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## Geo-database for Poor Families to Enhance Poverty Counter Efforts, Evidence from Jordan

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### ABSTRACT

The main aim of this paper is mainly oriented toward human and social service organizations understanding the importance of geographically enabling information systems (with GIS) to support their core missions taking Al Salt city center as a pilot study area. GIS can support their business process and workflows. Previous studies assured that efforts of struggling poverty were lacking of obvious and comprehensive spatial database. In addition, the need of updating data is critical for this kind of database. A spatial database shall add more clearness and understandable for agencies, associations and institutions working in this field. On the other hand, geo-database the contradictory happened in poverty efforts alleviation from different agencies may vanished gradually by using the same spatial data base. Furthermore, the decision making process will be much easier. Correspondingly, poverty planning could be more efficient. Academics have made the case that social work needs mapping. This paper describes how geographic information systems (GIS) fill that prescription by creating a real Geo-database for poor families at Al Salt city center as a pilot study area. The study use a a handled GPS machines and a written questionnaire to collect the spatial and attribute data for 253 poor family at Al Salt city center. These 253 families were recognized from National Aid Fund (NAF) database. Even NAF have database, this database needs updating and auditing and it lacks of spatial location of poor families which this research tried to fulfill. On the other hand, NAF database is an excel sheet with written addresses of poor families not (X,Y) location easy to reach from NAF employees and any other agencies or individuals try to reach these poor families. Geo-database also have other capabilities concerning map visualization and thematic maps creation. GIS is a key component in modernizing the information technology (IT) of many human and social service programs. The results indicated the possibility to estimate and continually monitor poverty rates by using GIS techniques to support traditional methods of data collection and analysis.

**Keywords:** GIS, Geo-database, Al-Salt, poverty alleviation, Mapping Poverty.

### INTRODUCTION

Poverty is general scarcity or dearth, or the state of one who lacks a certain amount of material possessions or money (World Bank, 2014). Absolute poverty or destitution refers to the deprivation of basic human needs, which commonly includes food, water, sanitation,

clothing, shelter, health care and education. Relative poverty is defined contextually as economic inequality in the location or society in which people live (World Bank, 2011). poverty is a very complicated issue which has a lot of socio-economic aspects.

Poverty reduction is a major goal and issue for many international organizations such as the United Nations and the World Bank. The World Bank estimated 1.29 billion people were living in absolute poverty in 2008. Of these, about 400 million people in absolute poverty lived in India and 173 million people in China. In terms of percentage of regional populations, sub-Saharan

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Africa at 47% had the highest incidence rate of absolute poverty in 2008. Between 1990 and 2010, about 663 million people moved above the absolute poverty level. Still, extreme poverty is a global challenge; it is observed in all parts of the world, including developed economies. UNICEF estimates half the world's children (or 1.1 billion) live in poverty (World Bank, 2010).

Around the world, over half million of social workers and human service professionals are helping vulnerable and distressed people every day. Their clients include foster children, the elderly, the mentally ill, the homeless, the disabled, and many others in need. Social workers and human service professionals accomplish their work through hundreds of different programs in government agencies, nonprofit organizations, private practices, and other groups. These programs are in great demand due to the global economic crisis and numerous other drivers including changing demographics.

As spatial determinants are increasingly considered essential in understanding poverty, the use of consistent Geo-datasets in developing poverty reduction strategies is a growing requirement (Henninger,1998). This is because the success of poverty reduction programs depends largely on the use of quality data to help determine the nature and extent of poverty and to properly design and implement strategies for alleviating poverty in a particular context. Efforts of struggling poverty are lacking of obvious and comprehensive spatial database. In addition, the need of updating data is essential for this kind of database.( Hentschel et al,1989). A spatial database shall add more clearness and understandable for agencies, associations and institutions working in this field and the contradictory happened in poverty efforts may vanished gradually. Furthermore, the decision making process will be much easier. Correspondingly, poverty planning will be more efficient. By leveraging the data management, analysis, and visualization capabilities of GIS, social workers and other human service professionals are empowered to understand community needs, measure environmental forces (including

access to services), deliver services more efficiently, and detect fraud and abuse(Tatem et al,2014).

