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Content Details:

<p>Asamoah - Frimpong Gifty (Author) <i>Ghana National Association of Private Schools (GNAPS)</i></p> <p>Samuel Agyapong (Co-author) <i>Department of Education Leadership, Institute for Teacher Education and Continuing, Professional Development, University of Education</i></p>	<p>Implementation Challenges of Inclusive Education in Basic Schools in Kumasi Metropolitan Assembly</p>
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Abstract

Every nation is required to grant every child of school age equitable access to education, according to the Salamanca World Conference and Action Framework on Special Needs Children of 1994 and the 1990 United Nations Convention on the Right of the Child. The provision of education for people with special needs still faces significant difficulties, even though some nations, notably Ghana, have complied with and put into practice the declarations. A lot of strategies have been put in place by educationists in the Kumasi Metropolis; to address it yet its implementation is without challenges. The study sought to find out the extent of collaboration there is between parents, other professionals, and teachers in inclusive schools when it comes to dealing with difficulties involving children with special needs. Also, to determine whether teachers in the regular schools have requisite experience and special training to enable them teach in an inclusive classroom. Simple random and purposive sampling techniques were used to select the expected 40 teachers and 36 parents for the study. A self-administered semi-structure questionnaire and observation checklist was used to generate information from the study participants to achieve the set objectives. The submission of the data on the online platform of Google form was exported as excel files. These files containing the data were exported into Statistical Package for Social Science (SPSS) version 21 was used to process the data for analysis using tables and pie charts. Variables were coded for easy analysis. Descriptive and quantitative research methods were used for the analysis. The study revealed that parents do collaborate with teachers in dealing with issues with inclusive education implementation challenges. However, modern technology teaching aids are lacking in most of the schools which negatively affects inclusive education in basic schools in Kumasi. The study recommended that children in inclusive schools are to be provided with modern technologies. The study further recommended the encouragement of parent-teacher partnerships, professionally develop teachers and celebrate students' diversity in our basic schools.

Keywords: Inclusive Education, Basic Schools, Kumasi Metropolis

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<p>Felicia Hagan (Author) <i>Teesside University Middlesbrough</i></p>	<p>A Systematic Review of Research That Explores the Benefits and Challenges of Including Students of Autism in English Higher Education</p>
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Abstract

This paper critically reviewed a systematic study on the integration of autistic students to UK higher education, digging deeper into the advantages and drawbacks. The review aims to provide a comprehensive literature review by identifying key findings, strengths, weaknesses, and feeding the lessons learned into a roadmap of future directions.

Applying a systematic approach as a basis, the report combs through academic databases and relevant literature, extracting and synthesizing data which speaks about the experiences of autistic students in higher education environments.

The main findings suggest that statutory acts like Autism Act 2009 and Equality Act 2010 have led to legal provisions for the autistic students but are yet to resolve the remaining issues to accomplish full inclusion and academic success. With sensory sensitivities, social integration difficulties and the lack of sensibilities and proper support from educational institutes being identified as some of the disadvantages. The opposite is true, that is, the advantages of participatory higher education for autistic students are also acknowledged in terms of better academic performance and development of social skills. Moreover, the confidence level of autistic students is increased.

The review underscores the necessity for educational institutions to adopt more comprehensive and individualized support strategies that recognize the diverse needs of autistic students. It also calls for further research to explore the intersectionality of autism with other demographic factors such as ethnicity, socioeconomic status, and cultural background, to fully understand and address the barriers to inclusion and success in higher education.

Keywords: Autism spectrum disorder (ASD), Autistic students, UK higher Education, Autism Act 2009, Equality Act 2010, intersectionality of autism

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<p>Abdoulmajid Abdramane Mahamat (Author) <i>Dibebe Ngo for Development and Aid</i></p>	<p>Attractiveness of local cultural industry products: opinion of young Chadians</p>
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Abstract

Nowadays, cultural industries represent a group of industries which contribute significantly to the economy and development of communities. The purpose of this study is to assess the level of attractiveness of local cultural industry products and the consumption habits of these products by young Chadians living in N'Djamena. This cross-sectional study was carried out from 15 April to 20 May 2024 among students in the 1st year of their Bachelor's degree in the Faculty of Languages, Literature, Arts and Communication at the University of N'Djamena. The study involved 200 students with an average age of 22.17 ± 2.05 years (min=19 years; max=25 years). Young people surveyed who did not know what a cultural industry was represented 41% of participants, while only 57.32% of young people who were familiar with what a cultural industry was could name at least one local cultural industry. Moreover, a total of 40% of the young people surveyed said they had not consumed any products from local cultural industries in the past year. The products from the cultural industries judged as of poor quality were Disc/Cassette (36%) and films (29%). Audiovisual content broadcast on radio or television (64%) and works of art were highly rated (58%). On the other hand, books produced by local cultural industries were financially inaccessible for 11% of participants. It is therefore necessary to revitalise the sector by strengthening the skills of those involved and digitising the cultural goods produced.

Keywords: cultural industry, knowledge, consumption, youth, Chad

Attractiveness of local cultural industry products to young Chadians

Cultural industries are important economic levers that contribute to the development of communities. They contribute significantly to economic, social and cultural change in societies. They are at the heart of the production and dissemination of products that influence people's knowledge, perceptions and overall experience with regard to the rest of the world (Hesmondhalgh, 2013). Writers such as Theodor Adorno and Max Horkheimer (1972) denounced the commodification of culture, the alienation of the consumer and the transformation of the cultural producer into a salaried worker (Adorno et Horkheimer, 1972). Away from the controversial thoughts given to the notion of the cultural industry in the 90s, it has over time become a crucible for the promotion and immortalisation of cultural trends in our societies. Thus, the cultural industries today represent a group of industries whose common denominator is the production and distribution of cultural goods (Bouquillion et al., 2013). These industries cover music, the visual arts, film, literature, the performing arts and, from a broader perspective, fashion, architecture and design (Caves, 2000).

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New technologies supporting cultural industries

It is clear that the atmosphere in the cultural industries has undergone major changes in recent years (Power et Hallencreutz, 2002 ; Parthasarathi, 2013 ; Rivron, 2010). This has been done with the arrival of new technologies, which have led to changes in the organisation of industries and new ways of creating, producing, distributing and consuming cultural content. Moreover, the ways in which communities appropriate these technologies (De Certeau, 1980; Appadurai, 1996) vary from one country to another. Traditional cultural industries have undergone profound changes linked to the development of information and communication technologies (Anderson, 2004; Benghozi, 2006; Bouquillion et al., 2013).

Challenges currently facing local cultural industries

We also note the emergence of the phenomenon of cultural globalisation. Cultural globalisation has undeniable advantages. Among other things, it increases individuals' cultural choices and creates new ways of appropriating transnational cultural flows (Hall, 1997; Hannerz, 1997). But it sometimes threatens local culture and brings other realities to the fore, such as the stifling of local cultural dynamics, the concentration of knowledge and power in a few places, and movements to assert identity (Dollfus et al., 2000; Cadène, 2007). Today, more than ever, it presents new challenges in the face of growing cultural and territorial issues. However, in the face of these new cultural challenges, Africa is still lagging behind Western countries. The measures taken in recent years have not done enough to accelerate the process of reappropriating our cultural identity, which is losing ground. Indeed, the ways in which cultural content is created, produced and distributed have been partly rethought, as is the case with machine-connected computing and digital production software involving social networks, streaming and downloading platforms, but also artists' websites, personal blogs, smartphone applications and so on. These are economic, social and cultural opportunities to be seized, which can have an impact beyond the borders of individual countries.

Purpose of the study

As in other African countries, it is more important than ever to assess in Chad the role of local cultural industries in the distribution and promotion of cultural heritage to local populations and internationally. Very few studies have looked into the relationship between young people (the main consumers of cultural products) and the cultural industries in Chad. It is therefore within this framework that the present work falls. The main objective of which is to assess the value that Chadian youth place on the products of the local cultural industry. This study aims to understand the level of attractiveness of local cultural industry products and the consumption habits of these

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products by young Chadians living in N'Djamena. It will also make it possible to improve national cultural policy through the digital transition that now seems inevitable for African countries.

Method

Study type and population

This is a cross-sectional study focusing on the attractiveness of local cultural industry products to young people living in the city of N'Djamena in Chad. It was carried out between 15 April and 20 May 2024 among students at the University of N'Djamena. Participants in the study were students from the Faculty of Languages, Literature, Arts and Communication at the University of N'Djamena. They were students in the 1st year of a Bachelor's degree in the Faculty of Languages, Literature, Arts and Communication, enrolled for the 2023-2024 academic year.

Sampling and data collection

The study team met with the target students to solicit their voluntary, free and informed participation in the study. The volunteers who took part in the study were free to choose and gave their free and informed consent. They were asked to answer certain questions and submit their answers on an online KoboCollect form. The demographic and socio-economic data of the participants was collected. Questions were asked to the participants using a self-administered semi-structured interview guide (online using the KogboCollect link).

Statistical analysis

Statistical analysis of the data was carried out using STATA version 17 software. Descriptive analyses were carried out to describe the level of attractiveness of products from local industries among study participants. Usual statistical measures were used depending on the type of variable, such as the calculation of averages with their standard deviations and percentages.

Results

Socio-demographic characteristics

Our study involved 200 students, of whom 47 were women (23.5%) and 153 men (76.5%), with a male/female sex ratio of 3.26. The mean age of the participants was 22.17 ± 2.05 years (min=19 years; max=25). Table 1

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Description of the study population

Variable	Number	Pourcentage
Ethnie		
Boulalas	47	23,5%
Ouadaïis	47	23,5%
Kanembous	24	12%
Dazas	23	11,5%
Arabes	23	11,5%
Ngambays	20	10%
Other	16	8%
Marital status		
Married	153	76,5%
Single	47	23,5%
Religion		
Muslim	176	88%

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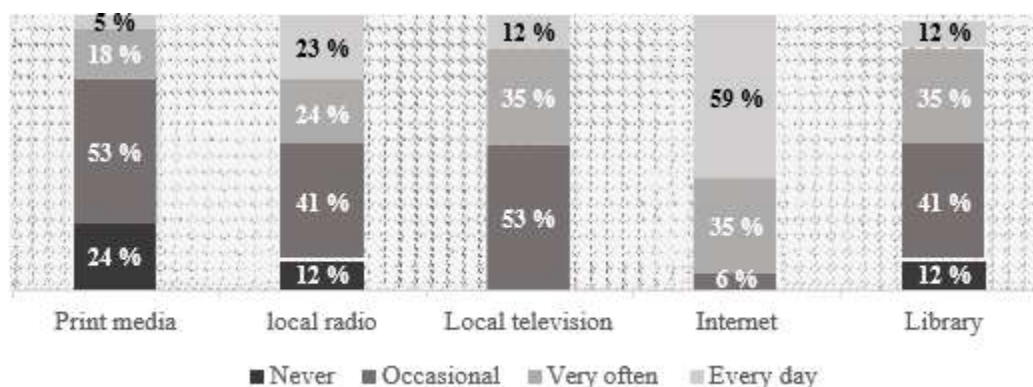
Christian	12	6%
Other	12	6%

As shown in Table 1, most of the study participants were of Boulalás (23.5%) or Ouaddaïs (23.5%) ethnicity. Concerning their marital status, the majority were single (76.5%) compared with married (23.5%). The dominant religion in our study population was Islam (88%).

Frequency of use of information channels

Information channels enable people to keep abreast of national news, including in the cultural sphere. These channels are used in a variety of ways, depending on their geographical accessibility and people's preferences. Figure 1

Frequency of use of information channels



The most frequently used information channels included the internet, local radio, local television and the library (Figure 1). This study revealed that almost all participants (94%) used the internet very often, if not every day. Local radio was used very frequently (every day) by 57% of participants. Television as an information channel was used frequently by 47% of participants. The least used information channel was the written press (24%). Nevertheless, 53% used it occasionally.

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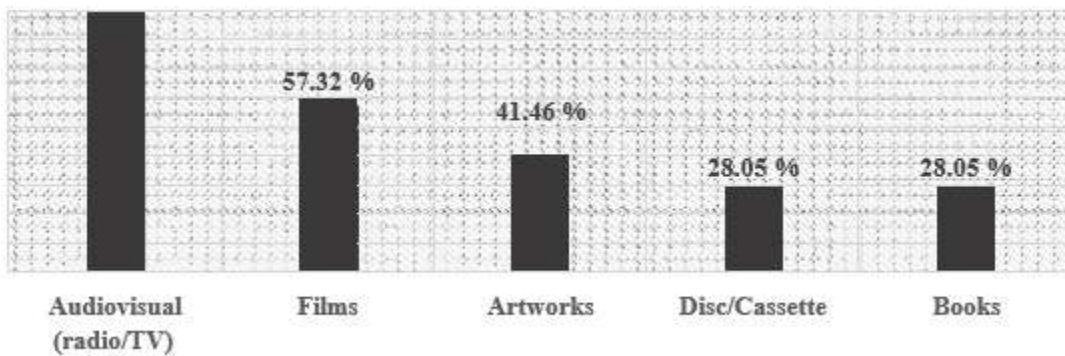
Knowledge about the cultural industry

Young people's responses made it possible to identify those who really knew what a cultural industry was. This study revealed that cultural industries remain largely unknown among the young people surveyed. Among the participants, those who did not know what a cultural industry is, was not negligible (41%).

Figure 2

Products of the cultural industries cited

85.37 %



In addition, products that can be derived from the cultural industry, and which were the most cited (Figure 2) by the participants (the 118 participants who knew about the cultural industries), were audiovisual content broadcast on radio and television (85.59%), films (57.62%) and works of art (41.52%). Books and Disc/Cassette were mentioned by 28.05% of participants, making them the least frequently mentioned products. Of the 118 participants who knew what a cultural industry was, only 57.62% knew of at least one local cultural industry.

Consumption of cultural industries products

Products from Chad's local cultural industries are available and accessible to the vast majority of the population. However, at the end of the present study, a total of 60% of participants (120 participants) had consumed at least one product from the local cultural industries during the past year.

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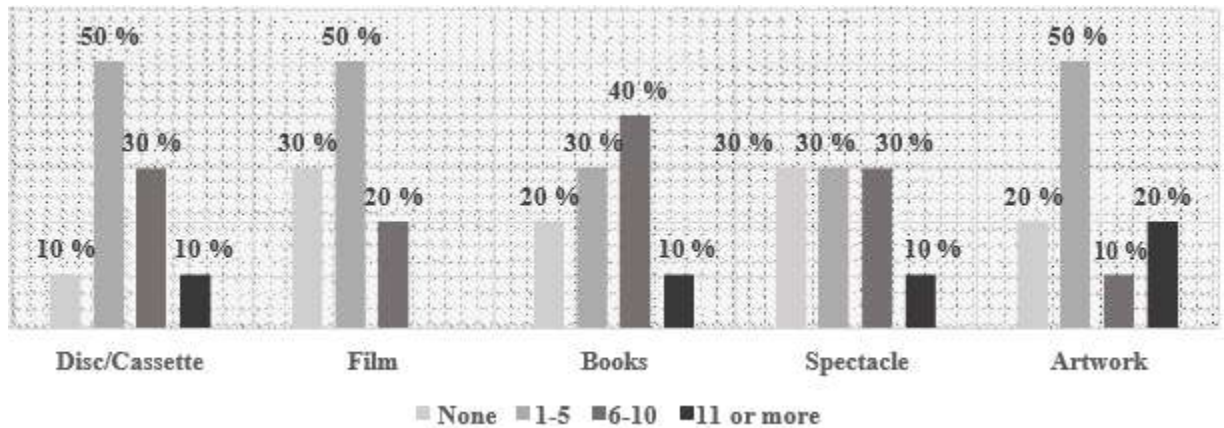
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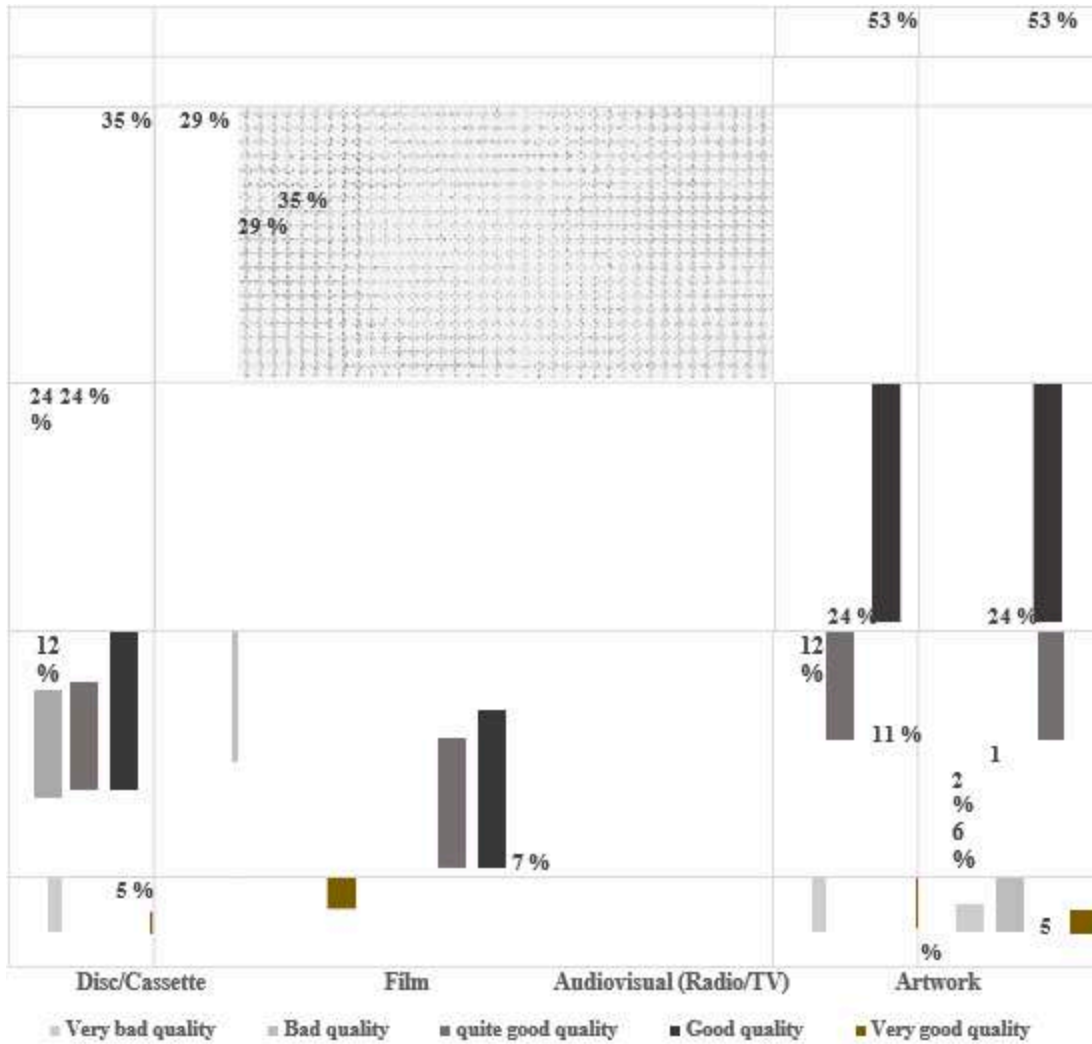
Figure 3

Frequency of consumption of products from local cultural industries



Every year, local cultural industries produce a number of cultural goods for the Chadian population. An analysis of participants' consumption habits over the past year (figure 3) revealed that the products most consumed were Disc/Cassette (90%), followed by books (80%) and works of art (80%). Most participants had consumed one to five (1-5) Disc/Cassette (50%), one to five (1-5) works of art (50%) or six to ten (6-10) books (40%) in the past year. The products least consumed in the past year were films (not consumed by 30%) and

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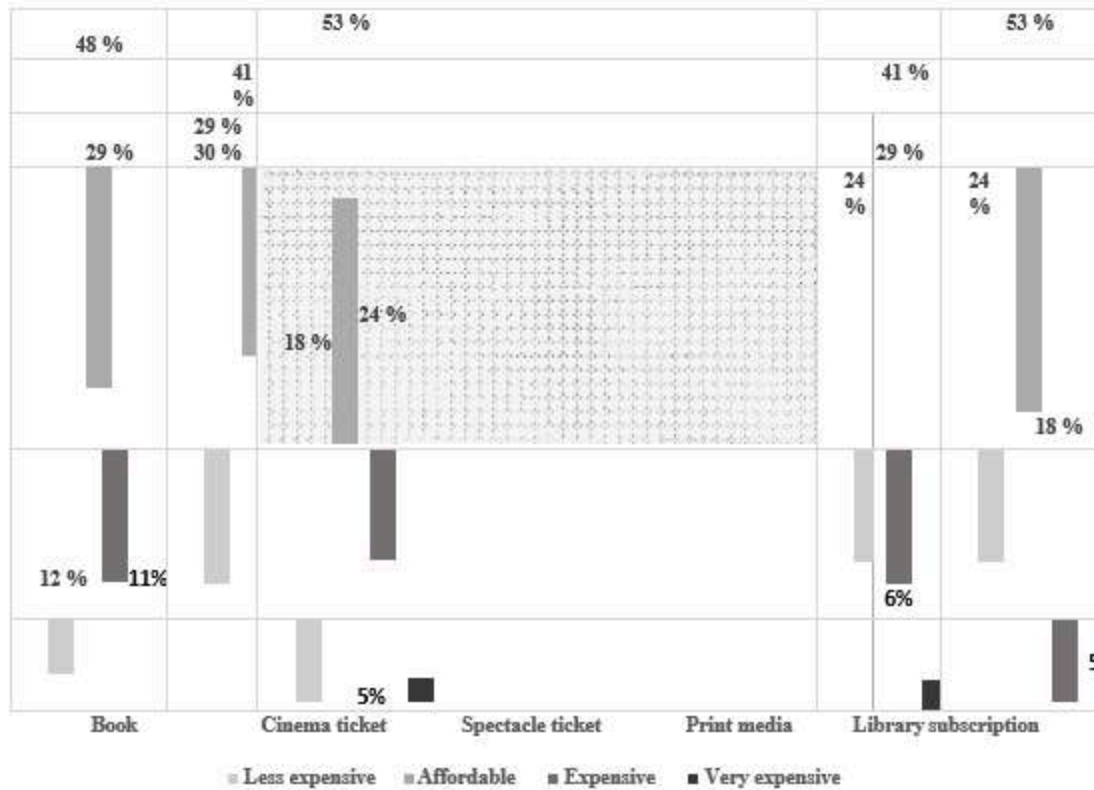
According to the majority of participants in the study, the products judged to be of poor quality (Figure 4) were Disc/Cassette (36%) and films (29%). Audiovisual content broadcast on radio or television (64%) and works of art were very highly regarded (58%). Similarly, according to 71% of participants, the cultural dynamic has made progress thanks to the cultural players themselves. Those participants who felt that Chad's cultural

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The most affordable product (Figure 5) according to participants was a library subscription (77%).

Tickets for shows and cinemas were affordable for 72% and 70% of participants respectively. On the other hand, books produced by local cultural industries were financially inaccessible for 11% of participants.

Discussion

The aim of this study was to assess the interest shown by young Chadians in the products of local cultural industries and to understand the potential reasons for this.

