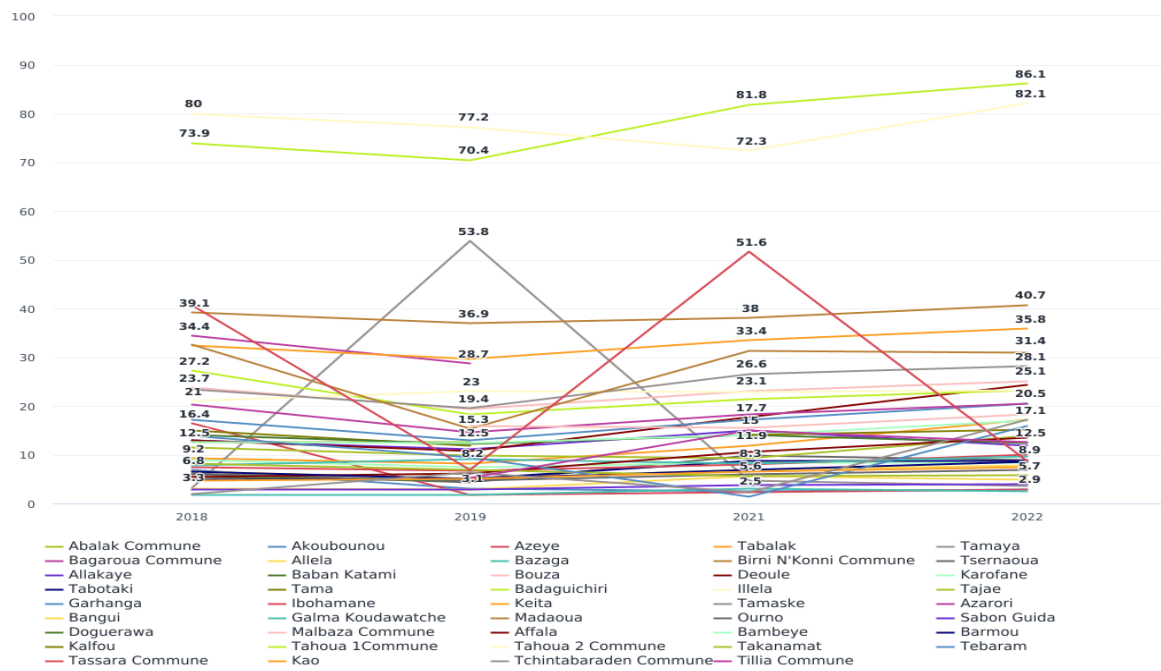*Figure 10: GER for girls at primary school in the communes of Tahoua from 2018 to 2022*

*Figure 21: GER of girls in Secondary 1 in the communes of Tahoua from 2018 to 2022*
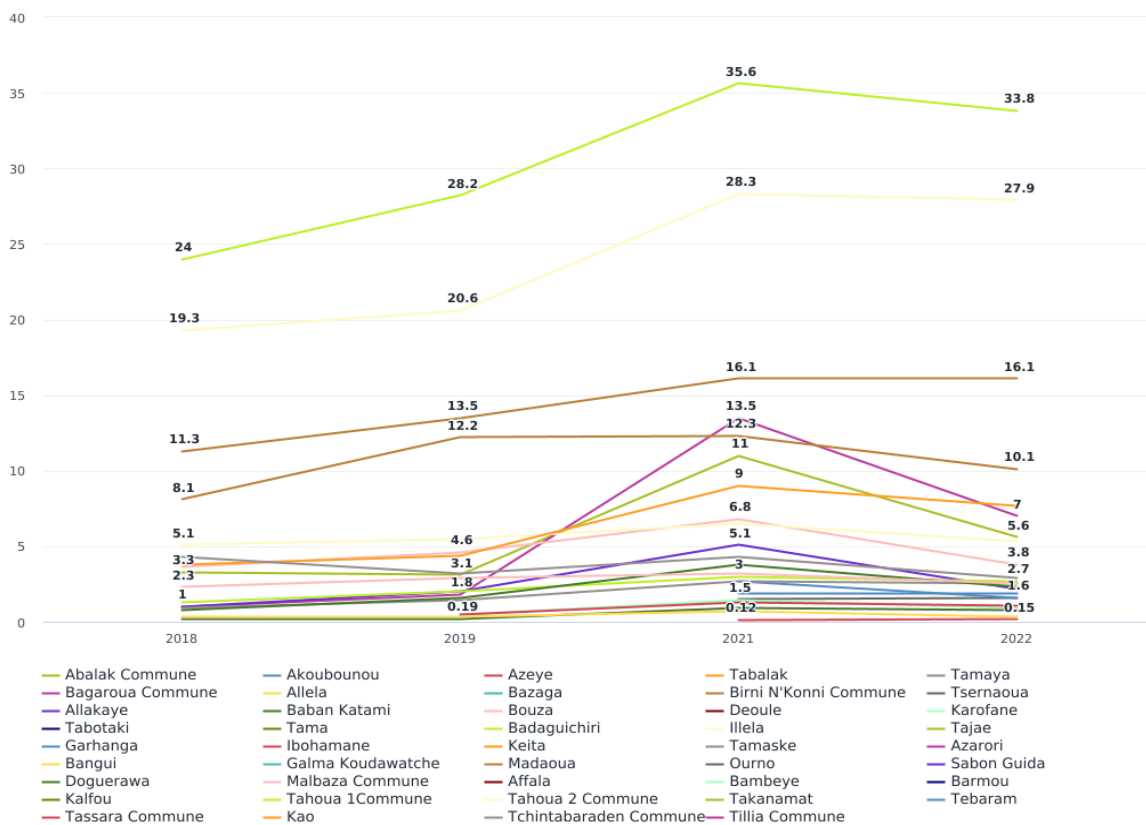