## **2 Literature Review**

Few studies concentrate on the effectiveness of Geo-database in managing poverty efforts. Recently researches use the new techniques' especially GIS to introduce the spatial aspect of the poverty problem. Urbanism related in recent studies to poverty accordingly slum areas began to exist mainly in large and metropolitan cities. On the other hand, poverty preliminary appears in rural districts after the industrial revolution in the 19th century at industrial countries but still poverty appears widely in developing countries in rural areas as well. Researches began to take in their studies the spatial distribution of poor families in order to release the reasons of poverty as we can see in the study done by Al kaddam & Al habeas (2010) This study aimed at shedding light on the phenomenon of urban poverty in the southern territory of Jordan through analyzing the factors affecting the level of poverty of urban families in order to account for this phenomenon. The study drew several conclusions; of these most notably ones is the existence of a significant relationship between economic factors and increasing rates of urban poverty and the existence of a relationship between government policies to deal with this phenomenon. Another study held by Al Sqoor (1989) concentrate in poverty regions and how the poverty distribute regarding spatial aspects under the supervision of Ministry of Social Development. Furthermore, Levernier, Partridge &. Richman (2000) wrote about the causes of regional variations in United States of America poverty, he took a cross-county analysis which also take into consideration the spatial issue and how poverty differs through regions of US trying to find the variation reasons. They depend on poverty maps of Us. Moreover, Shtayeh (2007) investigate the phenomenon of urban poverty and its impact on urban development in the city of Nablus. Other studies concentrate on rural poverty such as a

study done by Benson, Chamberlin, and Rhinehart (2005) examining the spatial determinants of the local prevalence of poverty in rural Malawi. Furthermore this spatial aspects could be found obvious in UNDP report (1999) addressed " Urban Settlements and Poverty", UNDP (2005) report "human development report" and in World Bank report (2004)" Assessment of Poverty in the Hashemite Kingdom of Jordan". On the other hand, a study done by Akinyemi (2009) concentrates in the using of spatial data for poverty reduction efforts. The article emphasis that the use of consistent spatial datasets in developing poverty reduction strategies is a growing requirement. In addition, the success of poverty reduction poverty programs depends on the using of good quality data to help determine of the nature and extent of poverty and to properly design and implement strategies for alleviating poverty in a particular context. The article highlighting on the possibility of sharing and updating of geospatial poverty data nationally and internationally . They also facilitate the use of spatial data for poverty assessment and mapping and the development of poverty reduction applications. The survey done by researcher find that spatial data reveals the types of spatial data used for addressing poverty are diverse and vary between programs, depending on the type of poverty measure adopted. Finally, the researcher admitted that Spatial data use is fast becoming a best practice for poverty assessment.

A poverty map as defined in a manuscript done by Nawar, Abdel-Hameed (2007) is a map which provides a detailed description of the spatial distribution of poverty and inequality within a country. It combines individual and household (micro) survey data and population (macro) census data with the objective of estimating welfare indicators for specific geographic area as small as village or hamlet (world bank,2004). Recent advances in geographic information system (GIS), databases and computer aided software engineering make poverty mapping possible, where data

can be presented in the form of maps and overlaying interfaces for cross-comparisons. Spatial analysis and benchmarking are also applied to assess the relationships between the two sets of micro and macro data according to their geographic location. The first poverty map recognized done by Charles Booth's showing the Old Nichol, a slum in the East End of London. It was published in 1889 in London.



**Fig 1 The oldest poverty map 1889/London**

Another study done by Davis, Benjamin, and Siano (2001) address the importance of using poverty maps in having accurate and constant information. In addition, Feeney, Williamson, and Bishop (2002) also emphasis on the Spatial Data Infra structure (SDI) for poverty regions to Support Spatial Decision-Making. Also Gauci, and Steinmayer (2005) shed light also on the poverty maps as a useful tool for policy design to reduce poverty.

Another report done by Aidoo, Schwabe and Govender ( 2006) took the geo-database as essential point in the efforts of reducing poverty in Africa. Mistiaen, Özler, and Razafindravonona (2002) wrote about putting welfare on the map in Madagascar. Meanwhile, Snel and Henninger (2002) focused on the spatial locations of the poor experienced with the development and use of poverty maps. They realized the importance of positioning the poor in their locations to help them and to find solutions to reduce the poverty

rates. Then Snel (2004) developed a poverty-conservation mapping applications. His main idea was that mapping poverty could reduce the efforts and money spend in poverty alleviation rates.