Knowledge about cultural industries

Results show that 41% of the young people who took part in the survey were unfamiliar with the cultural industries. The young people surveyed seem to be confused about the real role of these industries in culture. What's more, only 57.32% of the participants who were familiar with the cultural industries claimed to know at least one local cultural industry. This situation, which is also the case in several African countries, partly reflects young people's need for information on issues relating to the cultural industries, their importance in the development of peoples and their role in promoting local culture. The

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most well-known cultural industry products were audiovisual content broadcast on radio or television (85.7%), films (57.32%) and works of art (41.46%). These are the most highly valued products.

Consumption and quality of cultural goods produced by the cultural industries

Results of the surveys show a low rate of local consumption of products from cultural enterprises in Chad. Many focus on technical quality and the lack of innovation. As a result, the lack of professionalism on the part of the players makes it difficult to satisfy young people in a context of strong international competition due to cultural globalisation. However, several countries in the sub-region have in recent years improved the quality of the products that the national cultural industries offer to their populations. This is the case in Burkina, Nigeria, Mali, Senegal, Côte d'Ivoire etc (OIF, 2020; Aminatou, 2020). However, the situation in Chad is completely different, as this study has revealed. In the Chadian context, this weakness is based on the lack of structures that can support businesses in achieving their objectives, which is to satisfy the population and encourage them to consume more local products.

Conclusion

The aim of this study was to assess the interest of young Chadians in cultural goods produced by local cultural industries. The study showed that local cultural industries are little known by young people in Chad.

Young people's knowledge of the cultural sector is low. This is due above all to the low value placed on cultural products. It should also be noted that the products of the cultural industries are little consumed by the young people surveyed overall. This situation is the result of several factors, including the absence of structures to professionalise the players and the low level of digitisation of these cultural goods in order to adapt to the opportunities offered by the new information and communication technologies.

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<p>Cheng Fang Hsu (Author) <i>Shu Te University</i></p>	<p>The application of AHP method on the choosing factors for Taiwanese students to study abroad</p>
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Abstract

The purpose of this paper is to aim at the factors for Taiwanese students to choose study abroad. The study adopted the Analytic Hierarchy Process (AHP) techniques as the research methodology. A model has been proposed to evaluate the best treatment and disposal technology. As well, Expert opinions have been incorporated in the selection of criteria. AHP has been used to determine the weights of criteria, followed by available ranking. Through quantitative weightings from the AHP model were calculated to identify the priorities of alternatives. The study provides a simple framework to the complex models. Because most students study abroad to invest in a better self-future. The model identifies the factors for Taiwanese students choosing study abroad should be considered at school conditions, personal conditions, and social conditions. The findings found that School conditions can create good learning outcomes. The school's conditions must consider the factors such as curriculum, admission requirements, and school resources. Moreover, financial and living environment are also important of concern. Therefore, factors that Taiwanese students choose to study abroad must be comprehensively considered to create their best future opportunities.

Keywords: AHP, choosing factors, study abroad

Introduction

"It's hard to find a job this year," according to an analysis of the 1111 Job Bank employment report. In the post-epidemic era, although the market will recover in the first half of 2023, many companies are still cautiously controlling costs and there are not many job vacancies. In the past, graduates in this quarter, it took job seekers an average of 2.9 months to find a job; when the epidemic was at its worst, it took 4.2 months; although the market has recovered after the epidemic, only more than 60% of companies have resumed normal recruitment. Due to the Directorate General of Budget, Accounting and Statistics, Executive Yuan reported that the unemployment rate in May was 3.46%, and the demand-supply multiple was 1.55 times, which means that there are only 1.55 job opportunities for a job seeker. The voice of many graduates is that it is difficult to find a job. Therefore, more and more students consider at studying abroad to upgrade their value for Improving their market competitiveness.

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Literature review

In recent years, competition in Taiwan's job market has been fierce. In order to cope with the rapid changes in the general environment, job seekers need to not only strengthen their professional functions, but also develop soft skills, such as having an international perspective, the flexibility to work in remote locations, and possessing independent management, communication and collaboration skills, etc., enhance workplace competitiveness. To improve their employment competitiveness, many young students consider studying abroad.

There are many issues to consider when studying abroad. From school problems to the environment, to the school's reputation, to personal factors, etc., they are all the focus of concern for students who are preparing to study abroad. School issues cover both software and hardware issues, such as curriculum planning, school location, subject selection, campus equipment, and even admission requirements are all factors that need to be considered. Therefore, the challenges faced when choosing a school are wide and varied, including software and hardware considerations. These issues include course design, subject selection, campus facilities, location selection, and even entry requirements and many other factors need to be carefully considered.

Batey and Lupi (2012) proposed that studying abroad is a personal career planning decision, which depends on the individual's choice of future needs, growth direction and competitive advantage. Personal recognition needs refer to the ability to use one's own advantages in the future job market environment so that one can survive in industrial competition and strive for future development. Porter (1980) emphasized that students obtain better market salaries through competitive strategies such as work experience, ability improvement, and international perspective.

Thomas (2012) believed that although studying abroad is a personal need, it is affected by many factors, such as the ranking of the school, family financial support, personal personality factors, etc., which will all affect the decision to choose to study abroad. Parents will consider students' personal growth and development plans when choosing to study abroad. One of the most important reasons for its selection is international competitiveness. Because the development of studying abroad is not only a substantial improvement in English ability, but also an international perspective is a very important factor. In addition, when studying abroad, students can face and solve problems independently. These are all reasons for parents to choose to let their children study abroad. In view of these reasons, when choosing to study abroad, the school's courses and resources, the city's environment, tuition fees, etc. have become extremely critical selection factors. (Stachowski and Sparks, 2007; Thomas, 2012; Vande, Paige, and Lou, 2012)

Thomas (2012) students who choose to study abroad, if their families cannot provide a certain degree of financial support, must work while studying. The ultimate learning effect is that they need to think seriously when choosing to study abroad, because once they are unable to complete their academic qualifications, all these, the effort is a waste. Because the most important thing for studying abroad is to complete your studies and obtain academic certificates to increase your personal market

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competitiveness. If students spend too much time working part-time, they may neglect their studies and fail the subject. The cost and time of rebuilding are considerations that cannot be ignored.

Figueiredo and Mauri (2013) pointed out that studying abroad must take into account students' ability to adapt to the environment, not only the external environment, but also the living environment. Traffic conditions, weather factors, food, social atmosphere, school friendliness, teaching quality, etc.; plus internal environmental factors, refer to the factors of students' personal personality, such as not being independent enough to take care of themselves, over-reliance and severe homesickness, Introversions makes it difficult to get along with others, etc. However, when many parents consider students studying abroad, they pay too much attention to the tuition fee issue. Tuition fees are the top priority. All they want is to get a good job with an overseas degree. But this is not an absolute result. (Cohen, Cohen, West and Aiken, 2003; Chena, Liu and Portnoy, 2012; Figueiredo and Mauri, 2013; Deng and Sun ,2014).

Figueiredo and Mauri (2013) pointed out that although the school's admission requirements are not the most preferred factor in choosing to study abroad, it is the most critical reason. Many times, students must give up the school they want because their abilities cannot meet the requirements of the school they want to apply for. Parents in Taiwan are relatively concerned about the school's ranking in the market, equating it with the performance of future employment competitiveness in the market or good opportunities and salary conditions when looking for jobs in the future. So that they will choose a school with a higher ranking or a higher reputation (Deng and Sun ,2014).

Methodology and Discussion

This research employed the Analytical Hierarchy Process (AHP) as its chosen methodological approach, a powerful and structured decision-making tool created by Thomas Saaty in 1971. AHP is renowned for its ability to tackle intricate problems with multiple criteria, making it a valuable asset for decision-makers seeking to make informed and prioritized choices while considering both qualitative and quantitative aspects of the problem at hand. This method is particularly notable for its capability to establish the relative importance of criteria in an analysis and its proficiency in addressing both measurable and intangible factors through pairwise comparisons.

Despite AHP's widespread use in multi-criteria assessment, its application for simultaneously considering criteria interdependence and feedback has been notably absent in the existing literature. The process of pairwise comparison and synthesis within AHP plays a pivotal role in selecting the most suitable technology while optimizing costs. The AHP methodology generally encompasses four key steps: structuring the decision into objectives and alternatives, quantifying these objectives and alternatives through pairwise comparisons, synthesizing the objectives, and incorporating subjective inputs to derive a prioritized list of alternatives (Bertolini, Braglia, and Carmignani, 2006).

In AHP, the nominal scale is predominantly used for pairwise comparisons, with a nine- point scale derived from a basic five-point scale. The maximum eigenvalue (λ_{max}) serves as an indicator of the consistency of the comparison matrix A, ideally equal to the number of criteria (n) for perfect

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consistency. In practical applications, the pairwise comparison matrix often deviates from complete consistency. The difference between λ_{max} and n is termed the consistency deviation, which signifies the degree of inconsistency in the criteria. To gauge the consistency, the Consistency Ratio (C.R.) is calculated by dividing the Consistency Index (C.I.) by the Random Index (R.I.). When C.R. is less than or equal to 0.1 and tends toward 0, the consistency is considered satisfactory.

In the context of this study, the AHP approach was harnessed to construct a two-tiered framework that seamlessly integrates insights from a literature review and expert opinions (see Figure 1). This innovative framework serves as a structured and systematic methodology for addressing complex decision-making scenarios by considering various criteria and the intricate interrelationships among them.

The first tier of this framework involves an exhaustive literature review. This phase is instrumental in identifying and defining the critical objectives and alternatives that will be evaluated. By drawing on existing research, the study gains valuable insights into the landscape of the problem and the factors that should be considered during the decision-making process. This knowledge forms the foundation upon which the subsequent steps of the AHP methodology will be built.

The second tier of the framework entails expert opinions and pairwise comparisons. In this phase, experts in the field are engaged to provide their insights and expertise. Through a series of pairwise comparisons, these experts evaluate the importance and relationships among the identified objectives and alternatives. This process allows for the quantification of subjective judgments, rendering them amenable to rigorous analysis within the AHP framework.

The synthesis of these two tiers results in a comprehensive and well-informed decision-making process. The literature review provides a solid theoretical basis, while the expert opinions bring in practical, real-world insights. The pairwise comparisons are essential in assigning relative weights to the criteria, considering both their importance and interdependencies. The combination of these elements allows the AHP methodology to generate a prioritized list of alternatives that optimally align with the specified objectives.

The integration of these two tiers into a single framework represents a significant advancement in the application of the AHP method. It enables decision-makers to tap into a rich pool of knowledge from both academic research and practical experience. By accommodating the multifaceted nature of decision-making scenarios, this approach enhances the robustness of the decision-making process and facilitates more informed and effective choices.

In conclusion, this study utilized the Analytical Hierarchy Process (AHP) as a methodological approach to address complex decision-making scenarios with multiple criteria. AHP's structured framework, which incorporates pairwise comparisons and expert opinions, enhances the ability to make informed and prioritized choices while considering both qualitative and quantitative aspects of the problem. The integration of a literature review and expert insights into the AHP methodology within a two-tiered framework represents an innovative approach that fosters more effective and informed decision-making. This holistic methodology offers a valuable tool for decision-makers in various fields, enabling them to navigate intricate problems and make optimal choices.

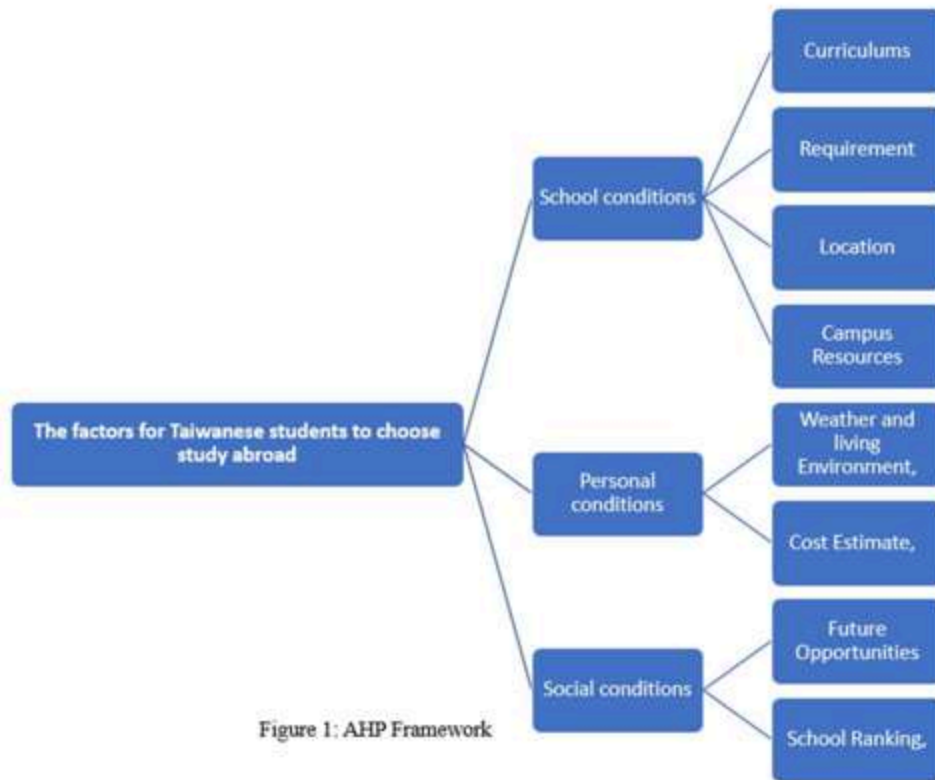
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This study tried to obtain the weights Value by AHP and determine the most important priority factors. The relationship is between the weight of other factors and so on, and to understand why and how Taiwan student choosing the factors when they decide to study abroad. According to the ten experts in the first layer of the weight value of the AHP results, seven experts as the first choice, cost estimate is most important. And the other three experts also take cost estimate as a second choice. The sum of the averages in cost estimate took the highest point, 0.355 for the first position in total. (Table 1) According to study result found that school ranking is not unimportant, but it is thought cost estimate is the basic condition and the essential element for studying abroad oversea. Hence, the choosing factors on the school ranking refers to if the cost estimate is potential or not.

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Table 1: The Frist layer of the weight value of AHP results

Level 1	School conditions				Personal conditions		Socila conditions	
Lever 2	Curriculum	Requirement	Location	Campus Resources,	Weather and living environment,	Cost Estimate	Future Opportunities	School Ranking,
Expert 1	0.253	0.167	0.060	0.032	0.126	0.274	0.049	0.314
Expert 2	0.285	0.082	0.091	0.045	0.249	0.142	0.107	0.141
Expert 3	0.029	0.054	0.080	0.015	0.510	0.512	0.233	0.080
Expert 4	0.026	0.139	0.239	0.014	0.045	0.325	0.069	0.467
Expert 5	0.033	0.151	0.204	0.016	0.071	0.421	0.053	0.472
Expert 6	0.087	0.154	0.095	0.034	0.145	0.222	0.021	0.465
Expert 7	0.022	0.085	0.165	0.326	0.039	0.356	0.181	0.181
Expert 8	0.029	0.033	0.431	0.029	0.089	0.441	0.131	0.259
Expert 9	0.033	0.303	0.198	0.059	0.083	0.276	0.100	0.225
Expert 10	0.052	0.222	0.431	0.024	0.066	0.298	0.085	0.121
The sum of the averages	0.849	1.390	1.994	0.594	1.423	3.267	1.029	2.725
Sequence	7	5	3	8	4	1	6	2

In the second layer of the weight value of the AHP results BY ten experts, Cost estimate (3.267) stood up to the first place and flowing is School ranking (2.725). The third came on Location (1.944) and the fourth position is Weather and living environment (1.432). Requirement (1.390) sat at the fifth important and Future Opportunities (1.029) took the sixth situation. Curriculum (0.849) took the seventh position. However, it is surprising that Campus Resources (0.594) turned out to be the last seat. Through the result found that cost estimate has the strongest influence if Taiwan student decide to go study oversea or not. It is relatively easy to recruit students with a cheaper cost estimate. And another important and direct element on affecting their choosing factors is the School ranking. (Table 2)

Table 2: The Second layer of the weight value of AHP results

School conditions	3	Curriculum	3
		Requirement	2
		Location	1
		Campus Resources,	4
Personal conditions	1	Weather and living environment,	2
		Cost Estimate	1
Socila conditions	2	Future Opportunities	2
		School Ranking,	1

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To assess the relative the first layer of the weight value of the AHP results, each element in the three dimensions of school conditions, personal conditions, and social conditions for the choosing factors for Taiwanese students to study abroad. It outcomes that personal conditions is the priority element, and social conditions is the second. Surprisingly, school conditions occupies the last position. The result indicated that the Taiwan student choosing the factors when they decide to study abroad takes the most importance on cost estimate. Moreover, among the eight key indicators of the key decision-making affecting factors is the cost estimate scale has the greatest impact on the key factors, which is the first priority, followed by the school ranking, and the least influential element is campus resources.

For the above analysis, it can be seen that the most important and critical element have been selected by the mid-to-high-ranking experts, as the first and second priority among the eight key indicators, the cost estimate and the school ranking which both belong to the personal conditions and social conditions element in the first layer of the weight value of the AHP results. So that cost estimate is the most important element affecting Taiwan student choosing the factors when they decide to study abroad. However, campus resources, under the three types of selection indicators gained the minimum requirements to measure the conditions. Especially campus resources took the lowest consideration. Because the school resources is already a very basic and standard requirements. Therefore, the key factors influencing affecting Taiwan student choosing the factors when they decide to study abroad should be cost estimate, school ranking, location, weather and living environment, requirement, future opportunities, curriculum, and campus resources in order.

Conclusions

The major key of Taiwan student choosing the factors when they decide to study abroad is to be the cost estimate. Through the study result found that cost estimate, school ranking, location separately taking the different factors and proportions to build up the key elements for Taiwan student choosing the factors when they decide to study abroad. Cost estimate is the most important element and direct influences if Taiwan student decide to go study oversea or not.

There are many factors for Taiwan students to decide studying abroad. They care not only about cost but also social opinion. Hence, they see school ranking is important as the second. The school ranking is another key for Taiwan students choosing school abroad. Students and parents decide to study abroad because there is a widespread belief in society that having an international degree leads to better job opportunities. However, studying abroad is not just a short-term study, and most students also pay attention to the location of the school. This is related to the quality and convenience of life such as weather and living environment and so on. However, when taking a school, students and parents must also consider at students' ability. Hence, the school entrance requirements must also be in the considerations. Holding an international degree can give you a more positive attitude towards Taiwan's job market. Because society still has the mentality that the moon in foreign countries is rounder. Therefore, it is easier to obtain more job opportunities and better wages. However, curriculum, and

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campus resources are listed at the last two. That's doesn't mean students or parents do not care for it. It's because Taiwan students are used to follow studying the set program which the school arrange for them. As well, Taiwan students does not complain with campus resources often. Therefore, curriculum, and campus resources are not their first consideration within other more important elements.

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<p>Yongwook Ju (Author) <i>East Stroudsburg University of Pennsylvania</i></p>	<p>Exploring the Roles of Cognitive and Affective Loyalty in Hotel Brand Crisis</p>
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Abstract

How would a consumer’s positive bond behave in the context of the corporate social responsibility (CSR) brand crisis? In order to explore the underlying causes of the “love is blind” and “love turns into hate” effects, this study investigated the influence of cognitive and affective loyalty on a consumer’s perceived betrayal and how this feeling of betrayal could lead to retaliation intentions in a lodging industry setting. Moreover, a multi-group analysis was conducted between hotel loyalty program members and non-members to investigate the moderating effect of member's enrollment status. A scenario-based online survey was distributed using the Qualtrics database, and highly valid 391 responses were used for statistical analysis. The results showed that cognitive loyalty negatively influences perceived betrayal, while affective loyalty increases the feeling of betrayal in a CSR brand crisis. The multi-group analysis result showed that the negative effect of perceived betrayal on repatronage intention is significantly lower for the hotel’s loyalty program members compared to non-members. The findings suggested that the type of bonds that consumers form behave differently when a CSR brand crisis occurs, and this relationship could also vary based on the consumer’s involvement in the loyalty program.

Keywords: Corporate social responsibility, brand loyalty, perceived betrayal, brand crisis, green initiatives, loyalty program

Introduction

Would a positive bond with a brand always lead to a positive result—even when your trusted brand betrays you? To answer this question, a recent study conducted by Kang, Slaten, and Choi (2020) investigated the relationship between pre-crisis corporate social responsibility reputation and retaliation intention and discovered that pre-crisis CSR reputation has a negative influence on perceived betrayal in corporate ability crises; thus, this result suggested that consumer’s positive bonds ameliorate negative feelings caused by the CSR crisis. On the other hand, the findings from Zhang, Zhang, and Sakulsinlapakron’s (2020) study suggested that the relationship between failure severity and negative emotion is positively moderated by brand love (i.e., “love turns into hate”), but, at the same time, brand love negatively moderated the relationship between negative emotions and retaliation intention (i.e., “love is blind”). Since consumer’s positive bond had not only positive but also negative effects in the CSR crisis context, the question remains: What could be the underlying cause of this difference?

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This study posits that this question could be answered by investigating the type of bonds that consumers form with a brand. According to Oliver (1999), consumers form cognitive, affective, and conative bonds (loyalty) with a brand. Specifically, this study focuses on cognitive and affective loyalty to investigate the impact of different types of bonds on perceived betrayal when a CSR crisis occurs. As consumers become more eco-conscious, the importance of CSR has been increasing. Especially the lodging industry sector has also been participating in green initiatives, and most hotel brand advertises their sustainability practices to improve their brand image. However, the reality is that many franchise hotels are owned and operated by independent owners and management companies; thus, there is a risk that the green initiatives that franchise advocates might not be fully implemented at the property level, and the impact of this could have a significant influence on consumer's emotion—and thus their behavioral intention. In that regard, research is needed to investigate the possible consequences of such CSR failures on consumer's behavioral intention in the lodging context. This study aims to provide theoretical and practical implications by 1) providing empirical evidence to better understand customer's "love turns into hate" and "love is blind" behaviors in the context of hotel CSR brand crisis by analyzing brand loyalty in a two different level—cognitive and affective loyalty, 2) exploring the consequences of perceived betrayal caused by hotel CSR brand crisis on consumer's retaliation intentions, and 3) examining how such relationship could vary between member and non-members of hotel loyalty program (see figure 1 for research framework).

Literature Review

Customers form cognitive, affective, and conative bonds (loyalty) with a brand (Oliver, 1999), and this study postulates that cognitive, affective, and conative loyalty could possibly have a different impact on perceived betrayal in the context of a hotel brand crisis. Based on attribution theory, consumers attribute the cause of a certain phenomenon either internally or externally (Heider, 1958). In the context of a CSR crisis, attribution could be made to the organization or the environment (Coombs, 2004). The antecedents of attribution are information, beliefs, and motivation, and the type of attribution made influences consumer behavior, affect, and expectancy (Kelley & Michela, 1980). The current study posits that cognitive and affective loyalty are 'beliefs/motivations' for attribution (either internal or external), and, based on the type of attribution made, it is expected to influence affect (perceived betrayal) and, eventually, behavioral intentions.