**Figure 32***: GER for girls in Secondary 2 in Tahoua communes from 2018 to 2022*

## Conclusion

In essence, the GAR rate is the proportion of children admitted to the first year of a given education cycle, whatever their age, in relation to the population of legal admission age. The GER rate, on the other hand, expresses the capacity of the system, or part of the system, to enroll its children. Based on the results of our analyses, we can safely say that, in Niger, urban areas are more conducive to education from primary to secondary 2. Moreover, the further away we are from urban centers, the lower the GAR and GER rates, illustrating the failure of the system to enroll children in the areas concerned.

## Références

[1] Adamou Bouba (2018),"perception par les formateurs et les eleves-maitres, du role des technologies de l'information et de la communication, dans la formation initiale a l'ecole normale d'instituteurs (eni) de dosso (niger).", n° 26, vol1.

[2] Agaissa Assagaye and Jean-Claude Bationo, (2023),"l'usage des technologies de l'information et de la communication (tic) dans l'enseignement-apprentissage de la geographie au niger.", vol.1, n.27.

[3] Dhis2, (2020), "dhis 2 developer guide",chapter 4 dhis2 technical architecture

[4] Moussa Mohamed Sagayar. "Transition numérique et innovation pédagogique dans l'enseignement supérieur au niger: contexte, solutions experimentees et alternatives possibles.", rise, vol. 1, nᵒ 1, p. 54–66.

[5] Yousfi soukaina, and Ihssane yousfi,(2023) "la formation des enseignants à l'integration des tic dans les pratiques pédagogiques." Didactica, vol.1, nᵒ1.

[6] Maïdakouale Ibrahim, and Carole Fagade (2022). "l'usage des technologies numériques éducatives dans l'enseignement supérieur africain : entre démocratisation de dispositifs et accentuation des inégalités socio-numériques : cas des universités du Benin, Niger et côte d'ivoire." *interfaces numériques*, vol.11 n.3 (2022).

[7] Matangelo Gerard Eloko eya, Anne–Marie Mvunda Nkongo, and Eric Panzi Kalunda, (2023),"les facteurs associes au faible remplissage du rapport mensuel de l'hopital et du centre de sante du systeme national d'information sanitaire «etude menee dans les zones de sante de: gombe, kintambo, lemba et maluku 1 a kinshasa»." revue internationale du chercheur, vol. 4 no.3 (2023).

[8] Farnham Andrea, et al., (2023), "a roadmap for using dhis2 data to track progress in key health indicators in the global south: experience from sub-saharan africa.", bmc public health, vol.23 no.1

[9] Fofana A., et al.(2023), "evaluation du systeme de surveillance des paralysies flasques aiguës, district sanitaire de beyla, septembre 2021." revue d'épidemiologie et de sante publique,vol.71, pp.101980.

[10] Matin Hamidullah, et al.(2023),"covid-19 vaccines coverage in afghanistan: a descriptive analysis of secondary data from dhis2.", razi international medical journal, vol. 3., no. 2,pp.62-69.

[11] MEN/AEP/PLN, ministere de l'education nationale, de l'alphabetisation, de l'enseignement professionnel et de la promotion des langues nationales du niger, (2023), "statistiques de l'education et de l'alphabetisation", annuaire 2022-2023, pp. 1-5.

[12] Keita F. D., N. gbamou, and s. corvil., (2023), "evaluation du systeme de surveillance de la covid-19, coyah, septembre 2021." revue d'épidemiologie et de sante publique, vol. 71, p. 101940.