This study shall emphasize the importance of mapping poverty concentrating in the rapidly use of GIS as a solid technical tool of building a Geo-database. The addition will be that mapping poverty not as a pocket but build a very accurate Geo-database represent each family as a significant point with full attribute gathered from field.

Another addition could be added to this study that, the accuracy of pointing every poor family could be reflected directly in enhancing poor families lives. Since each family shall has its own updated record database. All agencies work in field can make continuous caring and follow up to these poor families easily. Even individuals can reach these poor families for charity reasons effectively.

### ***3 Goals of the Study***

This study aims mainly to illustrate the importance of using GIS technology in poverty alleviation by using it to create a Geo-database for poor families at Slat city center region in Jordan as a pilot study .Creation of this Spatial data base shall unify the efforts of all institutions work in the field by distributing the spatial database through available network. Up-dating data for National Aid Fund ( NAF) Beneficiaries families; this includes add new families or cross out others Also, it means change the attribute or spatial data for these families. In addition, analytical studies using this spatial database by GIS and other software will be much available and easier. Finally, the study aims to distribute this kind of Geo-database to all governorates of Jordan.

### ***4 Study Methodology & Tools***

The study shall follow the applied methodology to achieve the study goals depending on field survey which conclude collecting spatial data by using GPS handled machines and a questionnaire to collect attributes of poor families in the pilot study area followed by office work

using geographical information system(GIS) software to build the Geo-database using the latest soft ware of ArcGIS 10.3.1 and for analysis purposes .

#### ***4.1 Define Poor Families***

The definition of poverty and the measurement methods used to identify poor persons are part of a longstanding discussion in development economics (Chambers R.(2006). It is important to define the Poor family in this study given that it's the key of building the poor families Geo-database. Department of statistical bureau in Jordan makes a survey for poverty in Jordan using cluster sample in 2008 & 2010 collaboration with USAID and ministry of Planning in Jordan. The poverty rate in Jordan is 14.4% in this report for 2010 and the absolute poverty line is (813.7 JD) per capita annually and (68JD) per capita monthly. For standardized Family (5.4 individual) it was (4394 JD) annually and (366 JD) monthly. The study will depend on this absolute poverty line since it depends on a trusted scientific survey. National Aid fund (NAF) and other governmental and non governmental agencies in Jordan also depends in these figures. The National Aid Fund (NAF) was established in 1986 (Law no. (36)) and functions as an autonomous institution under the auspices of the Ministry of Social Development.

NAF has its own procedure to emphasizes the Poor family. Every Poor family can fill an application in the nearest NAF field office and there is face to face interview. On the other hand, there social workers visit applicants in their locations and check the information filled by applicants and the submitted official documents. Furthermore, NAF has links with other related governmental and nongovernmental agencies such as social security Corporation, Department Of Lands and Survey, Zakat fund ...etc to audit the information declared by applicants. NAF has six defined programs, but the study concentrated on the category which takes recurrent financial aid. This is the largest program administered by NAF in terms of scope. It provides in cash support to a

variety of groups such as the poor, elderly, divorced women, families taking care of orphaned children (below 28 years old), families with disabled persons, and families of detained prisoners, foster families, young women, Jordanian women married to non-Jordanians, humanitarian cases, abandoned women, persons receiving assistance and rehabilitation loans, families of seasonal workers, families of missing and absentee fathers, persons receiving Handicapped Care Aid, other candidates who received approval from the Board. All the beneficiaries of any of the NAF programs are automatically eligible for health insurance (National Aid Fund, 2011). The Fund provides the beneficiaries with monthly cash transfers ranging from JD 40 to JD 180 depending on income, assets, and family circumstances. Eligibility Criteria: General eligibility criteria include: Citizenship - Residency - family must have countable income less than its poverty line - An assessment is required for each household member to evaluate - The head of household must ensure their children age 7 to 12 attend school as required and finally the head of household must provide proof immediately, or within six months that all children for whom benefits are received are appropriately immunized.

Income-producing property, arable land, or possessions of a car (unless used by a disabled member of the family) are all considered to be disqualifying factors. Any income received by one of the family members decreases the benefit received by 25 per cent of the income amount up to the level when it is eliminated.