The findings from extant studies suggested that perceived betrayal has a negative influence on purchase intention in the context of crisis communication (Ma, 2018), and when service failure occurs, the perceived betrayal has a positive influence on retaliatory behaviors, including negative word-of-mouth (Gregoire & Fisher, 2008). This study also postulates that the same relationship between perceived betrayal and retaliation intentions is expected to exist in the context of the lodging industry. When enrolled in the hotel's loyalty program would generate a sense of community (Rosenbaum et al., 2005), and, from the marketing standpoint, it increases consumer's switching

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costs since not using it could limit the opportunities of using and accumulating membership points (Yi & Jeon, 2003). Members of the hotel loyalty program were expected to display mixed behavior. The current research postulates that while loyalty program members' positive bond is expected to generate more perceived betrayal, it will have a buffering effect on the relationship between perceived betrayal and retaliation intention. The following hypotheses are suggested:

H1: Pre-crisis cognitive loyalty has a negative effect on perceived betrayal in hotel CSR brand crisis.

H2: Pre-crisis affective loyalty positively affects perceived betrayal in hotel CSR brand crisis.

H3: Perceived betrayal negatively influences consumers' post-crisis repatronage intention.

H4: Perceived betrayal positively influences consumers' post-crisis negative electronic word-of-mouth (eWOM) intention.

H5: In the context of the hotel CSR brand crisis, the effect of a) cognitive and b) affective loyalty on perceived betrayal is stronger for loyalty program members than for non-members.

H6: In the context of the hotel CSR brand crisis, the effect of perceived betrayal on a) repatronage intention and b) negative eWOM intention is weaker for loyalty program members than non-members.

Methods and Results

Participants were asked to indicate their cognitive and affective brand loyalty to the hotel brand in a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), and measurement items were adopted from the study conducted by Back and Park (2003). Subsequently, participants were asked to read a news article that was supposedly posted on the New York Times' social media page, and the article discussed an incident regarding a certain hotel brand's failure to be socially responsible—especially related to green initiatives. The article was displayed to imitate a real social media page (see Appendix A). After reading the news article, participants were asked to indicate the level of perceived betrayal (1 = strongly disagree to 5 = strongly agree) and repatronage intention (1 = strongly disagree to 5 = strongly agree). Since the current study aimed to investigate the relationship between suggested latent variables, the hypotheses were tested using the structural equation modeling (SEM) approach. IBM SPSS Amos 26.0 was used to conduct statistical analysis.

A total of 413 responses were collected, and 22 respondents who typed invalid answers for the hotel brand identifying question (e.g., I don't know, not sure, etc.) were removed from the further analysis. After conducting the data cleaning process, 391 highly valid responses were utilized to test hypotheses. The demographic profile of participants showed that 46.0% of respondents were male and 52.4% were female. The median age was 38, and the majority of respondents identified themselves as Caucasian (73.1%) followed by African American (10.7%). 60.1% of respondents (n = 235) were enrolled in the

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hotel brand's loyalty program, while 39.9% were non-members ($n = 156$). Confirmatory factor analysis result showed acceptable model fit (PCMIN/DF = 2.68; TLI = 0.96; CFI = 0.97; RMSEA = 0.07), and all indicators, including factor loadings, Cronbach's Alpha, composite reliability, and AVE, were in the acceptable range.

The result of SEM analysis is displayed in Table 1, and it showed that cognitive loyalty had a negative influence on perceived betrayal ($\beta = -0.34$, $p = .00$) while affective loyalty had a positive influence on perceived betrayal ($\beta = 0.24$, $p = .04$) supporting H1 and H2. These findings confirmed that the different types of bonds—cognitive and affective—that consumers have could generate a different psychological effect in the context of the CSR crisis in the lodging industry. Perceived betrayal had a negative influence on repatronage intention ($\beta = -0.40$, $p = .00$) and had a positive influence on negative eWOM intention ($\beta = 0.50$, $p = .00$). Thus, H3 and H4 were supported (see figure 1). Multigroup analysis based on loyalty program membership status was performed using the chi-square difference test. The result showed that the path between cognitive loyalty to perceived betrayal was statistically significant for non-members ($\beta = -0.39$, $p < .001$), while it was not significant for members ($\beta = -0.41$, $p > .1$). Although perceived betrayal had a significant negative effect on repatronage intention for both groups, the coefficient was significantly lower for member group ($\Delta^2 = 21.16$, $p = .00$). H5 was not supported, and H6 was partially supported. Table 2 shows the result of multi-group SEM based on loyalty program membership.

Discussion

This research intended to explore consumers' "love is blind" and "love turns into hate" behavior in the context of the CSR brand crisis. Based on the review of extant related literature, the type of this positive bond was categorized as cognitive and affective loyalty. A total of 391 usable responses were collected, and the hypotheses were tested using SEM and multi-group analysis. The result showed that when a CSR brand crisis occurred, cognitive loyalty had a negative influence on perceived betrayal, while affective loyalty had a positive effect on perceived betrayal. The result also suggested that perceived betrayal decreased hotel repatronage intention and increased negative eWOM intention. The multi-group analysis between loyalty program members and non-members showed that increase in the path coefficients between cognitive/affective loyalty and perceived betrayal, but they were not statistically significant; however, the effect of perceived betrayal on repatronage intention was significantly weaker for loyalty group members than non-members.

To date, no studies have investigated the CSR brand crisis in the hotel industry context. Thus, this study is the first to explore the influence of CSR brand crisis on consumer's retaliation intentions. In that regard, this study contributes to the body of knowledge by providing empirical evidence that the type—cognitive and affective—of positive bonds matters when understanding consumer behaviors in the context of the CSR brand crisis. Cognitive loyalty led to less perceived betrayal (i.e., love is blind), while affective loyalty had a positive influence (i.e., love turns into hate). These findings expanded our

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understanding of relevant consumer behavior. The findings also showed that enrolling in the loyalty program could have a mixed influence on the lodging industry in the context of the CSR crisis. In addition, this research confirmed that perceived betrayal leads to less repatronage intention and more negative eWOM intention in the context of the hotel brand crisis. The finding suggested that, in the CSR brand crisis, the negative influence of perceived betrayal on repatronage intention was significantly lower for consumers enrolled in the hotel's loyalty program. Therefore, increasing the loyalty program enrollment is important not only because it could increase the profit but also because it has a buffering effect on the negative influence of perceived betrayal on repatronage intention after a possible CSR crisis. Furthermore, the result showed that cognitive loyalty decreased the perceived betrayal; thus, when consumers have a strong cognitive bond, which is formed based on information available to consumers and experience (Oliver, 1999), this type of bond is likely to decrease the perceived betrayal in a crisis setting.

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Table 1. Result of SEM Analysis

Hypothesized relationship	β	t-value	p	Result for hypothesis
H1: Cognitive Loyalty → Perceived Betrayal	-.34	-2.96	.00	Supported
H2: Affective Loyalty → Perceived Betrayal	.24	2.10	.04	Supported
H3: Perceived Betrayal → Repatronage Intention	-.49	-9.53	.00	Supported
H4: Perceived Betrayal → Negative eWOM Intention	.50	9.80	.00	Supported
Overall goodness-of-fit indices				
χ^2/df	3.65****			
TLI	.94			
CFI	.95			
RMSEA	.08			

Note: β = standardized path coefficient; CFI = comparative fit index; TLI = Tucker Lewis index; RMSEA = root mean square error of approximation.

Table 2. Result of Multi-Group SEM Based on Loyalty Program Membership

Hypothesized relationship	Non-Member		Member		Multi-group comparison	
	β	t-value	β	t-value	p-value	Result for hypothesis
H5: Loyalty → PCB	Not Supported					
CL → PCB	-.39	-3.37***	-.41	-1.44	.90	Not Supported
AL → PCB	.12	1.12	.43	1.50	.27	Not Supported
H6: PCB → Retaliation Intentions	Partially Supported					
PCB → RI	-.71	-11.59***	-.28	-3.35***	.00	Supported
PCB → NWM	.53	8.30***	.72	5.64***	.60	Not Supported

Note: β = standardized path coefficient.
 *** p < .001.

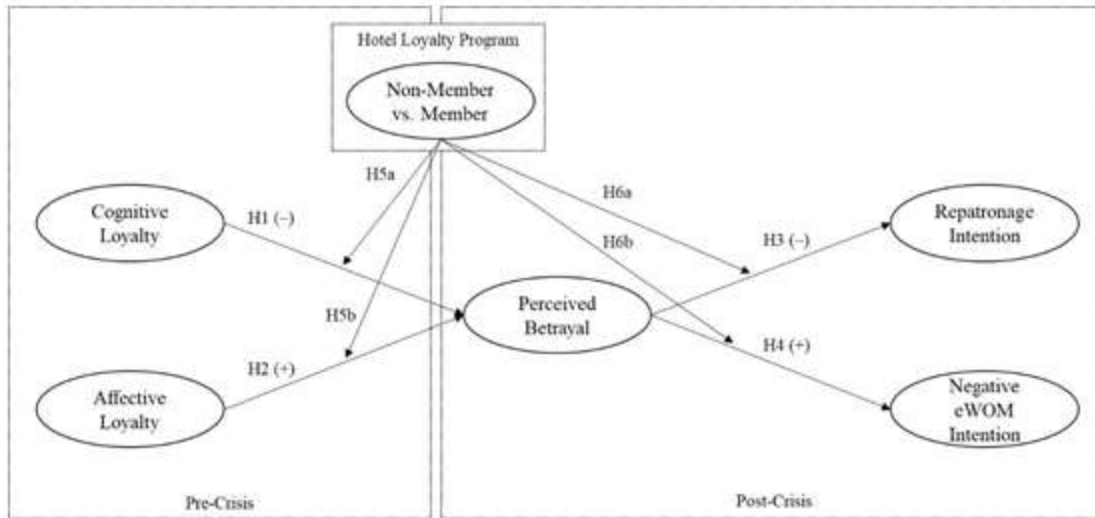


Figure 1. Research framework.

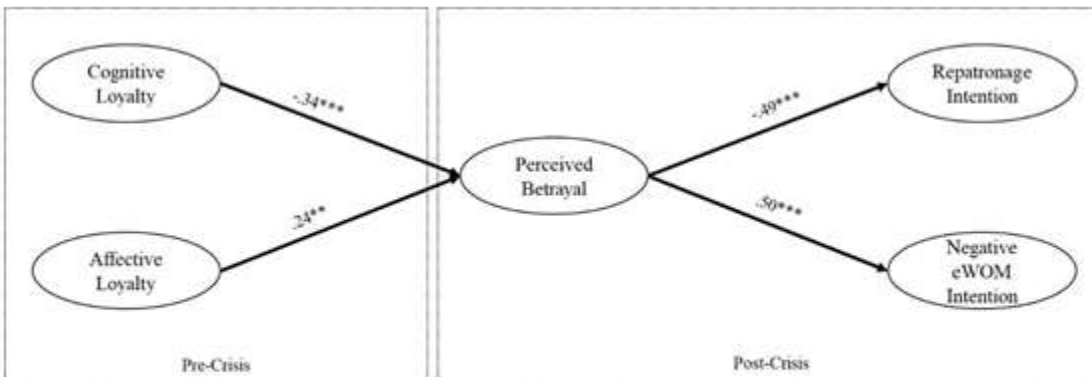


Figure 2. Path Diagram for SEM. Note: — statistically significant; --- statistically not significant; *** $p < .001$; ** $p < .01$

<p>Sahar Jamshidi (Author) <i>Islamic Azad University of Tabriz</i></p> <p>Amin Faraji (Co-Author) <i>Faculty of Management and Accounting, University of Tehran</i></p>	<p>The Development of Smart Tourism with approach of the Social Resilience of the Destination Community</p>
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Abstract:

Communities' fascination with tourism development stems from the many economic benefits that come to countries each year. This particular advantage has become one of the most important reasons for destination communities to consider tourism as a development strategy. With the development of technology and information technology, smart tourism has become an important aspect of development in smart cities, but it has also had many negative effects on the destination community and has shaken the resilience of the city. One of the most important pillars for the development of smart tourism is the resilience of the destination community. A society that has social capital, knowledge, skills, awareness, etc., has a high capacity to achieve smart tourism. In this study, to study the social resilience of Tabriz, the three components of smart people, smart life, mobility and smart dynamics have been studied. The research method for this article is a library and questionnaire and the results of the collected data have been evaluated and analyzed by SPSS software. Based on Cronbach's numbers, it can be said that the city of Tabriz is in a good position in terms of resilience of the destination community and the possibility of developing smart tourism is provided in it. The high resilience of a society can be a step towards the sustainability of a society.

Keywords: smart city, smart tourism, Destination community, social resilience, Tabriz

Introduction:

The process of smartening up the world involves both creating new smart cities and making existing cities smarter (Afzali, Modiri, & Farhoodi, 2018), which enables governments and urban management to provide more services to citizens and enhance the quality of urban life (Roostaei, Poormohamadi, & Ghanbari, 2018). In recent decades, during the transition from the industrial to the post-industrial era, information technology has increasingly influenced society. The tourism industry has not been an exception and has extensively benefited from information technology. Tourism and travel, as a high-income industry and an important source of foreign exchange, annually account for 10 percent of the global GDP and 6 percent of the world's total output (Qian, Nophea, Jourdain, Sohee, & Shivakoti, 2017). Therefore, smart tourism has become an important development strategy in the tourism industry of destination communities (Wakil, Sun, & Chan, 2021). Smart tourism is a new practical term that requires a smart destination, smart experiences, and smart business ecosystems to be realized (Gretzel, Werthner, Koo, & Lamsfus, 2015). Although the tourism industry has many benefits for destination

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communities, its rapid development has led to the neglect of the basic needs of the destination community. Therefore, the lack of simultaneous development and attention to the basic needs of the community and smart tourism leads to disruptions and social harm, ultimately resulting in a reduced temporal adaptation capacity of communities to these changes (Becken, 2013). The deterioration of community resources and social capital reduces the community's resilience to stress and disruptions, making it unable to manage and adapt to changes in place, society, and everyday life (Platts-Fowler & Robinson, 2016). Thus, examining the resilience of the community as a key factor in addressing the social issues arising from the development of smart tourism can be considered. Considering the studies conducted in the fields of smart tourism, urban resilience, and the smartening of urban infrastructure, it can be said that citizens are the key factor in the success or failure of an urban project (Dashtali, Aligholi, & Nourbakhsh, 2020). Although urban planners have always strived to present urban plans to improve the quality of life for citizens, not all aspects have always been considered. In smart tourism development plans, attention to the needs of tourists, their comfort, security, and convenience from origin to destination and vice versa is very important (Cheer & Lew, 2021). Smart platforms and systems have been used in various areas such as virtual tours, ticketing, transportation, and more to attract more tourists (Morales, McCabe, & Martines, 2023). However, the most important aspect that has been neglected is the destination community and the impact that tourists have on them. If the destination community is socially prepared in terms of knowledge, awareness, and education to attract tourists and is rich in information technology infrastructure, it is possible to achieve development in the field of smart tourism. Enhancing societal trust should be achieved through the enhancement of local community technological infrastructures, improving people's knowledge and awareness towards using smart systems, addressing the technological needs of the local community prior to smart tourism development (Gursoy, Loungo, Corte, & Sepe, 2024). Additionally, in the development of smart tourism, attention should be paid to ensuring that not only does it not negatively impact local community employment, but also that the community benefits from tourist influx (Musavengane, Siakwah, & Leonard, 2020). The historical city of Tabriz, located in the northwest of the country, is a tourism hub due to its exceptional geographical and historical significance (Romao, 2020). Positioned along the Silk Road, throughout the past centuries, Tabriz has consistently been one of the most important centers of trade and commerce in Western Asia. The beautiful nature, extraordinary mountains, and the city itself along with its surrounding areas are among the tourist destinations of Azerbaijan. The rich cultural heritage of this city can be observed in its mosques, churches, and extraordinary castles of Tabriz. This research aims to examine the indicators of smart mobility, smart people, and smart living in the tourist-friendly city of Tabriz. The objective is to foster an informed and self-reliant local community in the realm of smart urbanization, leveraging the infrastructure of smart cities and Information and Communication Technology (ICT). The goal is to develop smart tourism in this city in the foreseeable future, witnessing annual advancements in both tourism and smart urbanization in this historic city. What holds significant importance in achieving smart urbanization is its citizens, as having intelligent individuals is a prerequisite for attaining a smart city.

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Theoretical Foundations

Smart City

The term 'smart' encompasses a diverse range of concepts stemming from the achievements of ICT and its users, individual or organizational expertise, as well as the rapid communication and transmission of information. The smarter it is, the more it requires superior strategic direction (Batty, et al., 2012). A smart city is more than just a digital city. A smart city is one that can link physical capital with social capital to develop better services and infrastructure. It is when technology, data, and political perspectives are collected according to a coherent plan and urban services are improved (Ginfinger, et al., 2007). Thus, a smart city can be understood as a city that utilizes ICT and other innovations to make vital infrastructures more interactive and efficient. Moreover, while considering the tastes and preferences of citizens, it makes them more aware of improving the quality of urban daily life and achieving economic, social, institutional, and environmental sustainability when receiving urban services. The concept of smart cities represents a deliberate effort to utilize information technology to transform life and work in their region through fundamental and essential pathways rather than incremental ones (Pourjavan, 2019). A smart city primarily involves research functions, technology transfer, product development, and technology innovation as the foundation for innovative industries akin to a knowledge city. Based on this, eight main components are introduced as the dimensions of a smart city, as follows: 1. Smart Infrastructure: Facilities and equipment (water, electricity, gas networks, streets, cloud computing systems), 2. Smart Mobility: Advanced transportation networks with real-time monitoring and control systems, 3. Smart Environment: Innovation and utilization of ICT for waste management, pollution reduction, 4. Smart Services: Use of ICT in tourism, education, safety, 5. Smart Governance: Establishment of smart governance in urban space and provision of services and facilitation for smart participation, 6. Smart People: Increasing creativity and innovation, awareness, 7. Smart Living: Innovation to enhance the quality of life and happiness in urban spaces, 8. Smart Economy: Utilization of information technology in business, employment, and urban growth. While not all smart cities worldwide possess all of the above components in their entirety, achieving each of these components can be seen as a step towards realizing a smart city.

Smart Tourism

Smart tourism is the result of the combination of two fields: tourism and information technology, both of which are among the most common activities generating employment opportunities and economic prosperity in today's world (Zangouei, Azar, & Sadaghian, 2020). In this type of tourism, tourism resources and information technologies such as artificial intelligence, cloud computing, and the Internet of Things are integrated to provide explicit information and efficient services to tourists in specific cities based on the development of innovative technology (Wang, Li, & Li, 2013). Smart tourism includes two techniques: 1- Smart demand and the use of managerial techniques capable of managing demand and access, and 2- Smart marketing. Smart tourism has been developed with the aim of improving tourism service objectives, enhancing tourist experiences, innovating tourism management,

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and optimizing tourism resources (Zhang, Li, & Liu, 2012), essentially representing a distinct step in the evolution of information and communication technology in tourism, whereby the monitoring and physical dimensions of tourism are digitized, ushering in a new level of intelligence in tourism systems (Gretzel, Sigala, Xiang, & Koo, 2011). According to Fig. 1, smart tourism encompasses multiple intelligent components and layers supported by information and communication technology (Zangouei, Azar, & Sadaghian, 2020).

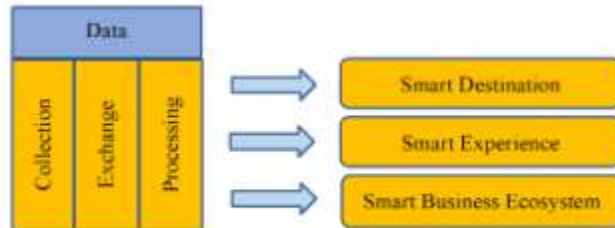


Fig. 1, Components and Layers of Smart Tourism (Zangouei, Azar, & Sadaghian, 2020)

A smart destination, built on infrastructure based on the latest technology, ensures sustainable development of tourist areas with universal access, facilitates tourist interaction, allowing tourists to easily connect with their surroundings, enhances the tourist experience of the destination, and ultimately improves the living conditions of the host community (Zangouei, Azar, & Sadaghian, 2020). The smart experience layer specifically emphasizes tourism experiences obtained through technology and enhancing experiences through personalization, awareness of existing contexts, and real-time monitoring (Buhalis & Amaranggana, 2015). Smart commerce, as the third layer, facilitates the exchange of tourism resources and the creation and support of tourist experiences. The smart commerce layer digitizes organizations and makes them more agile. An organizational aspect of smart commerce is the collaboration between the private and public sectors and the focus on modern technologies. In smart tourism, tourists create and provide significant added value while being monitored. Tourists can also play a supervisory role over smart commerce in this type of tourism. Smart tourism consists of three sub-layers as follows:

- The smart information sub-layer, which aims to collect data
- The smart exchange sub-layer, which aims to support relationships.
- The smart processing sub-layer, which is responsible for analyzing, visualizing, integrating, and intelligently using data (Tu & Liu, 2014).

Smart tourism technologies emphasize smart tourists. The goal of these technologies is to support tourists in the following areas:

- Enhancing tourists' experiences during their travels by providing accurate location-based information and interactive services.
- Predicting tourists' needs based on various factors and offering technology tailored to their activities before, during, and after their trips, such as points of interest, accommodation, and recreational attractions.
- Empowering tourists to share their travel experiences during and after their trips to help other tourists while also enhancing their own travel experiences and ultimately increasing self-awareness through

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their travel experiences (Gretzel, Werthner, Koo, & Lamsfus, 2015).

The goal of smart tourism is to meet the needs of tourists through the integration of information and communication technology, with tourist satisfaction during their travels being of paramount importance in the context of smart tourism (Buhalis & Amaranggana, 2015). However, smart tourism can only be expanded in our cities when the destination community is prepared in this regard and the social capital of the destination city is not overlooked. Without the acceptance of the local community and awareness of the use of information technology, the development of smart tourism could encounter numerous challenges.

Social Resilience

In today's society, social capital plays a crucial role, to the extent that, in its absence, other capitals of a city appear inefficient. Social capital fosters a community's ability to achieve various advancements, including sustainability, through collective efforts and diverse resources (Magis, 2010). Therefore, the primary criterion in urban development is attention to social capital and community resilience. If a community is exposed to an unpredictable event, it may lead to changes beyond the usual tolerance for adaptation, driving it into a new domain state and requiring fundamental changes to achieve a new stable condition (Morales, McCabe, & Martines, 2023). Resilience is a measure of a system's ability to absorb changes in a way that maintains its previous resistance (Holling, 1973).

The nature of community resilience values the resources and assets of a community towards development, unity, and enhancing the quality of life, which are accounted for as the community's capital. The three important approaches, engineering resilience (the ability to withstand change), ecological resilience (the level of disturbance a system can tolerate without altering its structure), and adaptive resilience (the ability to function despite changes)-contribute to understanding the concept of resilience. Resilience encompasses various dimensions such as economic, physical-environmental, institutional, and social (Rezaei, Bastamina, & Fakhraeipoor, 2017). Social resilience includes conditions under which individuals and social groups adapt to their environmental changes and have the ability to return to equilibrium after significant changes. It means that people are prepared to face any kind of development or harm in terms of culture, knowledge, lifestyle, etc.

According to a study conducted by Cinner and colleagues in this field, four elements - wealth, flexibility, capacity for self-organization, and capacity for learning - are identified as key components of social resilience (Cinner, Fuentes, & Randriamahazo, 2009). As you can see in Table 2, the components and achievements of enhancing resilience in the social-human dimension have been specified.

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Table 1, Social Capital and its Implications for Resilience and Social Development (Wakil, Sun, & Chan, 2021)

Convex	Elements	Achievement
Social-Human	<ul style="list-style-type: none"> - Knowledge and skill - Job skill - Healthy Living - Culture - Personal qualities 	<ul style="list-style-type: none"> - Increasing awareness and facilitating communication - Crisis management knowledge - Establishing strong relationships between community members and organizations - Creating a platform for interaction - Having a common goal

Based on this, it can be stated that in order to enhance social resilience, it is crucial to increase the awareness and skills of a community, as well as to analyze its social and cultural structure. Strengthening social resilience is essential for preserving the most significant asset of a community: its people.

Methodology

This research is applied in terms of its objective and descriptive-analytical in terms of its research method. Two methods, library research and fieldwork, have been used to collect the required information. In the library research section, the theoretical foundations of the study were derived from books, articles, and urban studies. In the fieldwork section, data collection was conducted using a questionnaire. The questionnaires were completed by 40 experts in urban planning and design who are familiar with the concept of smart city development. This study examines three social indicators of a smart city (smart mobility, smart people, and smart living) to investigate community resilience. The data was analyzed using SPSS software, considering the nature of the data and variables. The geographical scope of this research is the metropolitan city of Tabriz.

This research is practical for officials, urban designers, and urban planners.

Analysis and Evaluation

The city of Tabriz is bordered to the north by the counties of Ahar and Shabestar, to the east by the counties of Sarab and Miyaneh, to the south by the county of Maragheh, and to the west by Lake Urmia and West Azerbaijan. This city is located on the most suitable and important communication routes between the northeast (Ardabil, Caspian shores, Astara), east (Miyaneh, Qazvin, Tehran), west (extension of Marand, Khoy, Erzurum Turkey), and north (Marand-Jolfa route, Yerevan, Baku, Tbilisi). Therefore, its transportation routes have always been of interest to tourists and merchants throughout history (East Azerbaijan Governorate, 1395). Tabriz, as the third-largest city in Iran, with its abundant natural and historical attractions, holds a special and unique position in the country's tourism industry. Therefore, the development of the tourism industry using cutting-edge technologies in this city can lead to a further boost in tourism and added economic value.

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Table 2, Components, Indicators, and Items of a Smart City

SMART CITY		
COMPONENT	INDEX	INDICATOR
smart living	Level of public satisfaction- Increase in personal safety- Increase in facilities- Level of interest in political activities- Importance of political issues to citizens- Health and cultural conditions- Level of social cohesion	Level of access to online medical services/ Level of access to online educational services/ Level of access to electronic police services/ Level of access to online shopping centers/ Level of access to online equipment in transportation systems/ Level of online social communications/ Level of remote control of home through online audio and visual systems
Smart mobility and dynamics	Acceleration and information exchange using technology- Access to services and information	Level of internet access at home/ Level of internet access in public places/ Level of satisfaction with internet speed/ Level of mobile phone usage/ Level of access to safe transportation systems/ Level of satisfaction with public transportation system/ Level of innovation in safe transportation systems/ Level of safety control of roads and driving guidance
smart citizens	Providing a high level of inclusive education to citizens in describing the quality of social interactions, cultural awareness, open-mindedness, and the level of citizen participation in social life.	Level of participation in social life/ Level of individual skills and expertise/ Level of skill in secondary education/ Level of creativity and innovation/ Level of familiarity with foreign languages/ Level of computer skills/ Level of individual adaptability/ Level of compatibility and communication with diverse cultures/Level of ethnic and cultural diversity

Considering that the people of Tabriz are civilized and have a rich historical identity, attention to their social resilience is one of the most important aspects to be considered in the development of smart tourism. In this study, three components: smart living, mobility and dynamics, and smart citizens, which are among the fundamental components of urban smartness from a social perspective, have been examined. In this article, a questionnaire with 34 specialized questions regarding the indicators of the three components of a smart city has been prepared. Given the novelty of the smart city subject and the wide scope of the population, this questionnaire was completed by experts, specialists, and city managers in Tabriz. Subcategories and indicators of the three components of the smart city are identified in Table 2.

Smart living

The indicators of the level of citizens' online access to services (educational, medical, shopping, etc.), the use of smart systems in daily life, and the level of acceptance of new technologies by the citizens of Tabriz city have been examined in the smart life component. According to Table 3 and Fig. 2, the score of the smart life indicators is 2.90, which is within the domain of significance and at a relatively desirable level.

Table 3, Analysis of smart life indicators

Indicator	Average responses	Domain of Significance
Level of access to online services. (Medical, Education, Shopping)	3.08	Relatively desirable
The level of online social communications and participation in the city	2.67	Relatively desirable
The level of acceptance of new technologies by citizens	3.08	Relatively desirable
The level of access to online equipment in transportation systems	2.56	Relatively desirable
The level of access to electronic police services	2.64	Relatively desirable
The impact of smartification on reducing human resources	3.39	Relatively desirable
Overall average	2.90	Relatively desirable

Based on the obtained results, smartness is moderately acceptable only in the areas of access to transportation and security, and there is a tendency for further improvement. However, in the areas of electronic police services, the level of technology acceptance by citizens, and the degree of control over security using technology, is at a moderate to low level.

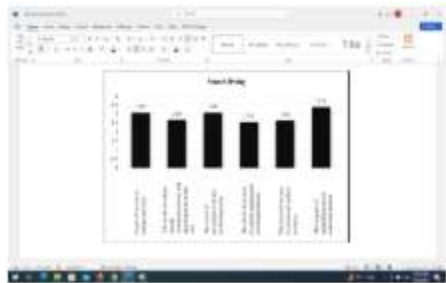


Fig. 2, Smart living Indicators Analysis Chart

Furthermore, considering the scores obtained from these indicators, it can be said that smart life in Tabriz city has relative desirability and requires more public awareness and information dissemination, as well as strengthening the city's security systems with the assistance of officials.

Smart mobility and Dynamics

The concept of smart dynamics entails providing services through information and communication technologies, accelerating information exchange using technology, reducing costs and displacements, accessing services and information, and delivering better services. Based on Table 4 and Fig. 3, the responsiveness score for the dynamic smartness component is 2.37, which falls within the domain of significance and is at a relatively desirable level.

Table 4, Analysis of Smart mobility and Dynamics

Indicator	Average responses	Domain of Significance
The level of internet access in public places throughout the city	2.22	Relatively desirable
Satisfaction with internet speed and online service delivery	2.19	Relatively desirable
Level of access and innovation in safe transportation systems	2.22	Relatively desirable
Satisfaction with public transportation systems	2.44	Relatively desirable
The impact of technology on controlling road safety and guiding and driving	2.78	Relatively desirable
Overall average	2.37	Relatively desirable

Based on the results obtained from the questionnaire, it can be said that the respondents' answers to all

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questions in this component were mostly average or very low. Furthermore, considering the average score of 2.37 obtained from the analysis of the questions in this component, it has been determined that the overall level of dynamics in Tabriz city is relatively acceptable and tends towards being weak. Therefore, upgrading the transportation system and its online services, as well as providing internet access in public places, are essential measures to enhance the resilience of the people and promote smart tourism. These actions should be prioritized by city officials and planners.



Fig. 3, Smart Mobility and Dynamics Indicators Analysis Chart
Smart Citizens

The primary considerations in a smart city include educational issues, fostering creativity, and engaging in public participation in urban affairs. Smart citizens are defined based on their skills and educational level. The quality of social interactions, such as cohesion, communal life, and the ability to connect with the outside world, are also examples of characteristics of smart citizens.

Based on Table 5, and Fig. 4, the established criteria yield a score of 3.12 for the smart citizens component in Tabriz city, which falls within the domain of significance and is relatively desirable. According to the results obtained from the indicators, it can be said that the options of average and high have been among the predominant responses. Furthermore, based on the results obtained from the analysis of these indicators and obtaining an average score of 3.12, it can be said that the level of participation in social life, creativity, and innovation among the people in Tabriz city has been high. This indicates the high level of literacy and culture among the people in this city. Additionally, it can be concluded that when the level of literacy and expertise among the people is high, the acceptance of technology use and is also higher.

Table 5, Analysis of Smart Citizens

Indicator	Average responses	Domain of Significance
Level of participation in social life	2.81	Relatively desirable
Level of individual skills and expertise	3.28	Relatively desirable
Level of creativity and innovation	3	Relatively desirable
Level of adaptability and communication with various cultures	3.06	Relatively desirable
Level of participation in realizing the smart city	2.94	Relatively desirable
Overall average	3.12	Relatively desirable

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Fig. 4. Smart Citizens Indicators Analysis Chart

Conclusion

Conclusion

In this study, three components of smart citizens, smart life, and smart mobility and dynamics were examined to assess the resilience of the people of Tabriz city towards the development of smart tourism, as they are highly influential in the realization of smart urban area. The results of this study have shown that the level of people's use of innovative technologies is in a suitable condition, and its acceptance among the people is also at an appropriate level. Additionally, the level of social participation, awareness and literacy, as well as the creativity and innovation of the people, are in favorable conditions, indicating a high level of knowledge among the people. Unfortunately, the level of access to online transportation services, electronic police services, internet access across the city, and so on, is in an undesirable condition. This indicates poor management and inadequate planning towards smart urban areas.

In general, according to the analysis of the indicators, it has been determined that the people are ready in terms of awareness and acceptance of using information technology and smart urban systems. Therefore, it is necessary to enhance the resilience of the people for the development of smart tourism by providing a comprehensive plan for the development of smart urban infrastructure and services.

As a result, it can be said that Tabriz city, as a smart tourist destination, has relatively desirable resilience. By upgrading smart facilities and infrastructure, significant assistance can be provided for the enhancement and development of smart tourism.

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<p>Fatogun Abiola Opeyemi (Author) <i>Facility Custodian Ltd</i></p>	<p>The Impact of Data-Driven Compensation Strategies on Job Satisfaction Among Employees in Nigerian Real Estate Companies</p>
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Abstract

This research paper examines the impact of data-driven compensation strategies on job satisfaction among employees in Nigerian real estate companies. As organizations increasingly adopt big data in human resource management, understanding these approaches' effectiveness in emerging markets is crucial. This research employs a quantitative, cross-sectional design with a sample of 177 employees from Nigerian real estate firms. Data were collected using the Minnesota Satisfaction Questionnaire (MSQ) short form and a custom-developed instrument measuring perceived use of data-driven compensation strategies.

Grounded in Herzberg's Two-Factor Theory, the study examines both intrinsic and extrinsic job satisfaction. Pearson's correlation and simple linear regression analyses revealed weak but statistically significant positive relationships between perceived data-driven compensation strategies and intrinsic job satisfaction, and a marginally significant relationship with extrinsic job satisfaction.

These findings suggest that while data-driven compensation strategies positively influence job satisfaction, their impact is limited. The results partially support Herzberg's theory and contribute to literature on Big Data applications in HRM, particularly in emerging markets and the real estate sector. Implications highlight the need for a holistic approach to employee satisfaction in Nigerian real estate companies. Limitations include convenience sampling and cross-sectional design. Future research should consider longitudinal studies, industry-specific factors, and comparative analyses across different sectors in emerging markets.

Keywords: data-driven compensation, job satisfaction, real estate, Nigeria, human resource management

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The Impact of Data-Driven Compensation Strategies on Job Satisfaction Among Employees in Nigerian Real Estate Companies

In the ever-changing landscape of modern business, organizations are continually seeking creative and innovative strategies to enhance employee performance and satisfaction. Data-driven compensation strategies and its implementation is one area that has gained significant attention in recent years. Biswas et al. (2023) explain that this approach utilizes advanced analytics and big data to inform various HR functions, including salary decisions, bonuses, and other forms of compensation. The real estate sector, particularly in emerging economies like Nigeria, presents a unique context for examining the impact of these strategies on job satisfaction.

Data-driven compensation refers to the use of quantitative and qualitative data to make informed decisions about employee pay and benefits (Stankevičiūtė, 2024). This approach aims to create more equitable, transparent, and motivating compensation structures by considering factors such as individual performance metrics, market trends, and organizational goals (SHRM, 2023). Job satisfaction, on the other hand, is a multifaceted concept that encompasses an employee's emotional and cognitive evaluation of their work experience (Memon et al., 2023).

The Nigerian real estate sector has experienced significant growth in recent years. Statista (2024) reports a 1.87% increase in Q2 2023 compared to the previous year, with the sector reaching its peak growth of 4.56% in Q3 2022. This growth has been accompanied by increased competition for talent and a growing recognition of the need for more sophisticated human resource management practices. As such, understanding the relationship between compensation strategies and job satisfaction in this context is crucial for both academic research and practical application.

The significance of this research is underscored by recent global trends, particularly those driven by the COVID-19 pandemic. According to Gigauri (2020), the pandemic has accelerated the adoption of digital technologies across industries, including human resources management. This shift has made data-driven decision-making more accessible and relevant than ever before. Additionally, the growing emphasis on employee well-being and work-life balance has prompted organizations to reassess their compensation strategies to better align with employee needs and expectations (Bello et al., 2024)

Several key theories and studies have contributed to our understanding of the relationship between compensation and job satisfaction. Herzberg's Two-Factor Theory (1959) posits that while compensation is a hygiene factor that can prevent dissatisfaction, it may not necessarily lead to increased satisfaction. This theory has been widely applied in various contexts for organization management.

More recent research has focused on the specific impact of data-driven compensation strategies and broader Big Data applications in Human Resources Management (HRM). A study by Sharma and

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Khan (2022) found that Big Data applications in talent acquisition and workforce optimization led to increased productivity, more accurate hiring predictions, and improved employee retention. The authors further noted that while Big Data can reduce recruitment time and costs, enhance performance analysis, and optimize compensation structures, ethical considerations like data privacy and bias must be addressed. While this study provides valuable insights, it primarily focused on larger organizations, leaving questions about its applicability to smaller firms or emerging markets.

In the Nigerian context, Yakubu et al. (2023) examined the relationship between compensation and job performance in Deposit Money Banks in Kano State. Their findings showed financial compensation significantly impacted employee performance, while non-financial compensation had a positive but insignificant effect. This study provides valuable insights into the Nigerian banking sector, but it does not address data-driven compensation strategies or extend to other industries such as real estate. The research methodology, using Partial Least Square Structural Equation Modelling (PLS-SEM), offers a robust analytical approach. However, the focus on traditional compensation measures rather than data-driven strategies, and its limited scope to one industry and region, highlights the need for further investigation into data-driven compensation approaches across various sectors, including real estate, in Nigeria. Addressing this research gap is crucial as it will provide practical insights for real estate companies in Nigeria and similar emerging markets, potentially informing more effective human resource management practices.

The motivation for this research stems from the recognition of the real estate sector's significant contribution to Nigeria's economic growth and the critical role that satisfied employees play in driving this growth. Recent reports have highlighted challenges in talent retention within the industry, suggesting a need for more effective compensation strategies (Mohamad Mazlan & Jambulingam, 2023). With increased access to data analytics tools and a growing emphasis on evidence-based decision-making (Stobierski, 2019), organizations are better positioned than ever to implement data-driven strategies to address these challenges. This study seeks to provide timely insights into the effectiveness of these approaches, potentially influencing policy and practice in the real estate sector and beyond.

Purpose of the Present Study

The primary aim of this study is to investigate the impact of data-driven compensation strategies on job satisfaction among employees in Nigerian real estate companies.

Research Objectives

To examine the relationship between employees' perception data-driven compensation strategies and intrinsic job satisfaction.

To examine the relationship between employees' perception data-driven compensation strategies and intrinsic job satisfaction.

To develop recommendations for Nigerian real estate companies.

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Research Questions

Will there be a significant positive relationship between employees' perception data-driven compensation strategies and intrinsic job satisfaction in Nigerian real estate companies?

Will there be a significant positive relationship between employees' perception data-driven compensation strategies and extrinsic job satisfaction in Nigerian real estate companies?

Research Hypotheses

There will be a significant positive relationship between employees' perception of data-driven compensation strategies and intrinsic job satisfaction in Nigerian real estate companies.

There will be a significant positive relationship between employees' perception data-driven compensation strategies and extrinsic job satisfaction in Nigerian real estate companies

Method

Philosophical Foundation

This study adopts a positivist paradigm, which aligns with the quantitative nature of the research. The positivist approach assumes that reality is objectively measurable and that knowledge can be gained through empirical observation and measurement (Park et al., 2020). This paradigm is suitable for examining the relationship between data-driven compensation strategies and job satisfaction, as it allows for the testing of hypotheses and the quantification of these relationships.

Sample

The target population for this study comprised employees of Nigerian real estate companies. The sample size was initially calculated using Cochran's formula for sample size determination:

$$n = Z^2 * p * (1-p) / e^2$$

Where: n = sample size, Z = 1.96 (for 95% confidence level), p = 0.5 (assumed proportion), e = 0.05 (margin of error)

This calculation yielded a sample size of 384. However, given the specific population of real estate employees in Nigeria, and the time-frame for the research, the finite population correction was applied, resulting in a final target sample size of 250. The study employed a convenience sampling method, distributing online surveys to employees across various Nigerian real estate companies. Out of the targeted 250 participants, 177 complete responses were received and analyzed, representing a response rate of 70.8%.

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Instrument

The short form of the Minnesota Satisfaction Questionnaire (MSQ), consisting of 20 items, was used to measure job satisfaction. This widely-used instrument has demonstrated high reliability and validity across various occupational groups (Weiss, 1967).

A custom-developed instrument was used to measure the extent and perceived effectiveness of data-driven compensation strategies. This survey included items assessing the use of data in setting salaries, bonuses, and benefits; perceived fairness; transparency; and alignment with market standards. The instrument was pilot-tested for face validity and reliability before full deployment.

Design

This study employed a quantitative, cross-sectional design. This approach allows for the examination of relationships between variables at a single point in time, which is appropriate for addressing the research questions and testing the hypotheses.

Procedure

The research was conducted over a one-month period. Participant recruitment was primarily carried out through LinkedIn, a professional networking platform. LinkedIn's search function was used to identify real estate companies operating in Nigeria. Once these companies were identified, their employees were located through the platform's company page feature and employee listings. Potential participants were then contacted directly via LinkedIn's messaging system or through email addresses provided on their profiles. The initial contact included information about the study's purpose, the voluntary nature of participation, and a link to the online survey hosted on Google Forms. To ensure a wide reach, the researcher also posted about the study on relevant LinkedIn groups focused on Nigerian real estate and property management. These posts included a brief description of the study and an invitation to participate, along with the survey link.

Data Analysis

Data analysis was conducted using SPSS version 25. Descriptive statistics were computed for all variables. The relationships between data-driven compensation strategies and both intrinsic and extrinsic job satisfaction were examined using Pearson's correlation coefficient. Multiple regression analysis was employed to assess the predictive power of data-driven compensation strategies on job satisfaction while controlling for demographic variables.

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Ethics

Informed consent was secured from all participants before they completed the survey. Participants were assured of confidentiality and anonymity, and all data was stored securely on a password protected One-drive. Participants were informed of their right to withdraw from the study at any time without penalty.

Results

Descriptive statistics

Table 1 (in the Appendix) shows that employee's perception of Data-Driven Compensation strategies had a mean score of 21.35 (SD = 7.19), suggesting a moderate level of perceived use of such strategies. Intrinsic Job Satisfaction displayed the highest mean score at 34.44 (SD = 11.58), indicating relatively high levels of internal job satisfaction. Extrinsic Job Satisfaction showed a moderate level with a mean of 27.89 (SD = 10.43). Notably, the standard deviations for all three variables, particularly for the job satisfaction measures, suggest considerable variability in responses across the sample.

Hypothesis Testing

To test the first hypothesis, a Pearson's product moment correlation coefficient was run, followed by a simple linear regression statistic. The result is presented in table 2 and 3 (See Appendix).

Table 2 shows a weak but statistically significant positive correlation between perceived data-driven compensation and intrinsic job satisfaction among employees in Nigerian real estate companies $r(177) = .15, p = .04$. To further establish and explain this relationship, a simple linear regression was run. The simple linear regression analysis (Table 3) shows that perceived data-driven compensation strategies significantly predict intrinsic job satisfaction, $F(1, 175) = 4.18, p = .04$. However, the model explains only 2.3% of the variance in job satisfaction ($R^2 = .023$). This indicates a statistically significant but limited relationship between data-driven compensation and intrinsic job satisfaction due to the small effect size.

Similar to the first hypothesis, a Pearson's product moment correlation coefficient, followed by a simple linear regression statistic was run. The result is presented in table 4 and 5 (See Appendix).

Table 4 presents a weak statistically insignificant positive correlation between perceived data-driven compensation and intrinsic job satisfaction among employees in Nigerian real estate companies $r(177) = .15, p = .05$. To further establish and explain this relationship, a simple linear regression was run. The simple linear regression analysis (Table 5) shows that perceived data-driven compensation strategies marginally predict extrinsic job satisfaction, $F(1, 175) = 3.76, p = .05$, explaining 2.1% of the variance ($R^2 = .021$). The borderline significant relationship suggests a weak effect with limited practical implications.

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Discussion

The findings of this research reveal a complex relationship between data-driven compensation strategies and job satisfaction in Nigerian real estate companies. A weak but statistically significant positive correlation was found between these strategies and intrinsic job satisfaction, with data-driven compensation strategies explaining 2.3% of the variance. Similarly, a marginally significant relationship was observed with extrinsic job satisfaction, accounting for 2.1% of the variance. These results partially align with existing literature, such as Sharma and Khan's (2022) study highlighting the potential of Big Data in optimizing compensation structures. However, the small effect sizes contrast with their more substantial reported impacts, possibly due to the specific context of the Nigerian real estate sector. The findings also somewhat parallel Yakubu et al.'s (2023) research in the Nigerian banking sector, though the weaker relationships in the present study suggest industry-specific dynamics.

Theoretically, these results provide partial support for Herzberg's Two-Factor Theory, with compensation showing some positive impact on satisfaction, albeit with small effect sizes. This suggests compensation may indeed play a more significant role in preventing dissatisfaction rather than actively promoting satisfaction. The study also contributes to the growing literature on Big Data applications in HRM, though the small effect sizes indicate that industry-specific factors or organizational data analytics maturity may moderate its transformative potential.

Practically, these findings suggest that while data-driven compensation positively impacts job satisfaction, Nigerian real estate companies should adopt a holistic strategy addressing both intrinsic and extrinsic factors. In addition, industry-specific compensation and improved data analytics are essential. Finally, data-driven compensation should be part of a broader strategy recognizing the complex factors influencing employee satisfaction and retention.

Conclusion

This paper explored the impact of data-driven compensation strategies on job satisfaction among employees in Nigerian real estate companies. The findings revealed weak but statistically significant positive relationships between these strategies and both intrinsic and extrinsic job satisfaction. While data-driven compensation strategies showed a positive influence, their small effect sizes suggest that other factors may play more substantial roles in determining job satisfaction in this context. These results contribute to the growing body of knowledge on Big Data applications in Human Resource Management, particularly in the context of emerging markets and specific industries like real estate. The study also provides empirical support for the nuanced application of Herzberg's Two-Factor Theory in the Nigerian real estate sector.

However, limitations such as the use of convenience sampling and the cross-sectional design may impact the generalizability of the findings. Future research could benefit from longitudinal studies to

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examine the long-term effects of data-driven compensation strategies. Additionally, investigating the interaction between these strategies and other factors influencing job satisfaction, such as organizational culture or leadership styles, could provide a more comprehensive understanding. Exploring the varying impacts of different types of data-driven strategies and considering the role of data analytics maturity in organizations could also yield valuable insights. Finally, comparative studies across different sectors in Nigeria or similar emerging markets could help identify industry-specific best practices in implementing data-driven compensation strategies.