From NAF records (2014), a total of 89,411 families all over Jordan are benefiting from the National Aid Fund's (NAF) monthly assistance at a cost of around 7.152 million JD each month. Approximately 225,753 individuals receive an average of 31.6 JD from the fund each month, according to NAF figures. The study followed the indicators and standards which NAF depends on. Additionally, the study used auditing tools to clarify the information given by the applicants

through field visit survey, personnel meetings and questionnaire for each applicant. On the other hand, the study search for volunteer persons and charity associations work in the district to meet any poor family that is not signed in NAF attributes. Deliberate that when the Geo-database is finished and published it will be easy to sign any new needed poor family by themselves or by other volunteer agencies.

#### **4.2 The Procedures:**

**1-Field work:** A well trained team consists of five social workers and a team leader specialized in GIS and GPS techniques worked to complete the survey for the whole region of Salt city center to specify the spatial and attribute data of all NAF beneficiary families in this region. Fieldwork took about 10 days, taking into consideration that poverty families is at least 235 families. Every trip calculated from 25 family points by using GPS handled devices and the questionnaire sheets.

**2-Office work:** Using ArcGIS software 10.3 to transfer the collected data immediately from field by coordinating between social workers and the team leader. They build the Geo-spatial database taking into account its accuracy and constancy. Requested this step contain:

A- Creation of shape files needed with accreted spatial reference (UTM). Point layer for NAF Beneficiary families(x ,y); point layer for land marks; raster layer for satellite map; polygon layer for administrative divisions...Etc;

B- Digitizing the spatial data for all layers; the point coordinates, the address, the pictures...etc

C- Filling the attribute data from questionnaire sheets;

D- Audit the spatial & attribute data and be sure of its accuracy

E- Create layers from shapefiles.

3-Analytical work: using (GIS) technique and other software. This step contains:

A- Symbolization the attributes in the layers by a

proper symbols.

B- Classification of attributes mainly on the base of family criteria depending on fields such as: Income; Cause of poverty; place of residence; family size; family kind...etc.

C- Create graphs , tables and reports.

**4 Prospect Work: Publishing Geo-database**

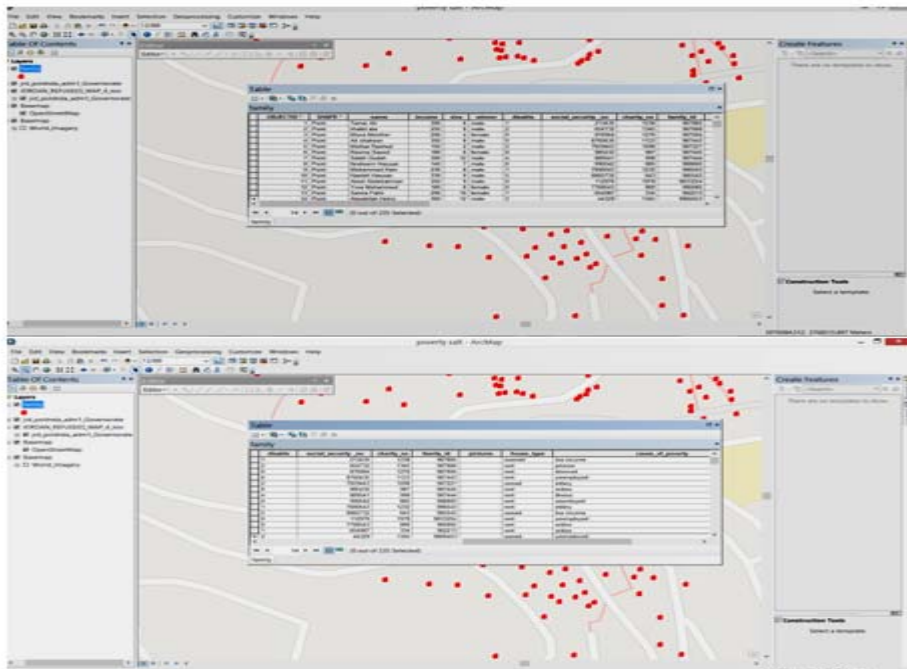
The study aims to publish its work in a website or GIS server after applied to all governorates of Jordan. NAF could be the host of the server because the data need to update continuously in view of the fact that NAF is a governmental authority has the abilities, employees and authorities to control the server contents and

security. It needs updating the data besides having links with other related institutions and agencies.