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Appendix

Tables

Table 1: Mean and Standard deviation of participants on Perception of Data-Driven Compensation, Intrinsic Job Satisfaction, and Extrinsic Job Satisfaction

Variables	Mean	SD
Perceived Data-Driven Compensation	77	1.35
Intrinsic Job Satisfaction	77	4.44
Extrinsic Job Satisfaction	77	7.89

Table 2: Summary of Pearson Product Moment correlation co-efficient

Variables	Perceived Data-Driven Compensation
Intrinsic Job Satisfaction	0.15*

Note. * p < .05

Table 3: Summary of simple linear regression analysis

Variable	B	Beta	r	sig	R	R ²	F-ratio	p

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Perceived Compensation	Data-Driven	25	15	.04	04	15a	023	1.18	<.05
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Table 4: Summary of Pearson Product Moment correlation co-efficient

Variables	Perceived Data-Driven Compensation
Extrinsic Job Satisfaction	15

Note. * p < .05

Table 5: Summary of simple linear regression analysis

Variable	B	Beta	F	sig	R	R²	F-ratio	p
Perceived Compensation	21	15	.94	05	15a	021	1.76	>=.05

Questionnaire

Minnesota Satisfaction Questionnaire (MSQ)

Short Form

Ask yourself: How satisfied am I with this aspect of my job?

5 = Extremely Satisfied

4 = Very Satisfied

3 = Satisfied

2 = Somewhat Satisfied

1 = Not Satisfied

1. Being able to keep busy all the time. (IS)

2. The chance to work alone on the job. (IS)

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3. The chance to do different things from time to time. (IS)
4. The chance to be “somebody” in the community. (IS)
5. The way my boss handles his/her workers. (ES)
6. The competence of my supervisor in making decisions. (ES)
7. Being able to do things that don’t go against my conscience. (IS)
8. The way my job provides for steady employment. (IS)
9. The chance to do things for other people. (IS)
10. The chance to tell people what to do. (IS)
11. The chance to do something that makes use of my abilities. (IS)
12. The way company policies are put into practice. (ES)
13. My pay and the amount of work I do. (ES)
14. The chances for advancement on this job. (ES)
15. The freedom to use my own judgment. (IS)
16. The chance to try my own methods of doing the job. (IS)
17. The working conditions. (GI)
18. The way my co-workers get along with each other. (GI)
19. The praise I get for doing a good job. (ES)
20. The feeling of accomplishment I get from the job. (IS)

Data-Driven Compensation Strategy Survey

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Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
My organization uses data (e.g., market benchmarks, performance metrics) to determine my salary.					
My organization uses data to determine my bonus or incentive compensation.					
My organization uses data to determine my benefits (e.g., health insurance, retirement contributions).					
Because of data adoption, my compensation is fair compared to others in similar roles at my organization.					
I understand the process by which my compensation is determined.					
My compensation is aligned with market standards for my role and experience level.					
My organization's compensation practices are competitive within my industry.					

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<p><i>Elham Mohsenbeigi (Author)</i> <i>Faculty of Management and Medical Information, Kerman University of Medical Sciences</i></p> <p><i>Mohsen Barouni (Co-Author)</i> <i>Modeling in Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences</i></p> <p><i>Leila Ahmadian (Co-Author)</i> <i>Medical Informatics Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences</i></p>	<p>Challenges, Prerequisites and Requirements of Implementation of Diagnosis-Related Groups Payment System in Iran: A Qualitative Study</p>
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Abstract

Payment system based on diagnostic related groups (DRGs) was first developed and implemented in United States. The main goals of applying this system in most countries are fair allocation of resources, cost control and efficiency enhancement. The purpose of this paper was to qualitatively determine the challenges, prerequisites and requirements of implementation of payment system based on diagnostic related groups in Iran.

This was a qualitative study conducted by participation of 20 experts working as operational, middle and top managers in three different levels of health system. Semi-structured interviews were conducted and data were analyzed using MAXQDA 10. Content analysis method was used to extract themes.

Four main themes regarding the challenges were structural, political, technical and technological challenges, and costs and provider behavior. Prerequisites and requirements for implementation of payment system based on diagnosis-related groups were categorized in 6 themes as follows; establishing a standard method for coding, developing a data collection and reporting system, implementing a classification system and the grouper application, developing a method for pricing and tariffing, getting support from stakeholders and selecting a monitoring and evaluation method.

The finding of this study can guide the policy-makers to deal with the challenges of implementing a payment system based on diagnosis-related group and help them to provide the prerequisites of this payment system.

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Keywords: challenges, Prerequisites, Implementation requirements, Diagnosis-Related Groups, Iran

Challenges, Prerequisites and Requirements of Implementation of Diagnosis-Related Groups Payment System in Iran: A Qualitative Study

Introduction:

Introduction of reimbursement mechanisms promote motives, which can influence the behavior of providers and consumers of the health system. The DRGs system has been used as a useful tool for saving medical costs and increasing hospital efficiency by reducing avoidable health services and improving utilization (Yuan et al., 2019). The prospective payment system was designed and developed based on diagnosis-related groups in the United States in 1980 (Cheng, Chen, & Tsai, 2012). DRG-based payment systems adopt a standard pricing framework that provides equity in payment among healthcare providers for similar services. However, its careful implementation is necessary because planners often face unintended consequences that they did not anticipate (Annear et al., 2018). Many countries have been moving towards DRG-based hospital payment systems to motivate hospitals to improve their performance. Prior to the introduction of this method, countries mainly used the two payment mechanisms of fee-for-service (FFS) and global budgets. The FFS encourages hospitals to provide more services for each patient, which may lead to unnecessary or inappropriate services and lack of attention to medical costs (Busse, Geissler, Aaviksoo, & Cots, 2013). In retrospective payment systems (such as FFS), costs are paid to providers based on provided medical services, which causes providers to over-treat to increase their income, which in turn increases medical costs. This issue can be overcome in the DRG payment system (Zhao, Wang, Shen, & Wang, 2018). In the DRG payment system, the price of hospital services are determined based on related groups of diagnoses (Quentin, Scheller-Kreinsen, Geissler, & Busse, 2012). These groups are in fact diagnostic groups of patients who has homogeneous resource use patterns (Mathauer & Wittenbecher, 2013). In this payment system, patients are classified by primary and secondary diagnoses, type of treatment, age and sex, type of surgery, complications and co-morbidities, discharge status and performed procedures (Mathauer & Wittenbecher, 2013; Quentin et al., 2012; Wang, Liu, & Jiang, 2014; Zhaoxin WA, Rui LI, Ping LI, 2014). Since DRG-based payment system was first introduced, many developed countries have implemented this system (Gao, 2013; Langenbrunner JC, O'Dougherty S, & Cashin CS, 2009). Successful DRG experiences in developed countries have also encouraged developing countries to use the system. Since 2000, various countries have introduced DRG reforms to control costs and increase hospital efficiency (Wang et al., 2014). Despite many benefits of this payment system, there is much criticism of the ability of the payment system to be based on diagnostic groups. Early discharge of patients, use of low quality medical consumables, reduced quality of service and shifting costs from inpatient to outpatient setting, or reducing the number of medical consultations are criticisms of the system (Ghaffari Sh,

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Abolhallaj M, & Pouragha B, 2012). A recent systematic review also showed that adverse outcomes of the implementation of DRG included reduced length of patient stay, early patient discharge, decreased admissions, increased re-admissions and reduced required services that should be provided to patients (Barouni, Ahmadian, Saberi Anari, & Mohsenbeigi, 2020). On the other hand, using a payment method based on DRG required a set of prerequisites and data to establish this payment system. Access to data such as clinical data, patient demographics, coded diagnoses based on classification systems, performed surgeries and the admission and discharge dates are important in grouping patients (Abbasi, Monavariyan, & Rezanejad, 2016; Babashahy, Baghbanian, Manavi, & Sari, 2017). It is also important to note that health policy managers play a key role in the implementation of this payment system, and without their determination, it would be difficult to implement this payment method (Masoudi Asl I, Bakhtiari Aliabad M, Akhavan Behbahani A, 2019).

Given that policymakers need to be aware of the challenges of DRG-based payment method and of prerequisites and requirements for deploying this system, the present article aimed to address the challenges, prerequisites and the requirement of the implementation of DRG-based payment system in Iran.

Methods

This study was a qualitative study, which was done in 2019. The purposive sampling method was used and experts who work in health sectors or insurance companies in Iran that were interested in participating in the study were selected for the interview. Those experts who were familiar with the payment systems in health care sectors were invited to participate. Table 1 summarized the characteristics of the participants.

The guiding questions for the semi-structured interviews were developed and approved by the research team. Each interview lasted an average of 30 to 90 minutes. Interviews saturated in the 20th interview, and data collection stopped at this point. During the interview researcher took notes while recording the whole interview. After listening several times to the recordings of the interview, the researchers applied the recorded information verbatim on paper after each interview as early as possible. In the results section, the letter (M) with the number means the interviewee who is quoted.

Data analysis

At this stage, content analysis was used to determine the meanings in the text of the interviews and to examine their occurrence, repetition and relevance, and to infer the facts underlying the views of the experts. Content analysis was performed in both deductive and inductive ways. The purpose of deductive analysis is to extract the themes and sub-themes, while at the same time the data itself is used to expand the framework. MAXQDA 10 software was used for data analysis. Before starting the data transfer and analyzing the data, the researcher became familiar with its

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scope and diversity and gained an overview of collected data. The researcher herself performed all stages of the interview, including listening to the recorded audio, reading the transcripts, and transcribing. In addition, all the recorded interviews and discussions were reviewed by the researcher once again and the raised questions were identified. Then, the content summary form for each interviewee was progressively completed throughout the process. The transcribed text was indexed using the codes associated with the themes and sub-themes. The researcher was re-contacted with the interviewees to clarify the information, and to ensure the accuracy of the analyzed data and the authenticity of the content of the interview.

In order to achieve the validity and reliability of the study, credibility criteria of Dependability and Conformability of the data were assessed. The participants expressed their views on how the findings were coordinated, as well as participatory reflection on the issues raised by the research team at various stages of the study. Documentation of all provided of information by the interviewees were done throughout the research process. Moreover, all study team were involved and participated in the analysis and confirmation of the extracted themes.

Ethical consideration

At all stages of the study from data collection until the end of the analysis and reporting of findings, issues such as informed consent, anonymity, confidentiality of information, and the right to withdraw from the study at any time were observed.

Results

The challenges and problems regarding establishing payment system based on diagnosis-related groups in Iran are categorized in 5 main themes and 18 sub-themes as shown in Table 2.

1 Challenges

1-1 Structural Challenges

The first group of challenges regarding establishment of payment methods based on diagnosis-related groups were structural challenges. Interviewees pointed out that implementing this method has complexity and stated that it is a major change in the health system.

1-2 Policy Challenges

The second group of challenges relates to the role of the policymaker and authorities. A number of interviewees pointed out that there is a lack of sufficient motivation for the policymaker to establish the DRG payment system.

1-3 Technical and technological challenges

The most important sub-themes related to this section include lack of standardization of codes and lack of recording of some diagnostic and procedures codes, lack of appropriate information structure for the integrated registration of diagnostic and therapeutic information and the lack of establishment of electronic health records.

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1-4 Cost Challenges

Cost challenges are related to the costs of establishing a DRG payment system. Participants stressed challenges such as lack of long-lasting financial resources for execution, purchasing appropriate software and its maintenance after implementation, identifying weighting indicators for services, modifiers and calculation of services cost. They pointed out that the expenses will be increased at the beginning of the implementation and this methods will result losing cost for sever patients to the difficult and complicated patients at the beginning of their implementation and their loss.

1-5 Provider Behavior Challenges

Possibility to increase outpatient treatment and transfer costs to other departments, increased hospitalization or admission rate, admitting patients who need less resources, code creep or up-coding were reported challenges by the interviewees. In addition, some participants explained the challenge of resistance of physicians and other hospital staff.

1-5-1 cream skimming

The most important risk identified is the phenomenon of cream skimming. As a result, patients who have complex condition will be referred to other settings because of possibility of imposing more cost. In this method, patients who demand less medical resources will be treated.

1-5-2 Code creep or up-coding (DRG-creep)

Code creep refers to shifting the code to higher codes or unrealistic registration of secondary diagnostic codes; generally to exaggerate the disease and perform surgical procedures for the patient and to show the severity of his illness in order to receive more money.

1-5-3 Physicians and other hospital staff resistance

This resistance is mainly due to concerns about reduced revenue and non-compliance with the system. The reason for this concern is their lack of involvement in system deployment and lack of adequate training.

2- Prerequisites and Requirements of Implementation of Payment System Based on DRG

Findings on the prerequisites and requirements for implementing payment systems based on DRG in Iran were presented in 6 main themes and 18 sub-themes (Table 3).

2-1 Generating a standard method for coding

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All participants reported that coding diagnoses and procedures are vital prerequisite for implementation. The diagnostic codes in Iran are based on the International Classification of Diseases- 10th revision (ICD-10), and the surgical procedures codes are based on ninth revision of the ICD. A system for cross mapping is required to encode the data based on DRG.

2-2 Developing a data collection and reporting system

The second important requirement that most interviewees mentioned is the creation of information infrastructure and the development of a hospital information system, a system that can accurately collect demographic and diagnostic information of patients. Participants stressed creation of an integrated diagnostic and therapeutic information registration system, the creation of a robust information system, and the development of existing information systems for data monitoring and analysis, the training of data mining professionals for reviewing data and analyzing them, and the creation of electronic health records should be considered.

2-3 Implementation of classification system and grouper software

One of the requirements of the payment system based on DRG is the classification software for grouping patients to the related diagnostic groups which is called DRG grouper. This grouper determined the best group based on the given information. Interviewees mentioned it will be helpful to identify successful countries in DRG implementation as a model, and to implement the system first as pilot.

2-4 Designing a system for calculation of cost or weight of services

Another requirement for implementing a payment system based on DRG is choosing an appropriate method for determining service tariff, cost weight and cost modifiers. Determining cost weight and base rate based on the country condition should be done. Cost modifiers vary from country to country, therefore these should be defined before implementation.

5-2 Getting support from stakeholders

Many participants pointed out that any plan for successful implementation requires stakeholder support and DRG-based payment system is no exception.

5-2-1 Creating Positive Attitudes in Policymakers and increasing their knowledge

Some interviewees believed that one of the barriers of DRG implementation in Iran is lack of incentives for policymakers for the implementation.

2.5.2 Training of physicians and hospital staff

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The successful implementation of DRG requires the use of expert opinions from physicians and staff, which ensures better implementation of the plan. Therefore, through holding seminars and workshops should give the required knowledge to providers that can address their concerns and ambiguities and prevent their resistance to and opposition to change.

2-5 Stakeholder Analysis

Another issue that few interviewees mentioned is stakeholder analysis for proper DRG implementation.

2-6 Selecting the monitoring and evaluation method

In order to have successful implementation of DRG that has a positive impact on the efficiency, quality and accessibility of health care, the system must be constantly monitored and evaluated. Developing and revising rules and monitoring the services based on clinical guidelines to increased efficiency and quality of services is required.

Discussion:

The findings of this study showed that the most important problems and challenges of DRG-based payment system in Iran are structural, policy, technical and technological challenges, and challenges regarding service cost and providers behavior. Regarding structural challenges the participants pointed out that the implementation of DRG is complex and this method is a major reform in the health system. In line with the present study, Babic (et al. (2015) in his study stated that the payment system based on DRG is more complex than other payment systems and it requires standards and precise information regarding costs (Babi, Soldatovi, Vukovi, & Šantri, 2015). Annear et al. (2018) also found in their study that payment system based on DRG is complex, so it is required first to establish required infrastructure, provide human resources capacity and information management systems before introducing this system (Annear et al., 2018). Mathauer et al. (2013) also pointed out that this method has the technical and administrative complexities and suggest that the effective performance of this payment system depends on different organizational changes (Mathauer & Wittenbecher, 2013). Therefore, in order to implement this payment method, there is a need for careful planning, infrastructure reform, and human resources coordination.

Regarding the policy challenges the role of policymakers. Andoh-Adjei et al (2018) in their study in Ghana concluded that policymakers should consider a key payment method to control health care costs (Boudewijns, Nsiah-boateng, & Asante, 2018). In their study, Ghaffari et al showed that the intent of Iranian health policy makers, authorities, and managers to establish and use a payment system based on DRG is essential (Ghaffari Sh et al., 2012). On the other hand, despite the adoption of strategies to control health costs in Iran in different periods, increasing health costs is a major concern. Therefore, health policy makers should develop and implement

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appropriate policies to better manage these costs while improving accessibility, quality of service and ultimately patient welfare (Masoudi Asl I, Bakhtiari Aliabad M, Akhavan Behbahani A, 2019). Positive attitude of policymakers and increasing their knowledge is necessary for implementing DRG payment system.

Babashahy et al. (2017) stated that using a DRG payment method brings transparency, efficiency and care quality to health systems but this method requires a comprehensive database of services and their costs. They argued that by creating suitable information infrastructure and advanced planning, challenges and problems could be addressed (Babashahy et al., 2017). Abbasi et al. (2016) in their study found that weaknesses in ICT can act as a barrier to the implementation of a payment system. Accurate, relevant and timely information can enhance the quality of decisions and planning and will prevent many incorrect decisions (Abbasi et al., 2016). Mathauer et al (2013) stated that to implement this payment system, coding standardization, data availability and information technology are needed (Mathauer & Wittenbecher, 2013). In line with the results of the present study, Berenson et al. (2016) stated in their report that the DRG payment method is more sophisticated than other methods, thus changing the encoding methods, and classifying patients is required. It requires specialized programming, data systems, and active monitoring of programming (Berenson, 2016). To implement DRG, a DRG Grouper software to classify data should be implemented (Polyzos, Karanikas, Thireos, Kastanioti, & Kontodimopoulos, 2013). The DRG Payment method was first implemented in the US, since then, it has been performed in various European countries including Germany, Australia, France, England and most Asian countries such as China, Korea, Colombia. Using the experience of different countries in implementing this payment method can be an effective step in advancing this system and reducing the challenges ahead (Mathauer & Wittenbecher, 2013; Naderi, 2019; Stephani et al., 2018).

A project carried out by the Bulgarian Ministry of Health in 2015 on the DRG payment system stated that DRG implementation requires accurate and complete data on the costs of implementing the scheme (*Final Action Plan for the Implementation of DRGs - based payments. Advisory Services Agreement between Ministry Of Health Of The Republic Of Bulgaria and the International Bank for Reconstruction and Development Final.*, 2015). Polyzos et al. (2013) in their review of the DRG payment system in Greece stated that a revised pricing system was needed to audit hospital activities and annual budgets to limit costs. Redefining cost weights and setting new prices for DRG payment methods can also be effective (Polyzos et al., 2013). Choosing the right way to determine the tariff of services, cost weights and modifiers is a prerequisite for solving the challenges ahead.

Jiang et al. (2019) in a review of DRG payment method stated that there are a number of challenges in implementing this scheme. Declining hospital revenues, which make hospitals reduce their medical services to increase profitability, which also reduces the quality of patient care. It also ensures that hospitals do not have sufficient incentives to provide specialized equipment to provide care to patients. Incorrect coding was another problem raised in this study

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(Jiang, 2019). Wu (2015) in his study in Taiwan stated that changes in provider behaviors, including a decline in patient care, have occurred as a result of this payment system. This method had a negative impact in financial revenue of health systems which provide care for patients with serious illnesses. Cost shifts, patient selection, and code creep were other challenges facing the implementation of the plan (Wu, 2015). A recent systematic review also showed that implementation of DRG-based payment system could transfer costs to other health centers (Barouni, Ahmadian, Anari, & Mohsenbeigi, 2020). Wild et al. (2015) also point out that the implementation of this procedure may have a negative impact on the quality of patient care and therefore requires careful evaluation (Wild V et al., 2015). Street et al. (2011) stated in their study that implementation of a DRG-based payment method may decrease treatment quality, transfer cost to other setting, encourage patient selection, and up-coding (Street, Reilly, Ward, & Mason, 1983). In their study, Ghaffari et al. (2012) considered resistance of physicians, nursing staff and other health care personnel as a challenge of this system. The resistance of the staff of the organization depends on their satisfaction level of the current process of the organization. Therefore, involvement of the staff in establishment of the system and providing required knowledge may help organization to have success in implementation (Ghaffari Sh et al., 2012). Any plan for successful implementation needs stakeholder support. Therefore, we need to have a proper analysis of the stakeholders and know at what point and in what context they can influence the implementation and quality of the project. Policymakers, managers, physicians, and other personnel can each in turn have a positive and negative impact on how this payment method is implemented.

Limitation

In this study snowball sampling was used which may resulted in missing the opinion of some experts in the field.

Conclusion:

In general, the results of this study showed that, by applying a number of changes we can solve the challenges of implementing DRG- based payment system and it is feasible to implement this payment system in our country. The use of the International Classification of Diseases system is mandatory and careful recording and documenting clinical data is a prerequisite for this implementation. Resistance to change is a natural phenomenon that can be mitigated to some extent by appropriate training programs and explaining the benefits and advantages of the system. It should be considered that implementing this payment is a large, national project and therefore requires the involvement of the government and health policy makers in the country.

The process of implementing this project on a large scale requires time, so it is better to start with a pilot implementation in some hospitals. As a result, the problems facing the system will be identified and meticulously planned. Moreover, the quality and quantity of hospital data is

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gradually improving and the conditions and infrastructure needed to implement this system are broadly provided.

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Table 1

The characteristic of the participants

Level	Position	Frequency
Top managers	Managers in department of health	3
	Managers in insurance companies	6
Middle managers	Academic staff	6
	Middle managers in insurance companies	3

Table 2

The challenges regarding payment system based on DRG in Iran

Main themes	Sub themes
Structural challenges	Complexity of implementation
	Big reform
	Lack of required infrastructure
Policy challenges	failure in custodianship of health system
Technical and technological challenges	No standard for coding
	Lack of proper information structure
	Lack of establishment of Electronic Health Records
Cost challenges	Lack of long-lasting financial resources
	Purchase of DRG software
	Identifying weighting indicators for services, modifiers and calculating cost of services
	Increasing costs at the beginning of implementation
Challenges regarding the behavior of service provider	Possibility to increase outpatient treatment and transfer costs to other departments
	Increased hospitalization or admission rates

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	Selecting patients need less resources
	Code Creep or up-coding (DRG-creep)
	Assigning wrong codes
	Resistance of physicians and other hospital staff

Table 3

Findings on the prerequisites and requirements for implementing payment systems based on DRG in Iran

Main themes	Sub-themes
Generating a standard method for coding	Coding of diagnoses
	Coding of surgical procedures
Developing a data collection and reporting system	Improvement of existing information systems
	Training experts in data mining
	Establishment of electronic health records
Implementation of classification system and grouper software	Identifying successful countries in DRG implementation
	Software customization
	Contract with a foreign consultant
	Pilot implementation
Designing a system for calculation of cost or weight of services	Determining actual cast and service weight
	Determining cost weight and base rate
	Determining modifier indicators
Getting stakeholders support	Creating Positive Attitudes in Policymakers
	Training of physicians and hospital staff
	Analysis of stakeholders
Selecting a monitoring and evaluation method	Developing and revising the rules and regulations
	Strong supervision based on clinical guidelines

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<p>Clara Obehi Ugege (Author) <i>University of Benin Teaching Hospital (UBTH)</i></p> <p>Peter Abhamiebarekioya Ugege (Co-Author) <i>Department of Social Work, Faculty of Social Sciences, University of Benin</i></p>	<p>The Impact of Data-Driven Compensation Strategies on Job Satisfaction Among Employees in Nigerian Real Estate Companies</p>
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ABSTRACT

Induction of labour is the stimulation of uterine contraction prior to the onset of spontaneous labour. Most women fall into labour naturally, others require a little bit of help to do so due to problems that may compromise the health of the mother or that of the fetus. It is carried out in order to reduce maternal and fetal mortality and morbidity. However, some pregnant women still frown at this practice. The aim for the study is to find out the factors that influence the acceptance of induction of labour by pregnant women in University of Benin Teaching Hospital. It will in turn be geared towards creating awareness through health education of pregnant women on induction of labour. A descriptive non-experimental research design was used for this study which was carried out in the Antenatal Clinic in University of Benin Teaching Hospital, Benin city. A total of 80 questionnaires were administered to the sample of 80 respondents. Same were retrieved and analysed. The results were represented in tables and bar charts. The Null hypothesis, which states that there is no relationship between health education and acceptance of induction of labour, was tested using chi-square statistical method at 0.05 level of significance. It was deduced that there is a significant relationship between health education and acceptance of induction of labour as revealed by the calculated value of 12.8 which is greater than the critical value of 3.84. Based on the findings, factors that influence the acceptance of induction of labour includes, previous successful induction, mothers request, prevents unplanned caesarean section, saves life of mother and baby. It was therefore recommended that health education is the key to creating awareness about induction of labour in order to reduce maternal mortality and morbidity.