**5 Outcomes and results**

**Scientific outcomes**

- 1- Proving the importance of Geo-database for poverty alleviation;
- 2- Production of spatial and attribute database for the poor families suffers from poverty in Salt city center region as shown in Fig 2;
- 3- Analytical studies of current and future situation of poverty in this region may conduct easily using this Geo-database.



**Figure.2 the spatial and attribute data base of Salt city center by ArcGIS 10.3.1**

**Applicable outcomes**

It is expected that all agencies and institutions from private, public sector or NGOs can use this Geo-database of poor families at Al-Salt city center easily and constantly(Fig3). This Geo- database can eliminate any

conflict of efforts. Every family suffers from poverty shall receive its human rights of development through projects and programs of poverty alleviation. In addition, these benefits occurred at Al- Salt city center will encourage other districts to implement the same procedure.



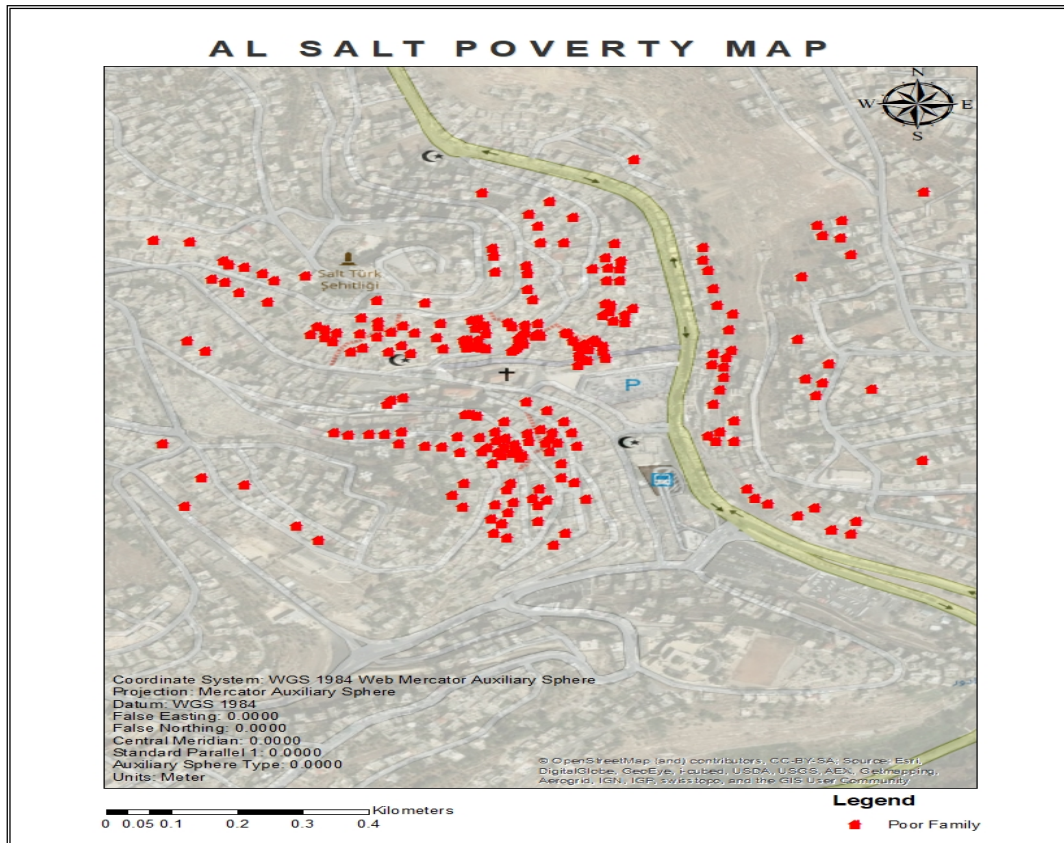


Figure3. Poverty map of Salt city center by Using ArcGIS 10.3.1 to Identify poor families.

**Development outcomes**

1- Reaching NAF beneficiary families in Salt city center region in this stage and whole poor families in all governorates of Jordan in the last stage. This expected to enhance poverty alleviation efforts in Jordan. The main goal is to reduce poverty rates and enhance Jordanians life.

2- Increase coordination between all agencies and Institutions working in the field of poverty to reduce of poverty rates in Jordan. This shall improve the quality of poverty projects and reduce the time and cost needed for such projects.