Keywords: Hospital, Labour, Induction, Pregnancy, women.

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INTRODUCTION

Background to the Study

Induction of labour is the stimulation of uterine contraction prior to the onset of spontaneous labour (Fraser and Cooper, 2019). It includes the stimulation of contraction in the presence of rupture of membrane without labour. Induction of labour has increasingly become part of modern obstetric practice. Most women fall into labour naturally others require a little bit of help to do so. This may be due to problem that may compromise the health of the mother or that of the fetus, for example, conditions like pre-eclampsia or post datism (exceeding the expected date of delivery) among others. Induction of labour is an obstetric intervention which should be used when elective birth will be beneficial to the mother as well as the fetus. It is carried out in order to reduce maternal and fetal mortality and morbidity rates. However, pregnant women still frown at this practice and are emotionally destabilized following the announcement of induction of labour to them. The emotional reaction may be due to lack of proper information or education prior to induction of labour, fear of outcome, misconception among others (Blackburn 2020).

Over recent decades, more and more pregnant women around the world have undergone induction of labour (artificially initiated labour) to deliver their babies (Fraser & Copper., 2021). In developed countries up to 25% of all deliveries at term now involve induction of labour. In developing countries the rates are generally lower, but in some settings they can be as high as those observed in developed countries (World Health Organization 2020). Induction of labour is usually performed by administering oxytocin or prostaglandin etc to the pregnant woman or by manually rupturing the amniotic membranes. Over the years, various professional societies have recommended the use of induction of labour in circumstances in which the risks of waiting for the onset of spontaneous labour are judged by Clinicians to be greater than the risks associated with shortening the duration of pregnancy by induction. These circumstances generally include gestational age of 41 completed weeks or more, pre labour rupture of amniotic membranes to prevent ascending infection to the fetus and reduce the incidence of morbidity to the woman, medical problems example diabetes mellitus which carry an increased risk of pregnancy loss. Obstetric history of previous still birth and placenta abruptio and other indication. Although currently available guidelines do not recommend this, induction of labour is being used more and more at the request of pregnant women to shorten the duration of pregnancy or to the time the birth of the baby according to convenience of the mother and/or health care workers, methods of inducing labour include both pharmacological, medication and mechanical or physical approaches (Clark, Feltovich, Janowski, & Carroll., 2020). Mechanical and physical approaches can include artificial rupture of membranes or membrane sweeping. The use of intrauterine catheters is also indicated. These work by compressing the cervix mechanically to generate increase in prostaglandins in local tissues. There is no direct effect on the uterus. Pharmacological methods are mainly using either misoprostol (prostaglandin E2) or misoprostol (a prostaglandin

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Elanologue). The American congress of obstetricians and gynecologist has recommended against elective induction before 41 weeks if there is no medical indication and the cervix is unfavourable. However, recent studies contradict this view. One recent study indicates that labour induction at term or post-term reduces the rate of caesarean section by 12% and reduce fetal death. The odds of having a vaginal delivery after labor induction are assessed by a "Bishop Score" (Mishanina 2019). Women who induction of labour is indicated for still frown/refuse and are afraid as a result of unknown outcome, hence, the researcher seeks to study factors that influence the acceptance of induction of labour among pregnant women in University of Benin Teaching Hospital.

The researcher in the course of her clinical posting observed that pregnant women are sometimes faced with the need to be induced, however some of them find it difficult to accept even when it is medically indicated, and this can result in serious complications such as fetal distress, prolong labour, intra uterine fetal death and maternal death amongst others.

If refusal of induction of labour can result in such serious complications, the researcher then decides to study to determine the factors that influence the acceptance of induction?

Research question

1. What are pregnant women awareness on induction of labour?
2. what are the factors that hinder the pregnant women's acceptance of induction of labour?
3. what are the factors that influence the acceptance of induction of labour?

LITERATURE REVIEW

Induction of labour has been linked to increased rates of prematurity and rising rates of cesarean birth. The purpose of this investigation was to evaluate current trends in induction of labor focusing on evidence-based factors that influence the practice of induction. Some women are pleased to be guaranteed delivery within specific time, while others are interested in achieving delivery by natural means, hence, dislike the suggestion of intervention. The decision to induce labour should only be made when it is clear that a vaginal birth is the most appropriate mode of delivery in this pregnancy for that particular woman and her baby. Labour should be interfered with, if the situation is indicated for any of the method outlined in her book to attain delivery within affixed range of time. It is an accepted medical scientific fact that by 37 weeks of gestation, baby in the womb is technically at term and therefore functionally mature and able to cope with the outside world. That is true for the overwhelming majority. However, spontaneous labour may not occur for another three or four weeks, even more, that which is sometimes too much for some to cope with. It is therefore, no surprise that these women, glamour for labor induction. Around 20% of all deliveries are preceded by labour induction, proportion that has not varied dramatically over recent years. Fetal death was the only indication for labour induction centuries ago, while this is 10 now a very rare indication, with prolonged pregnancy and maternal

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hypertensive disorders being the major indication for the last 50-60 years. Techniques for inducing labour has also changed from dietary delicacies and verbal threats giving way to physical stimulation mainly achieved by cervical stretching and amniotomy and more recently to sophisticated pharmacological manipulation using oxytocin and prostaglandins, based on our expanding knowledge of the physiological process involved in spontaneous parturition. The cervix is essential in maintaining uterine stability during pregnancy. To achieve this, the maintenance of cervical shape and consistency is imperative, since cervical ripening is a physiological process occurring throughout the latter weeks of pregnancy and is completed with the onset of labour. When delivery is necessary and ripening has not had time to occur, or has failed to be initiated, this natural process had to be accelerated (Smith 2020).

Over recent decades, more and more pregnant women around the world have undergone induction of labour (artificially initiated labour) to deliver their babies. In developed countries up to 25% of all deliveries at term now involve induction of labour, in developing countries, the rates are generally lower, but in some settings, they can be as high as those observed in developed countries (WHO, 2021). World Health Organization (2021) defined labour as low risk throughout, occurring between 37th and 42nd completed weeks of gestation, spontaneous in onset with the fetus presenting by vertex culminating in mother and child being in good condition following birth.

The induction of labour (IOL) rate in the National Health Service (NHS) in England is 20% and this rate was being slowly rising since 2018 (DH, 2020) making it an intervention that has become common practice in maternity units within the NHS. IOL is an intervention to initiate the process of labour by artificial means and is the term used when initiating this process in pregnancies in 24 weeks gestation, which is the legal definition of fetal viability in the UK, Royal College of Obstetricians and Gynecologists (RCOG, 2019). Where labour is being induced, a full assessment must be made to ensure that any intervention planned will confer more benefit than risk for the mother and baby. Induction of labour is an obstetric intervention which should be beneficial to the mother as well as the fetus. It is carried out in order to reduce maternal and fetal mortality and rates. However, pregnant women still frown at this practice and are emotionally destabilized following the announcement of induction of labour for them. This reaction is due to lack of proper information or education prior to induction of labour, fear of outcome, misconception is also a factor (Fraser and Cooper, 2020). Some women are pleased to be guaranteed delivery within specific time, while others are interested in achieving delivery by natural means, hence, dislike the suggestion of intervention. The decision to induce labour should only be made when it is clear that a vaginal birth is the most appropriate mode of delivery in this pregnancy, for that particular woman and her baby. National Institute for Health and Care Excellence (NICE, 2019). Fraser and Cooper (2020) state that the purpose of induction is to affect the birth of the baby thereby reducing the pregnancy. He further says that parent should partake in the decision-making process, give their consent or approval based on full information about the alternative method of birth example caesarean section labour should be interfered with, if the situation is indicated for

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any of the method outlined in her book to attain delivery within affixed range of time. Induction of labour is considered when the maternal or fetal condition suggests that a better outcome, will be achieved by intervening in the pregnancy than by allowing it to continue. This most commonly applies to cases, where there are deviations from the normal physiological processes of child birth as a result of maternal problems for example hypertension or diabetes, or fetal problems such as fetal growth restriction or macrosomia. The mother may also request to have labour induced for social reasons. However, the ground on which the decision is made to induce labour must be sound enough to support the outcome whatever the outcome might be. There is no guarantee that induction of labour, will result in a vaginal birth.

Theoretical Framework: Health Belief Model (HBM)

Health belief model is one of the first theories of health behavior it was developed in the 1950s by a group of United State public health service psychologist who wanted to explain why so few people were participating in programs to prevent and detect diseases. Health belief model is a good model for addressing the problem of behavior that evoke health concern (e.g. high risk), sexual behavior and the possibility of contracting HIV (Blackburn 2020) The health belief model proposed that a person's health related behavior depends on the person's perception of four critical areas. The security of potential illness, the person's susceptibility to the illness, the benefit of taking a preventive action, and the barrier to taking the action.

The health belief model is popularly applied in Nursing especially in issues focusing on patient's compliance and preventive health care practices. The model postulates that health seeking behavior is influenced by a person's perception of the threats posed by a health problem and the value associated with action aimed at reducing such threats. It also addresses the relationship between a person's belief and behavior, it provides a way of understanding between a person's belief and behavior, it provides a way of understanding and predicting how clients will behave in relation to their health and how they will comply with health care therapies.

Concept and definition of Health Belief Model

There are six major concepts in health belief model which are:-

- **Perceived susceptibility:** Refers to a person's perception that a health problem is personally relevant or that a diagnosis of illness is necessary.
- **Perceived severity:** Even when one recognizes personal susceptibility, actions will not occur unless the individual perceives the severity to be high enough to have serious organic or social complication.
- **Perceived benefits:** Refers to patient's belief that a given treatment will cure the illness or help to prevent it.
- **Perceived barrier:** Refers to the complexity of duration and accessibility to treatment.
- **Motivation:** Include the desire to comply with the treatment and the belief that people do what they do.

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- **Modifying factors:** This include personality variables, patients satisfaction and socio-demographic factor

Application

In the present study, the Health Belief Model (HBM) was adopted as a conceptual framework, to provide a sound theoretical basis for understanding the factors that influence women's childbirth decisions. The HBM can specify the relationship between health-related beliefs/factors and maternal behaviors, which can help in predicting the possibility of a woman choosing a particular mode of birth. Using this model, mode of birth and maternal choice and its determining factors can be explored within the five domains of the HBM, namely: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to action.

- **Perceived susceptibility**

Perceived susceptibility is a person's belief in his/her vulnerability to some medical condition. The more that a person believes he/she is at great risk, the more likely that person is to adopt a particular health-related behavior to minimize such risk. For instance, a negative experience in a previous birth could affect a woman's preference for a particular mode of birth in subsequent births, due to the belief that the negative experience could occur again.

- **Perceived severity**

Perceived severity is defined as one's belief in the intensity of the medical condition and its undesirable outcomes. If it is believed that there are very serious or intolerable complications associated with a specific mode of birth, women are more likely to express a preference for an alternative method of delivery, so as to reduce their risk.

- **Perceived benefits**

Perceived benefits are defined as one's belief that outcomes can be positively affected by engaging in a particular health behavior. The advantages of maternal and fetal health and a sense or anticipating fulfillment and satisfaction of sociocultural beliefs have been identified as important factors in maternal decision making.

- **Perceived barriers**

Perceived Barriers refers to an individual's perception of the difficulties stopping them from following a specific health-related behavior. The desire to choose this is hindered by existing medical contraindications.

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RESEARCH METHODOLOGY

The research design employed for the purpose of this project is the descriptive of the non-experimental research design. This study was conducted at the University of Benin Teaching hospital (UBTH), Benin City, Edo State, Nigeria which is located in Ugbowo quarters of Egor Local Government Area of Edo State. The University of Benin Teaching Hospital (UBTH) was established in 1973 and it is a referral Centre. It is located geographically in Ugbowo community between the boundaries of Egor and Ovia Local Government Area of Edo State. It is situated along Benin-Lagos express way. It shares boundary with federal Government girls College Road, it was founded in 1973, it is also made up of various department and wards. University of Benin Teaching Hospital is a tertiary health institution setup for the purpose of rendering health services to the general public and also for the training of nurses, midwives, medical doctors, and other health professionals.

A target population is the total group of individuals from which the sample might be drawn (Nwachukwu, 2015). This study involved only pregnant women attending the antenatal clinic (ANC) of the University of Benin Teaching Hospital. According to the information retrieved from the ANC register, the target population for this study comprised of 100 pregnant women (source antenatal clinic medical record) The target population comprises of 100 pregnant women attending antenatal clinic in University of Benin Teaching Hospital, Benin City. Taro Yamane was used to get the sample size from the population.

$$n = \frac{N}{1+N(e)^2}$$

n =80

sample size is 80

The accidental non-probability sampling techniques was used.

Presentation of Data

Table 1: Percentage distribution according to Demographic data

Age	Frequency	Percentage (%)
16-25 years	28	35
26 - 32 years	30	37.5
33-38 years	18	22.5

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39-45 years	4	5
Total	80	100
Marital status	Frequency	Percentage (%)
Single	7	8.75
Married	70	87.5
Divorced	3	3.75
Total	80	100
Occupation	Frequency	Percentage (%)
Civil servant	35	43.75
Self employed	25	31.25
Trader	5	6.25
House wife	15	18.75
Total	80	100
Educational level	Frequency	Percentage (%)
Primary	20	25
Secondary	12	15
Tertiary	48	60
Total	80	100
Religion	Frequency	Percentage (%)
Christianity	70	87.5
Islamic	8	10
Traditional	2	2.5
Others	-	-

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Total	80	100
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(Source: Fieldwork, 2023)

Table 1 shows that the highest age fall within 26 - 32 years (37.5%) followed by 16-25 years (35%) then 33 - 38 years (22.5%) and lastly 39-45 years (5%). 87.5% respondents were married, 8.75% single, 3.75% divorced. 43.75% are civil servant, 31.25% are self-employed, 18.75% are house wife and 6.25% are traders. 25% of respondents attained primary level of education, 15% secondary level of education while 60% attained tertiary level of education. 70(87.5%) of respondents are Christian, 8(10%) are Islam, and 2(2.5) traditional.

Table2: percentage distribution according to source of awareness

Response	Frequency	Percentage (%)
Friend	10	12.5
Midwife	20	25
Internet	20	25
Doctor	30	37.5
Total	80	100

(Source: Fieldwork, 2023)

Table 2 shows that out of 80 respondents who have heard about induction of labour, 10(12.5%) heard from a friend, 20(25%) from midwife, 20(25%) from internet while 30(37.5%) heard from a doctor.

Table 3: Percentage distribution according to respondents indication for induction of labour

Response	Frequency	Percentage (%)
Prolonged pregnancy	22	27.5
Diabetes in pregnancy	10	12.5
Hypertension	22	27.5
Maternal request	16	20
Fetal death	10	12.5

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Total	80	100
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(Source: Fieldwork, 2023)

Table 3 shows that out of 80 respondents who said they have been induced 22(27.5%) of respondents were induced due to prolong pregnancy, 10(12.5%) due to diabetes in pregnancy 22(27.5%) due to hypertension, 16(20%) due to maternal request, and 10(12.5%) due to fetal death

Table 4: Percentage distribution on what the complication to the mother was

Response	Frequency	Percentage (%)
Cord prolapse	10	12.5
Placenta abruptio	30	37.5
Uterine rupture	18	22.5
Post-partum haemorrhage	22	27.5
Total	80	100

(Source: Fieldwork, 2023)

Table 4 shows that out of 80 respondents that said they had complication, 10(12.5%) had Cord prolapse, 30(37.5%) had Placenta abruptio, 18(22.5%) had Uterine rupture and 22(27.5%) had Post-partum hemorrhage

Table 5: Percentage distribution on what the complication to the fetus was

Response	Frequency	Percentage %
Fetal distress	30	37.5
Intracranial haemorrhage	15	18.75
Fetal hypoxia	18	22.5
Still birth	17	21.25
Total	80	100

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(Source: Fieldwork, 2023)

Table 5 shows that out of 80 respondents that said there was complication to the fetus, 30(37.5%) had fetal distress, 15(18.75%) had Intracranial haemorrhage, 18(22.5%) had fetal hypoxia and 17(21.25%) had still birth.

DISCUSSION OF FINDINGS

The discussion of relevant findings from data presented and analyzed. Structured questionnaire was used to elicit information from the respondents. The number of respondents was 80 pregnant women in University of Benin Teaching Hospital, Benin City, Edo State.

Awareness of pregnant women on induction of labour

The study established that 60(75%) respondents show high level of awareness of induction of labour and source of information being from friends, midwife, doctor and internet. Minority 20(25%) of respondents are not aware of induction of labour. It can be inferred that most pregnant women of University of Benin Teaching Hospital show high level of awareness of induction of labour. This is in line with WHO (2011) which stated that, over recent decades, more and more pregnant women around the world have undergone induction of labour (artificially initiated labour) to deliver their babies.

However, most of the respondents are aware of induction of labour and yet some refuse induction, hence, there is need to know the factors that influence women's acceptance of induction of labour.

Factors that hinder the pregnant women's acceptance of induction of labour

It was observed that 30(37.5%) of respondents said that degree of pain hindered their acceptance, 18(22.5%) said misconception, 14(17.5%) said fear of the unknown while 18(22.5%) said previous experience. This is in agreement with Fraser and Cooper (2020) who stated that pregnant women still frown at this practice and are emotionally destabilized following the announcement of induction of labour for them. The emotional reaction may be due to lack of proper information or education prior to induction. Fear of outcome, and misconception is a factor.

Factors that influence the acceptance of induction of labour

From the study it was also observed that out of 80 respondents who have been induced previously, 59(73.75%) said health education has a role to play in the acceptance of induction of labour. It can be inferred that health education has a great influence in acceptance of induction of labour. This corresponds with Fraser and Cooper (2020) who state that patients should partake in the decision

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making process, give their consent or approval based on full information about the alternative method of birth. Labour should be interfered with if the situation indicated arises.

Implication to Midwifery

Induction of labour like any other procedure requires the full consent of the patient. Lack of awareness or absence of meaningful information about procedures was evident in all studies where IOL took place for low-risk postdates pregnancies as part of usual care. Information was given but not adequate or women did not remember it being given at all or it was given in a rush or too close to the time of induction. Meaningful individualized conversations with healthcare practitioners were absent. Women sought information from other sources including the internet and friends and family (Coates et. al 2019). This study will help to improve the knowledge of nurses and midwives on factors responsible or contributing to the acceptance of induction of labour as compared to normal onset of labour which will enable them to provide appropriate care needed by these women. Induction of labour is an obstetric intervention which should be beneficial to the mother as well as the fetus. It is carried out in order to reduce maternal and fetal mortality rates. The decision to induce labour should only be made when it is clear that a vaginal birth is the most appropriate mode of delivery in the pregnancy.

Conclusion

It was discovered that majority of respondents are aware of induction of labour. It is important and beneficial especially when indicated, to ensure survival of mother and the baby. Misconceptions about induction of labour contribute to non-acceptance which can result to loss of life of the pregnant women and foetus. Adequate information to correct misconception goes a long way to influence women's acceptance of induction of labour.

Recommendations

Based on the findings, the following recommendations were made:

- Public enlightenment on the dangers associated with refusal of induction of labour.
- The federal and state government should participate in creating awareness through adequate publicity in the mass media.
- Health educating the populace on the advantages of induction of labour as a method of child birth.
- To health personnel: They should provide adequate information and give opportunity to client to air their view, express doubt and concerns about the procedure. Anxiety should be allayed and misconception corrected.

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- To the client: The client should be receptive to advice that the doctors and nurses have for them bearing in mind that induction of labour when suggested is done to save her life and that of her baby.

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<p>Sabreih Zarei (Author) <i>Iran University of Medical Sciences, Tehran, Iran</i></p>	<p>Diagnosis of Anterior Abdominal Wall Defects as Omphalocele Using 3D-Ultrasonic Sonogram</p>
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Abstract

Omphalocele in terms of abdominal wall defects (AWDs) considered as a congenital anomaly and its diagnosis is critical to clinical management. We aimed to report a case with AWD using three-dimensional (3D) ultrasound (US) and its correlation with the departure of the vital organs in first trimester. The ultrasound (US) Samsung W9 device was used for a routine first trimester screening of fetus. A 21-year-old pregnant female was presented to the ultrasound unit for a routine first trimester screening. The defect of the anterior wall along with the departure of intestine loops, liver and heart was diagnosed with color Doppler assessment. All the evidences were suggestive of the omphalocele along with the departure of vital organs, first of all cantrell pentalogy referred for further evaluation and amniocentesis. Omphalocele or pentalogy of cantrell observed with pushing out bowel and/or liver thanks to herniation into the umbilical cord. 3D-US is feasible method for the early detection and diagnosis of fetal omphalocele from other physiological herniation which will substantially make proper decision on clinical outcomes and fetal wellbeing.

Figure: Defect of the anterior abdominal wall especially omphalocele with externalized liver, and cardiac in first trimester using ultrasound assessment.



Keywords: abdominal wall defects (AWDs); omphalocele; early detection; prenatal.

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<p>Karana Kebah Weefar (Author) <i>Southern Medical University</i></p> <p>Eyeh Mulbah (Co-Author) <i>Cuttington University, Monrovia, Liberia</i></p>	<p>Prevalence of Hypertension and Associated Factors in People Living with HIV in Liberia</p>
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Abstract

The prevalence of hypertension varies across regions and country income groups with WHO African Region the highest prevalence of hypertension of 27%. People living with HIV (PLWH) have been found to be at an increased risk of developing hypertension compared to the general population with studies in Sub-Saharan Africa (SSA) ranging from 15.4% to 20.0%.

The study addresses the intersection of two significant public health challenges: HIV and hypertension and to fill a critical knowledge gap and address the unique healthcare needs of individuals living with HIV in Liberia.

Using standard Kish and Leslie formulas, a cross-sectional study design, with a population sample size of 168 of individuals aged 18 years and above who have been diagnosed with HIV and are receiving care was employed to assess the prevalence of hypertension and identify associated factors among people living with HIV in the Wayzohn district, located in Grand Bassa County.

Factors such as Prevalence and associated factors of hypertension in the context of HIV infection contributed to 18%, association between antiretroviral therapy and the development of hypertension in the HIV population (32.5%), and lastly the impact of socio-economic factors, lifestyle behaviors, and HIV-related clinical parameters contributed to 49.5% of the total respondents. The study sheds light on the dual burden of these conditions and their implications for clinical management and public health strategies.

In summary, the potential to influence public health policies and interventions related to HIV and non-communicable diseases is highlighted through providing valuable data thereby contributing to the development of evidence-based policies and guidelines aimed at improving cardiovascular outcomes for individuals living with HIV.

Keywords: Hypertension, People living with HIV, Liberia, public health, antiretroviral therapy.

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<p><i>Emmanuel Shumbusho (Author)</i> <i>Department of Biomedical Laboratory sciences in Kibogora Polytechnic</i> <i>Department of laboratory in University Teaching Hospital of Butare</i></p> <p><i>Mahoro Iradukunda Alain (Co-Author)</i> <i>Department of Polyclinique Medicale la Providence.</i></p>	<p>Antimicrobial Susceptibility Pattern of Neisseria Gonorrhoeae Isolated From Male Patients.</p>
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ABSTRACT

Gonorrhoeae is the second most reported bacterial sexually transmitted infection (STI), after chlamydia (Buder et al., 2019). Untreated gonorrhoeae can lead to pelvic inflammatory disease and infertility in women and epididymitis and orchitis in men (Tsevat et al., 2017). Identification of the antimicrobial susceptibility pattern of Neisseria gonorrhoeae isolated from male patients attending Polyclinique Medicale la Providence. A descriptive cross-sectional study design was used; the target population were 385 of men attending the health facility. Penile discharge, painful urination are inclusion criteria. Questionnaires was used to collect information. Samples of urethral swabs are inclusion criteria. Questionnaires was used to collect information. Samples of urethral swabs were collected from men aged between 18-60 years old using Dacron swab and analyzed to CHUB. Cultures were done on Thayer Martin media for Neisseria gonorrhoeae and E-Test strips were used perform antimicrobial susceptibility on growth culture. Significance was set at p value less than 0.05. SPSS v22 was used for data analysis

Results: 46 % of participant have not used the antimicrobial agents, 22 % didn't know the type of antibiotics taken, only 19% expect to be cured by antibiotics. People working in private were more exposed to Neisseria Gonorrhoeae [a OR 006; 95%CI=0.001-0,312; P=0.006]]. No use of condom increases the risk of Neisseria gonorrhea [OR 2.33 95% CI 0.804-6.754 p=0.119]. Married people used condoms more than 4times compared to others. S: Sensitivity, I: Intermediate, R: Resistance The MIC analysis from E-Test revealed that Ceftriaxone has S:0.08, I:0.2 and R:0.8. Cefixime has S:0.1, I:0.25, R:0.78. Azithromycin has S:0.15, I:0.6 and R:1. Ciprofloxacin S:0.016, I:0.6 and R:3. Doxycycline has S:0.03, I:1.1 and R:3.1. Cefixime and ceftriaxone has the highest sensitivity and should be use in treatment of Neisseria Gonorrhoeae. Many antibiotics showed resistance due to self-prescription.

Keywords: Neisseria gonorrhoeae, STI, antimicrobial susceptibility, Culture media

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<p>Alemayehu Wubie Zerihun (Author) <i>Ethiopian Institute of Agricultural Research (EIAR)</i></p> <p>Adamneh Dagne (Co-Author) Gashaw Tesfaye (Co-Author)</p>	<p>Reproductive biology and condition factor of the African catfish, <i>Clarias gariepinus</i> (Burchell1822) in Lake Koka, Ethiopia</p>
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Abstract

The study was conducted to investigate the breeding season, sex ratio, size at maturation, fecundity, and condition factor of *Clarias gariepinus* in Lake Koka. A total of 754 fish specimens were collected from October 2020 to August 2021 on six sampling occasions covering pre-rainy, rainy and dry seasons. From the collected specimens, fish total length and total weight were measured to the nearest 0.1 cm and 1 g, respectively. Moreover, sexes were identified and gonad maturity levels were recorded. Ripe ovaries were removed and preserved using Gilson’s fluid until the eggs were counted. The sex ratio of *C. gariepinus* in different size classes was similar to that of a hypothetical 1:1 ratio. The length at first maturity (L_{50}) of the *C. gariepinus* was 51.8 cm in total length. The mean Fulton’s condition factor of female *C. gariepinus* ranged from 0.65 ± 0.05 - 0.71 ± 0.14 , while that of males ranged from 0.62 ± 0.04 - 0.7 ± 0.11 . The Fulton’s condition factor was significantly higher in August ($P < 0.05$) for females than in the rest of the sampling months. The highest ripe gonads were recorded in the rainy season and the lowest was in the dry season, with the percentage of ripe gonads being 27.5%, while the males showed similarly and extended maturity patterns among seasons. Fisheries management for *C. gariepinus* in Lake Koka should therefore take into account the estimated L_{50} value and the main breeding season (rainy season) to sustain the fishery and benefits to the fishing community.

Keywords: Breeding season, Fecundity, Fulton’s condition factor, Maturity, Sex ratio

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Introduction

In Ethiopia, African catfish (*Clarias gariepinus*) is widely distributed in most water bodies both in major river basins and lakes (Golubstov and Mina, 2003; Redeat Habeteselassie, 2012). African catfish is the second most important commercial fish species in Ethiopia's capture fishery next to the Nile tilapia, *O.niloticus* (Gashaw Tesfaye and Wolff, 2014). Generating information on the biology (reproductive, food and feeding habit) of freshwater fish species is important for proper decision making in developing appropriate management program in the capture fishery as well as in the culture systems.

Information in the food and feeding habits of African catfish has been documented by various scholars (Elias Dadebo, 2000; Elias Dadebo, 2009; Elias Dadebo et al., 2014; Demeke Admassu et al., 2015). However, the reproduction biology and condition factor of fish vary depending on where the lake is located and the climate conditions (Elias Dadebo, 2000; Billard and Breton, 1978). Therefore, generating baseline information on the reproductive biology of the African catfish would support the management efforts of this important resource in Lake Koka. Besides, since Lake Koka is serving as a source of parent African catfish brood stock and pituitary gland for captive breeding, proper understanding of the reproductive biology of this fish species at its natural habitat will be very much helpful for successful fish culture as the pituitary gland obtained during the peak breeding season is much potent than those in the other seasons.

Moreover, condition factor is an indicative of the well-being of fish (Bagenal and Tesch, 1978). As the condition of fish severely affects the reproductive potential of a given species, it is imperative to understand the factors that affect the conditions of fish and to know when the condition of the African catfish is good in Lake Koka. The present study therefore aimed to investigate some of the vital reproductive traits and condition factor of the African catfish in Lake Koka.

2. Materials and Methods

2.1 The study area

The Lake Koka is located in the Ethiopian Rift Valley (08°23'22" N; - 39°05'15" E) at an altitude of 1590 m.a.s.l. It has a surface area of about 255km²; the maximum and mean depth of the lake is 14m and 9m respectively (Gashaw Tesfaye and Wolff, 2015). It is 90 km far from the capital, Addis Ababa in the Southeast direction (Figure. 1). The Awash River is the main water supplier all year round and Mojo River inflows during rainy season. According to Daniel Gamachu (1977) the area is characterized by four months of dry season (November - February) and eight months of rainy season (March-October). Lake Koka has a production potential of 1362 t/year. It contributes about 7% of the country's annual catch (Gashaw et al., 2015).

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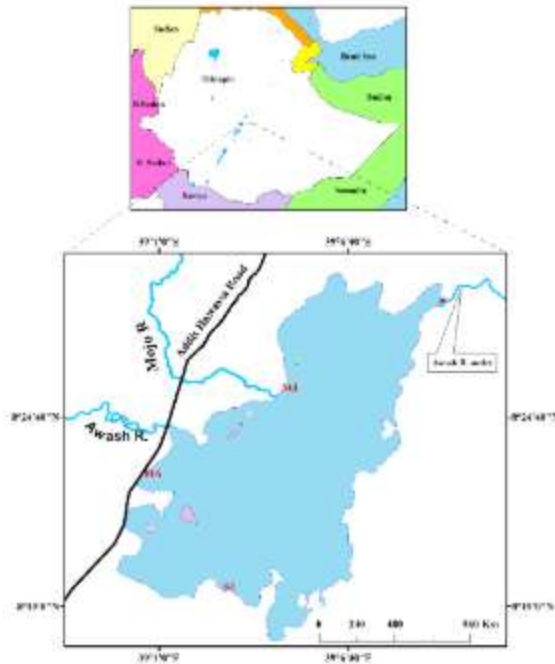


FIGURE 1 Map of Ethiopia and the geographical location of Lake Koka (source: Tesfaye 2016)

2.2 Fish sampling

The fish were collected at three different landing sites: Mojo river (MJ), Meto Aleka (MA) and Kentera (Kt) (Figure 1). Mixed size 754 fish specimens were bought from fish collectors at the landing sites. The fish specimens were collected from October 2020 to August 2021 at six sampling occasions. The total length (TL) and total weight (TW) were measured to the nearest 0.1 cm and 0.1 g, respectively. Each fish specimen was dissected, sex and maturity stages determined by visual observation of the gonad using five maturity scales. The gonad maturity level was determined according to Bagenal and Braum (1978). The maturity level was classified as immature (I), recovery spent or developing virgin (II), ripening (III), ripe (IV) and spent (V). The ripe ovaries were collected to determine fecundity, weighed to the nearest 0.1 g and preserved with Gilson's fluid.

2.3 Determination of fecundity and sex ratio

The fecundity of ripe ovaries was estimated using gravimetric methods (Bishail et al., 1974). All the ovaries' eggs were weighed, and preserved in Gilson's fluid. Two subsamples of ovaries were weighed and the eggs were counted. The average number of eggs was calculated from the two sub-sample eggs that were taken from each gonad. Then the total number of eggs per female was calculated as follows:

$$Fecundity = \frac{(Average\ No.\ of\ eggs\ in\ the\ sub\ sample \times gonad\ weight)}{Average\ weight\ of\ two\ sub\ samples}$$

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A chi-square test was employed to determine if the sex ratio varied between months and with fish size.

2.4 Length at first maturity and breeding season

The length at first maturity (L_{50}) commonly refer to as the length at which 50 % of the total number of individuals of a length group reaches maturity (Willowughby and Tweddle, 1978) was estimated using a logistic regression analysis following Gunderson et al. (1980) equation:

$$P_x = \frac{1}{(1 + \exp^{(bx+a)})}$$

The breeding season was determined by looking at the seasonal variation of the ripe gonads. As year-round sampling was not possible due to the Covid restriction and security problems during the main sampling periods, we have grouped the six sampling occasions as dry season, pre-rainy season (short rain) and rainy season. Sampling months of October, December and January represents dry season, March and April as pre-rainy season and August as rainy season.

2.5 Condition factor (K)

The wellbeing of *C. gariepinus* was determined using Fulton's condition factor (Bagenal and Tesch 1978). Fulton's condition factor (K) is calculated as follows. $K=W/L^3 \times 100$, where, "W" is the total body weight and "L" is the total length.

2.6 Statistical analysis

All data were analyzed using one-way analysis of variance (ANOVA) SPSS version 25 (IBM, SPSS) with the results represented as Chi-square. Sigma plot version 12 was incorporated to determine L_{50} .

3. Results

A total of 754 fish samples of *C. gariepinus* ranging in size from 20-110 cm were bought from fishermen, of which 368 (48.8%) were females, while the remaining 387 (51.2%) were males. The largest female caught was 105 cm and weighed 8853 g. While the largest male caught was 110 cm and weighed 9118 g. The total female to male ratio was 1:1 which was quite similar to the hypothetical sex ratio in the natural environment (Table 1). There was no significant difference in sex ratio of fish caught in all length classes (chi-square test, $P>0.05$). The number of eggs in the ripe ovaries varied from 3,966 to 444,880 eggs per female and the mean fecundity was 70,085 eggs per female. The lowest fecundity was 3,966 eggs in the fish that weighed only 352g that had an ovary weight of 6 g (1.7% body weight). Whereas the highest fecundity was counted from the fish measured 98 cm length and 8306 g total body weight with ovary weight of 855 g (10.3% their bodyweight).

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Length at first maturity

The percentage of female and male *C. gariepinus* having a gonad stage of III, IV and V were considered as matured fish and were plotted against length for combined sexes. In Lake Koka, the length at which 50% of *C. gariepinus* fish first maturity was computed as 51.8 cm TL and its 95% confidence interval ranges from 50.2 to 53.3cm (Figure 2).

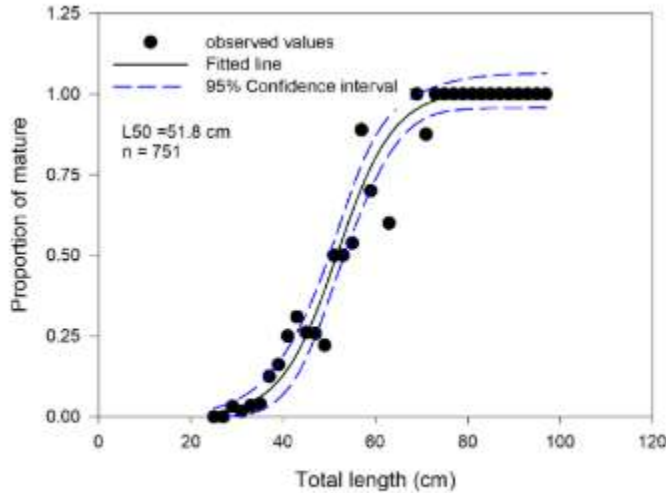


Figure 2. Length at first maturity (L_{50}) of *C. gariepinus* in Lake Koka.

Fulton’s Condition factor (K)

The Fulton’s condition factor (Mean \pm SE) of female *C. gariepinus* ranged from 0.65 ± 0.05 - 0.71 ± 0.14 while that of males ranged from 0.62 ± 0.04 - 0.7 ± 0.11 (Figure 3). The smallest condition factor was recorded in December for males; October and December for females. The Fulton’s condition factor was significantly higher in August for female *C. gariepinus*. The reproductive period of *C. gariepinus* was determined from the percentage of fish with ripe gonads taken in different seasons. Even if there were maturity eggs and milts existed in different seasons, the highest ripe gonad percentages were found during the rainy seasons with a 90.3% for females. On the other hand, lower percentages of ripe gonads were recorded during the dry season with only 27.5% ripe gonad in female. The males have shown similar maturity patterns at different seasons with ripe gonads ranging from 57.4- 63.0% ripe gonads in each season (Figure 4).

Figure 3. The mean Fulton's condition factory of *C. gariepinus* in Lake Koka.

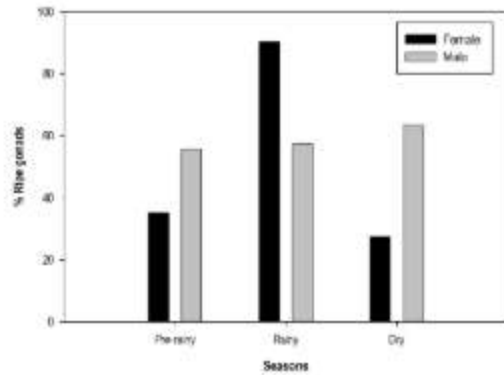


Figure 4. Seasonal variation of percentage ripe gonads in *C. gariepinus* in Lake Koka

Discussion

The study indicates that the overall number of females to male ratio in different length classes was close to the expected hypothetical 1:1 ratio (Table 1). This might be due to the inclusion of all fish, samples caught using beach seine, monofilament, and multifilament gill nets, and the representative random specimen was taken from this aggregate catch from fish collectors. Similar studies showed different sex ratios in Lake Hawassa and Lake Chamo (Elias Dadebo 2000; Elias Dadebo et al., 2011). The sex ratio in fish could vary from species to species and from year to year with the same population (Nikolsky 1963). In the wild population, however, sex ratio is close to one to one unless there is a bias in the sampling process.

Length at first maturity

The size of *C. gariepinus* at first maturity (Figure 2) was slightly smaller than previously reported value (53.4 cm) (Gashaw Tesfaye et al., 2016), but similar to the upper limit of our estimated 95% CI of L_{50} value. Fishing mortality is negatively correlated with fish size at maturity. An increase in the mortality rate of fish causes a change in the population's reproductive pattern to compensate for the losses caused by fishing activities (Wootton, 1998). The fishing pressure on *C. gariepinus* is higher because of its high demand as food fish as a result the length at first maturity becomes smaller compared to previous studies in the same lake. The size at first maturity in Lake Chamo shows that it was 58 cm for female catfish and 52 cm for male *C. gariepinus* (Elias Dadebo et al., 2011). This implies that *C. gariepinus* matured at larger size in Lake Chamo than in Lake Koka. However, the first length at maturity of *C. gariepinus* in Lake Tana was 43.2 cm for males and 57.7cm for females (Dereje Tewabe, 2013). These results clearly indicated that the L_{50} of *C. gariepinus* varies between stocks and/or water bodies.

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Fulton's Condition factor (K)

The Fulton's condition factor is an indicative of better physiological condition or well being of a fish (Bagenal and Tesh, 1978). In the presented study, the *C. gariepinus* showed a better body condition during the rainy season than the pre- rainy and dry seasons (Figure 3). This could be due to the high number of matured fish that contain the highest number of eggs in their ripe gonads. This is clearly shown by their computed value of gonado-somatic index. In August, the *C. gariepinus* gonado-somatic index (GSI) was 1.9, while it was 1.6 in March and 0.9 in October. The pre-spawning fish showed a higher GSI than spawned fish with ripe ovaries. Studies indicate that the oocytes of 20 µm diameter contribute over 65% of ovaries weight in the fish (Latif and Rashid, 1972). The present study showed that the mean ovary weight contributes 10.3% of the total fish body weight and supports Latif and Rashid's (1972) suggestion on ovary contribution to fish bodyweight. Another possible reason is that they have a high level of fat deposition in their body and the optimal water temperature may have encouraged the African catfish to feed actively throughout the wet months. The zooplankton abundance variation in lakes will have an impact on the condition factor fluctuation across seasons. Previous study showed that rainfall boosts phytoplankton and zooplankton productivity in the Rift Valley lakes, which is associated with increased nutrient loads from the watersheds (Elizabeth Kebede et al., 1994). However, further research should be conducted to determine the precise environmental factor that was responsible for the seasonal variation in condition factor of the fish in Lake Koka.

In Lake Koka, the highest number of ripe gonads in *C. gariepinus* were recorded during the rainy season (Figure 4), even though the other season's ripe gonads were available, but their proportion was less in number. Male *C. gariepinus* showed a uniform ripe gonad in a different season, which implies that, it has a prolonged spawning period compared to females in different seasons (Figure 4). An earlier study indicated that the spawning period of *C. gariepinus* occurred from February to August in Lake Hawassa and from March to June in Lake Chamo (Elias Dadebo, 2000). The present study indicates that the *C. gariepinus* peak breeding season showed a similar breeding season to that of the Lake Hawassa and Chamo. Several environmental factors could be responsible for high spawning activities. The main trigger factors associated with spawning period include rainfall and water temperature. The *C. gariepinus* peak breeding period is correlated with the maximum rainfall, a rise in water level, and flooded ponds and river margins stimulate the fish to spawn (Haylor and Muir, 1998). *Clarias gariepinus* maturity stages are influenced by water temperature change in the lake and spawning is triggered by rainfall (De Graaf et al., 1995). Even in the same region, gonad development may vary because of differences in environmental conditions. African catfish do not take care of their laid eggs and young; rather, they select a suitable spawning site with a rich food supply so that the larvae can use after hatching (Payne, 1986).

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Conclusion and recommendation

In this study, the highest body condition factor of *C. gariepinus* was recorded in the rainy season, which shows the wellbeing of the fish in the lake. Even though the *C. gariepinus* breeding period varies with location, most of the breeding has been associated with rainy seasons. The current study showed that 90.3% of the catfish carried matured eggs in August, which is the peak rainy season in the area. The rise in water volume and water temperature in the surrounding area and short rain of the area appear to be important triggering factor for the spawning of the fish. Therefore, for artificial propagation purposes of this fish, the parents should be collected from the wild in July and August since they carry ripe eggs and it is possible to breed them artificially under a hatchery set up. Even the pituitary collection should be collected in the potency period, which is mainly in the rainy seasons, mostly in August. The current finding of *C. gariepinus* length at first maturity was slightly lower than previous investigations in the same lake. This suggests that the lake fishery management was not proper in the last decade. Currently, fishermen use monofilament gillnets that are known to be destructive fishing gear in Ethiopia and many other African countries. So, proper management should be introduced to sustain the African catfish fishery in Lake Koka.

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The authors wish to convey their sincere gratitude to the people concerned for their help in field work.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request to the corresponding author.

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<p>Roohollah Omidi Nargesi (Author) <i>M-Tik Company</i></p>	<p>Reproductive biology and condition factor of the African catfish, <i>Clarias gariepinus</i> (Burchell1822) in Lake Koka, Ethiopia</p>
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ABSTRACT

The Iron & steel industry is one of the main causes of emitting dangerous greenhouse gases that causes Climate Change and global warming.

this study aims to address the impact of steel mill gases by collecting data of two large-scale steel mills, and using some software (e.g., IBM Environmental Intelligence, Greenly, and Net Zero Cloud), and draw graphs. analyzes of trends in the emissions of greenhouse gases (GHGs) in blast furnace gas (BFG), basic oxygen furnace gas (BOFG), and coke oven gas (COG), CO₂, CH₄, N₂O and CO will also be addressed. these two plants are using the electric arc method and burn coke and diesel (i.e., Msc Company and ES.Company). Noteworthy results were Monitoring of greenhouse gases on the air across the nearby large city with over five million people. The results were also compared with EDGAR and GGGRN. For instance, the evident factors include the effects of raw material, and the effects of standard filtering types on gases. Other substantially effective factors include reducing the use of steel alloys in equipment exposed to corrosion at high temperatures of furnaces, using copper as a durable metal instead of steel. According to the comparison of air pollution levels over the past three years with the GGGRN diagrams, there has been a dangerous rise in CO₂ emissions in the nearby metropolis. As per the results the direct emission of CO₂ caused by the manufacturing of crude steel is estimated at nearly 1.98 tons of CO₂ per ton of steel.

Keywords: Steel industry, Climate Change, Global warming, Co₂ emissions, air pollution, Greenhouse gases, air quality

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<p>Benyamin keshavarzi (Author) <i>Faculty of Veterinary Medicine, Islamic Azad University</i></p> <p>Mehdi Marjani (Co-Author) <i>Faculty of Veterinary Surgery, Islamic Azad University</i></p> <p>Hamidreza Hasani (Co-Author) <i>Faculty of ophthalmology, Alborz University of Medical Science</i></p>	<p>Comparing the Results of Using Bidirectional Double Needle PDO-Cog Thread with three Conventional Surgical Procedures for Correction of Ptosis in Dogs.</p>
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Abstract

Background and objectives: Ptosis of the eyelid or blepharoptosis, whether congenital or acquired, can obstruct vision and needs to be corrected. Several surgical procedures have been suggested for its correction; but each have specific limitations and complications. Here, we propose an innovative method and investigated its effect on 12 dogs. We hypothesized that the less tissue manipulation in this method can result in better outcomes for correction of blepharoptosis.