**6 Recommendations**

The study recommend intensively to publish the final Geo-database for the whole governorates of Jordan in a website or GIS server and Mobile application once applied to all governorates of Jordan . NAF could be the

host of the server since it's an authorized governmental body. The data needs updating continuously as well having links with other related institutions and agencies. NAF can add and remove beneficiary families straightforwardly. Furthermore, NAF can update the attribute and spatial data of the beneficiary families constantly. This updating is controlled from the website host. Publishing shall make it easy to reach the Poor families which were difficult to reach before, and this Geo-database will make the contradictory goes to the least by sharing the same data from different agencies. The aid money shall appear and updated directly in the attribute of the NAF beneficiary families. Other national agencies such as Zakat Fund, Hashemite development fund, Tekyat Um Ali, Charity associations, NGO's and international agencies can have a link to the Geo-



database as well by having a registration account.

The study suggests activating an E payment secure method in this website. It can be related directly to the bank accounts of NAF beneficiary families. The name of the poor family may not appear in the public website for security reasons.

Furthermore, individuals, NGO's and local associations wanted to aid to poor families can easily

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## قاعدة بيانات مكانية للأسر الفقيرة لتعزيز جهود مكافحة الفقر ، دليل من الأردن

رانية جعفر قطيشات

### الملخص

الهدف الرئيسي من هذه الورقة موجه بشكل أساسي نحو منظمات الخدمة البشرية والاجتماعية التي تترك أهمية نظم المعلومات الجغرافية لدعم مهامها الأساسية مع أخذ مركز مدينة السلط كمنطقة دراسة رائدة. أكدت الدراسات السابقة أن جهود مكافحة الفقر تفقر إلى قاعدة بيانات مكانية واضحة وشاملة. إلى جانب ذلك، فإن الحاجة إلى تحديث البيانات أمر بالغ الأهمية لهذا النوع من قواعد البيانات. يجب أن تضيف قاعدة البيانات المكانية المزيد من الوضوح والفهم للوكالات والجمعيات والمؤسسات العاملة في هذا المجال. من ناحية أخرى، قد يتلاشى تدريجياً التناقض الذي حدث في جهود الحد من الفقر من المؤسسات بسبب استخدامها بيانات مختلفة ومتناقضة. علاوة على ذلك، ستكون عملية صنع القرار أسهل بكثير. ومن جهة أخرى، يمكن أن يكون تخطيط الفقر أكثر كفاءة. لقد أكد الأكاديميون أن العمل الاجتماعي يحتاج إلى بيانات مكانية وخرائط. تصف هذه الورقة كيف تملأ نظم المعلومات الجغرافية هذه الوصفة من خلال إنشاء قاعدة بيانات جغرافية حقيقية للعائلات الفقيرة في مركز مدينة السلط كمنطقة دراسة رائدة. استخدمت الدراسة أجهزة GPS التي تم التعامل معها واستينياً مكتوباً لجمع البيانات المكانية والسمات لـ 253 عائلة فقيرة في وسط مدينة السلط. تم التعرف على هذه العائلات من قاعدة بيانات صندوق المعونة الوطنية (NAF). لدى NAF قاعدة بيانات، تحتاج قاعدة البيانات هذه إلى التحديث والتدقيق وتفقر إلى الموقع المكاني للأسر الفقيرة التي حاول هذا البحث تحقيقها. من ناحية أخرى، فإن قاعدة بيانات NAF تفقر إلى البعد المكاني للأسر الفقيرة مما يصعب الوصول إليه من موظفي NAF وأي وكالات أو أفراد آخرين يحاولون الوصول إلى هذه العائلات الفقيرة. تمتلك قاعدة البيانات الجغرافية أيضاً إمكانات أخرى تتعلق بتحليل البيانات وإنشاء الخرائط الموضوعية، حيث يعد نظام المعلومات الجغرافي مكوناً رئيسياً في تحديث تكنولوجيا المعلومات (IT) للعديد من برامج الخدمة البشرية والاجتماعية. أوضحت النتائج إمكانية تقدير معدلات الفقر ومراقبتها باستمرار باستخدام تقنيات نظم المعلومات الجغرافية لدعم الأساليب التقليدية لجمع البيانات وتحليلها.

الكلمات الدالة: نظم المعلومات الجغرافية، قاعدة البيانات المكانية، السلط، التخفيف من حدة الفقر، رسم خرائط الفقر.

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