Materials and methods: Twelve dogs, aged 2-10 years, mixed Persian, weighing 20-25 kg, including both sexes were selected, kept in standard situation, vaccinated, and fed appropriately. After 2 weeks of ptosis induction by injection of Botulinum toxin type “A” ocular muscles, the degree of ptosis were measured and the dogs were categorized accordingly into three groups. Group A received Fasanella Servat surgery, group B frontalis sling surgery with double Pentagon technique, and group C received levator resection in the left eye. On the right eye, bidirectional double needle PDO-Cog thread was used for correction of ptosis. Surgical details (including the duration of surgery, bleeding volume, cut size, and ease of surgery, need for cannulation), scar formation, need for further care and hospitalization, self-trauma, and time to recovery were evaluated on days 1, 3, 5, 7, 14, 21, 30, and after 3, 6, and 9 months. Data were analyzed using SPSS v. 21.

Results: Of 24 eyes, 12 underwent T procedure, and the other three procedures was performed in 4 eyes each. Mean MRD1 was not different before surgery (before and after injection of botulinum), but after surgery, group T had a higher mean, compared to groups A and B ($P < 0.001$) and group C ($P = 0.002$). Nine months after surgery, mean MRD1 was not different from after surgery ($P = 0.068$). Group T had a shorter duration of surgery and less bleeding during surgery, compared to the three other groups (all $P < 0.001$) The incision length was zero millimeters because, in method performed on group T, the needle was only inserted into the skin, and no incision was required. Postoperative complications also varied among the groups,

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and in group T, they were noticeably different from the other groups. The surgeon ranked the ease of surgery as group T, B, A, and C, respectively. Postoperative complications were different between the groups and in group T were significantly lower than in the other groups.

Conclusion: The innovative method we proposed here was superior to all three conventional surgical methods, used for different stages of blepharoptosis. Further clinical trials are required to confirm these results in humans.

Keywords: Blepharoptosis; Oculomotor Muscles; Surgical Procedures, Operative

INTRODUCTION

Blepharoptosis, or ptosis of the eyelid, presenting with dropping of the upper eyelid, usually occurs as a result of a congenital or acquired abnormality in muscles (1). Myogenic ptosis, resulting from the dysfunction of muscle elevating the eyelid, may be an autosomal dominant congenital disease (mainly associated with other anomalies, forming a syndrome) or sporadic as a result of oculopharyngeal or myotonic dystrophy, infiltrative ptosis, or myasthenia gravis (2). Aponeurotic ptosis, which results from stretching/detachment of levator palpebrae superioris (LPS) aponeurosis from tarsal attachment, usually occurs in patients with constant contact lens use and chronic rubbing or after cataract surgery due to trauma to LPS and superior rectus complex. Another cause of ptosis is neurogenic, which occurs in third nerve palsy and Horner's syndrome (3).

The ageing of the population, more use of contact lens and botulinum toxin A (for treating moderate-to-severe glabellar lines) have resulted in an increasing trend in the incidence of blepharoptosis worldwide (4); therefore, it is important to include eyelid measurements, including marginal reflex distance 1 (MRD-1) palpebral fissure height, upper eyelid crease, and levator function test, in ocular examination (5). Aside from the cause and significance of appropriate diagnosis, blepharoptosis needs to be corrected, as it obstructs the vision and the functional and cosmetic concern impair the patients' quality of life (6). Several surgical procedures have been suggested for correction of blepharoptosis, which are mainly based on removing extra tissue and using the orbicularis oculi muscles and those around them to support the upper eyelid (7). The type of surgical procedure is decided based on the disease severity, patients' age, and etiology of blepharoptosis. "Fasanella-Servat procedure" is indicated in patients with mild congenital or acquired ptosis with good levator function or Horner's syndrome; during this procedure tarsus is excised with lower part of Muller's muscle and conjunctiva (8). In patients with LPS function >4 mm, "levator resection" surgery is indicated and in patients with poor LPS function and food frontalis action, such as patients with congenital ptosis (older than three years old), myogenic or neurogenic ptosis, and blepharophimosis syndrome, "frontalis sling" surgery is performed (9, 10). Despite accurate

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patient selection and professional surgery, several complications are reported after surgery, which includes undercorrection, overcorrection, corneal exposure, infection, sling granuloma, and eyelid notching (11).

Here, we invented a novel method that involves less manipulation of the tissues; as this procedure does not require an incision, we hypothesized that it can result in less inflammation and thus better recovery. For testing this hypothesis, we performed this technique on one eye and compared the outcome of this technique with each of the three conventional surgical method on the other eye. This study aimed to investigate the efficacy and outcome of using bidirectional double needle polydioxanone (PDO)-Cog thread, compared to three conventional surgical methods, on dogs.

MATERIALS AND METHODS

Participants and preparation

Twelve dogs, aged 2-10 years, mixed Persian, weighing 20-25 kg, including both sexes were selected for this study, visited by a vet, and numbered. They were kept in standard situation, vaccinated, and fed appropriately. Ptosis was induced by injection of 100 IU Botulinum toxin type "A", diluted in 4cc normal saline, on 10 spots of ocular muscles, including levator palpebrae superioris and orbicularis oculi muscles (upper, lateral, and medial limbus). After 2 weeks, the degree of ptosis was measured (from the palpebral line to light reflex of pupil) and the dogs were categorized accordingly into three groups. The surgical procedure was selected based on the severity of ptosis. For preparing before surgery, petroleum ointment was applied for collecting debris and hair from the cornea and conjunctiva; the ointment was carefully removed by a sterile applicator before surgery and the eyelashes were shaved. Povidoneiodine 5% solution was used for scrubbing the surgical site three times; then washed with 0.9% saline solution. Because we required the dogs to stay still, they were anesthetized using 0.6-1 cc Acepromazine and 3-5 cc ketamine. The dogs were laid in prone (sternal recumbency) position on the surgical bed and one of the three surgeries was performed on their left eye (OS). Group A received Fasanella Servat surgery, group B frontalis sling surgery with double Pentagon technique, and group C received levator resection in the left eye. After surgery, topical antibiotic or corticosteroid was applied.

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Surgical procedures in the left eye:

A. Fasanella Servat surgery

In the first group, the upper eyelid was retracted with Desmarres #2 retractor and fixed to the temporal and nasal ends with 4-0 silk thread. The required cut zone was marked by a caliper on the tarsus (<3mm). Two curved hemostats were used to attach the upper parts of eyelid (about above the pupil) to hemostat the tarsoconjunctival Mullers complex, not the skin or the orbicularis oculi muscle. Plain gut 6-0 thread was used on the eyelid with horizontal mattress pattern within 1.5 cm of the hemostats (the end of sutures was not tied). Blade #15 was used to create a cut using metal on metal contact method; the extra tissues were removed completely. The rest of the thread was used for creating horizontal mattress sutures on the other side of the previous suture; the cut was closed completely. Figure 1 shows the different stages of this surgical procedure in one of the samples. In cases, in which the knot would contact the lens, bandage contact lens was use to prevent corneal scratch. Ocular tetracycline ointment and chloramphenicol eye drop were applied. The sutures were removed after 7 days.

B. Frontalis sling surgery with double Pentagon technique

Five cuts were created, forming a pentagon, three above the eyebrow and two within 3 mm above the upper eyelid. Using stab incision, two cuts were created on the eyelid's border and orbicularis muscle was dissected to expose the tarsal plate. Two partial thickness sutures were created with polypropylene 6-0 thread (without knot on the tarsus). Wright fascia needle was inserted to the eyelid fissure, passed below the tarsus and the underlying orbicularis muscle with silicon tape needle guide. Both medial and lateral ends of the silicon tapes were fixed with previous sutures and the two remaining ends in the orbital septum passed through nasal and temporal cuts using needle guide. Then, needle and the silicon tape passed subcutaneously and both ends were extracted from the top cut and attached together using the silicone sheath. By extending the strings, marginal reflex distance (MRD1) was measured for correcting the ptosis + 1 mm and fixed using silicone thread. Figure 2 shows the different stages of this surgical procedure in one of the samples. Artificial tear eyedrop was used immediately and repeated each hour for preventing keratopathy. Ocular tetracycline ointment was applied on the incision site twice a day.

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C. Levator resection procedure

In group C, the extra skin of the upper eyelid was measured and marked at 4 mm from the palpebral line, cut using laser, and fixed using forceps chalazion (Entropion Forceps Kuhnt). Orbicularis muscle was cut using scissor to expose levator muscle aponeurosis and then separated from tarsus. Levator and muller muscles were then separated from each other and from the palpebral conjunctiva. Using 6-0 vicryl thread and horizontal mattress technique, one bite was set 7-12 mm from the levator complex (muller's muscle and aponeurosis), based on the extent of ptosis, and the other bite was set on the other side from middle tarsus plate to pass medial to lateral side. After taking out the forceps, the thread was fixed; the extent of correction and the normal position of the eyelid were measured as the anesthesia faded. Eyelid fissure, eyelid curvature, and lagoonthalmus were measured in normal position. After removing the redundant skin and tissues, double eyelid fold were formed using 6-0 Nylon thread. The sutures were removed after 7 days. Figure 3 depicts the different stages of this surgical procedure in one of the samples.

A. The procedure on the right eye (group T)

On the right eye, Pdo-Cog string was used. As this procedure has not been performed previously, the required material was not available; therefore, bidirectional double needle PDO-Cog thread was made that has converging spines and two needles with needle gauge of 26. In this innovative technique, first tarsus plate was measured and two vertical lines were drawn to categorize the eyelash into three sections. Then, the deepest part of the palpebral fold was marked (at about half of the tarsal plate) and a horizontal line was drawn on previous lines; the points were named as "A" and "B". On the upper line of eyebrow, a "C" point was drawn between the two other points (A and B) and below eyebrow (depending on the eyebrow's thickness), "D" point was drawn. Here, as our samples were dogs, it was considered at about 8mm below the previous point. By connecting the point, two rectangles were created. Using Hardten compression forceps and placing tarsus plate between it, the eyebrow was taken above to become straight (in order to ease the procedure and prevent injury to sclera and cornea). Under the eyebrow, on the points drawn, a needle #25 was inserted into the sclera vertically and two stab incisions were made to enter the tarsal plate thickness but not pass it. One end of the thread was passed through the tarsal thickness and after passing levator aponeurosis, it was moved to lateral and exited from the palpebral (point E). It was again inserted from the exiting point and moved up to muller and superior levator palpebral muscles. Another needle was inserted to point "A" and moved to point "D" like the previous one. After the needles' apex passed orbicularis oculi and reached subcutaneous area; then, the needle on the right exited from point "D" and the needle on the left (that was entered from point "E") exited from point "C". from point "B", the same was repeated with a two- thread needle and this time, the one on the left exited from "D" and the needle on the right was moved 1cm to medial, exited from point

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“F”, re-inserted from the same point, and exited from point “C”. On point “D”, the two ends of threads was fixed by “Surgeon tie”. On point “C”, after correcting the ptosis by the extent of taking up the threads (by measuring MRD1), the thread ends were tied and fixed. Schematic and real pictures taken during surgery are shown in figures 4 and 5.

Postsurgical care and measurements

For groups “A” and “C” that had open surgery, for preventing re-infection, 1 gr cefazolin (20-25 mg/kg) and 50 mg pen strep (10.000 to 20.000 U/kg/day). Also, in groups A and B, tetracycline ointment was applied on the surgical site and incision sites (made for inserting cannula). After recovery, all dogs were transferred to separate boxes and taken care of.

After macroscopic examination of the surgical site for infection, allergic reactions, wound healing, complications of removing the sutures, bleeding or secretion, MRD1 was measured and recorded as normal (4-4.5 mm), mild (2-2.5 mm), moderate (1-1.5 mm), or severe (<1 mm). Cases who were not corrected appropriately were considered as undercorrected (<3mm) or overcorrected (>4.5 mm). Bleeding volume during surgery was measured by the number of sterile gauze (10×10 cm), filled with blood. The estimated blood for filling the gauze was 10 ml and the total amount of bleeding was counted and reported in cc. Ease of surgery was asked from the surgeon and he were asked to rank the four surgical procedures in this regard.

Also, to compare the overall outcome and aesthetic result, pictures were taken in the same position and with the same light before and after completing the botulinum effect on days 1, 3, 5, 7, 14, 21, 30, and after 3, 6, and 9 months. The data recorded on day 1 was considered as “after surgery” and the next follow-up data was collected on days 3, 5, 7, 14, 21, 30, and after 3, 6, and 9 months post-surgery.

Statistical analysis

The eyes of the dogs were numbered from 1-24 and the results were recorded accordingly and compared. Numeric variables were described using mean standard deviation (SD) and compared between the four groups using one-way ANOVA; significant differences were further compared using LSD posthoc test. Categorical variables were described using frequency (percentage) and compared using Chi square test. sample Shapiro– Wilk test was used to determine the normal distribution of data, which indicated that the data followed a normal distribution, and Levene’s test was used to test the equality of variances. Levene’s test was not significant in any of the variables that confirmed the equality of variances in all variables, except the incision length, for which non-parametric test was used for comparison (Kruskal Wallis test). In all values, P-values <0.05 were considered statistically significant. For the statistical analysis, the statistical

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software SPSS for Windows, Version 16.0. (SPSS Inc. Released 2007. Chicago) was used and for drawing the figures, Excel software version 2016 was used."

RESULTS

Data of a total of 24 eyes were recorded and analyzed. Mean \pm SD of MRD1 in different intervals are shown in table 1. According to the results of One-way ANOVA test, the mean MRD1 was not different before surgery (before and after injection of botulinum); however, after surgery, mean MRD1 was different, compared to after botulinum injection ($P < 0.001$). Post Hoc LSD test showed that this difference was significant between groups T and the other three groups ($P < 0.001$ for group T vs. group A and group T vs. group B, $P = 0.002$ for group T vs. group C). The mean values 9 months after surgery were not different from after surgery ($P = 0.068$).

The degrees of MRD1 before, after, and 9 months after surgery are shown in Table 2. As shown, Group T had a p-value of 0.041, indicating a significant difference in MRD1 changes among this group. Group A exhibited a p-value of 0.067, suggesting moderate variations, while Group B and Group C showed p-values of 0.075 and 0.084 respectively, reflecting less significant differences in MRD1 alterations. For the MRD1 classification before surgery, the p-value was 0.035, showing a notable variation between the groups. After surgery, the MRD1 classification had a p-value of 0.151, indicating a less significant difference in outcomes. Nine months post-surgery, the MRD1 classification showed a p-value of 0.045, suggesting a moderate difference between the groups over time. These results highlight the varying effectiveness of interventions across the different groups and time intervals.

Mean duration of surgery was different among the four groups and group T had a significantly shorter duration, compared to the three other groups (LSD test, all $P < 0.001$). Also, comparison between the other groups (A vs. B, B vs. C, and A vs. C) were significant (all $P < 0.001$; table 3). Bleeding volume was also different among the groups ($P < 0.0001$); posthoc analysis showed that group T had a significantly less bleeding during surgery, compared to the three other groups (A, B, and C); also, groups B and C were different in terms of mean bleeding volume ($P = 0.003$; table 2).

No incision was required in group T, whereas the incision length differed among the other groups ($P < 0.001$; table 3); posthoc analysis showed that group T had a significantly shorter incision length compared to the other groups. Ease of surgery was ranked by the surgeon as group T, B, A, and C, respectively. Considering postoperative complications, there was one case of bleeding in group A and two in group C during follow-up. Lagophthalmus was observed in two cases during day 5 follow-up and one case during day 7 follow-ups all of which resolved without any intervention.

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Some examples of visual control for the outcome of different surgical procedures are shown in figure 6.

DISCUSSION

The results of this study showed that using bidirectional double needle PDO-Cog thread resulted in better outcomes, compared to Fasanella Servat surgery, frontalis sling surgery with double Pentagon technique, and levator resection surgery. Each of these surgical procedures are performed in different indications and different severities of blepharoptosis (9, 12). But, the invented technique was superior to all methods, which shows that this procedure is effective for all disease severities. Inflammation and infection are important complications of blepharoptosis correction (13, 14); the proposed technique was superior in terms of the postoperative complications, as well. We believe that the satisfactory outcomes result from lack of incision in this technique; also, there is no need for knots, especially in mild and most of moderate cases. Also, this technique is transconjunctival and the threads were inserted from the scleral surface. This will ease the procedure of inserting the thread and increase the procedure's safety (reduce the risk of injury to the eye bulb and skin). Another important advantage of this procedure is its adjustability; the number of threads can be increased, when needed and the surgeon decides. For instance, in cases with higher degrees of ptosis or heaviness of the tissues. Also, this procedure is invertible and if performed with mistake, the threads can be removed by another surgeon and can be easily corrected.

Another priority of this method was absorbability of the used thread, which will remain in the body and reduce the risk of granulomatous reaction. Alloplastic materials have poor biocompatibility and research comparing different surgical procedures have shown greater rates of complications, such as early postoperative exposure keratopathy, inflammation, pyogenic granuloma, eyebrow scars, suture infection or exposure associated with nylon monofilament and Polytetrafluoroethylene (PTFE) (15). Observing these complications resulted in preference of absorbable threads. PDO is an absorbable thread, used as a novel tool in procedures of lifting the face, including treating nasolabial groove, malar area, or mandibular line; but its use did not replace surgery, considering the limited longevity of the effect of using PDO thread (16-18). Using mold thread with strong and numerous spikes (cogged threads) enables slow absorption. Cogged PDO thread has been used for improving the symptoms of botulinum-toxin induced brow ptosis; satisfactory results suggested the use of this thread as a reliable procedure for this purpose (19). Anchored barbed sutures resulted in favorable long-term outcomes, very few complications, and high patients' satisfaction and become an excellent option for minimally invasive facial rejuvenation procedures (20, 21). The novel studies on the use of PDO cog thread for face lift has suggested it as a simple, quick, minimally invasive method, superior to the conventional surgical methods, with persistent effects for at least 6 months (22). As

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suggested, PDO thread can strengthen the contours of the face, considering its collagen-stimulating properties (increased in dermal layer) that increases skin elasticity (21). It is also suggested that PDO thread improves the anti-aging condition through sagging skin, vascularization, and thinning of the superficial fat layer (reduced subcutaneous or hypodermis layer) (23). The thread will resorb within 6 months, until then the biostimulation property of the thread helps collagen induction. Histologic evaluation revealed that PDO threads maintain their shape for 12 weeks after insertion and become fragmented within 24 weeks; collagen production will last longer than 48 weeks, myofibroblasts will appear 0-12 weeks after insertion, fibroblast proliferation from 0 to 24 weeks that finally result in increased thickness of dermal layer (24). Although these studies focused on face lift surgery, they confirm the appropriateness of the thread used in our innovative technique for tissue repair and lifting.

Another important concern in surgical procedures, suggested for ptosis correction, is the complexity of techniques that result in a long learning curve for surgical students (25). The technique we proposed has been ranked by the surgeon as the easiest technique, which adds to the advantages of this method. This procedure had the shortest duration of surgery and least bleeding, compared to the other three procedures. Additionally, the needle is inserted from down to up that reduces the risk of injury to the eye and the resulting keratopathy.

Research comparing different surgical procedures has referred to the significant effect of the material used during surgery, as well.

As over- and under-correction are two important complication of blepharoptosis correction, it is important to pay attention to the effects of the materials used on the tissues on these complications, as well (26). In this procedure, we used PDO-Cog thread and considered the effect of gravity and the tissue's tendency to get back to the previous condition. Therefore, we considered about 2 mm overcorrection and the results of long-term

follow-up showed satisfactory results 9 months after surgery. These considerations should be justified for humans in further studies. It has to be considered that thread lifting is a novel technique and the details of this procedure has not been defined well. Palpability of the knot is one of the issues that may reduce patient's satisfaction and result in granulation tissue or bleeding; therefore, the surgeon should consider appropriate depth of insertion to prevent this complication. All in all, we suggest careful selection of appropriate thread and suturing technique to be used for each patient and explaining the pros and cons of each procedure to the patients.

The main strength of the present study was investigating the efficacy and safety of a novel procedure for correction of blepharoplasty. However, this study had some limitations, as well. One of the limitations of the present study was inability to measure the visual outcome of the procedures, as the study was performed on dogs; best corrected visual acuity and other measurements of visual acuity were not possible. Other clinical outcomes, such as success rate of the procedure could not be reported, as well. Accordingly, we could not compare the results

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of our study with previous clinical studies in this regard. Another point to be considered is the significance of symmetrical correction of the ptosis, which was not addressed in this study, because we performed the novel technique only on one eye of the dog and compared the results with another surgical technique on the other eye of the dog.

CONCLUSION

The results of the present study showed that the proposed technique can be a suitable alternative to the conventional surgical procedures for correction of blepharoplasty. It resulted in less bleeding during surgery, and is an easy method for the surgeon; the duration of this procedure is short and it is a safe technique. Further studies are required to confirm these results and investigate its efficacy in humans. Considering the anatomical differences, the considerations for achieving the most appropriate MRD1 discussed should also be justified for humans.

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Table 1. Comparing mean MRD1 of the eyes in different groups at different intervals

	Group T	Group A	Group B	Group C	p-value
Before botulinum injection	4.29±0.33	4.50±0.40	4.75±0.28	4.75±0.28	0.528
After botulinum injection	1.66±0.53	2.50±1	1.75±0.28	1.75±0.64	0.011
After surgery	6.45±0.49	4.50±0.91	4.75±0.38	5.22±0.64	0.000
Nine months after surgery	4.33±0.86	4±1.08	4.25±0.28	4.87±0.47	0.328
P-value	0.000	0.000	0.000	0.000	

[†]The results of chi square test, [‡]The result of independent samples t test, [§]

Table 2. Comparing the degree of MRD1 among the study groups at different intervals

		Group T	Group A	Group B	Group C	p-value
MRD1 class before surgery, n(%)	Mild	5(41.7)	1(25)	2(50)	2(50)	0.035
	Moderate	7(58.3)	3(75)	2(50)	2(50)	
MRD1 class after surgery, n(%)	Normal	0	1(25)	2(50)	1(25)	0.151
	Mild	0	0	0	0	
	Moderate	0	0	0	0	
	Undercorrected	0	1(25)	0	0	
	Overcorrected	12(100)	2(50)	2(50)	3(75)	
MRD1 class 9 months after surgery, n(%)	Normal	8(66.7)	2(50)	4(100)	2(25)	0.045
	Mild	1(8.3)	1(25)	0	0	
	Moderate	0	0	0	0	
	Undercorrected	0	0	0	0	
	Overcorrected	3(25)	1(25)	0	2(50)	

Table 3. Comparing surgical details among different study groups

Variables	Categories	Group T	Group A	Group B	Group C	p-value
Duration of surgery (min)		11.41±1.97	46±3.75	28.50±2.64	55.75±5.61	<0.001*
Bleeding volume during surgery (cc)		7.08±2.57	17.80±2.50	16.25±2.50	22.50±2.88	<0.001*
Incision length (mm)		3±0	13.75±1.25	15±0	22.55±1.29	<0.001†
Postoperative complication (number)	Skin dipping	3	0	9	0	0.031
	Scar	3	0	10	10	0.027
	Inflammation	3	6	5	6	0.614
	Bleeding	0	1	0	2	0.528

*The results of One-way ANOVA test, †The result of Kruskal Wallis test, ‡The results of Chi square test,



Figure 1. The stages of *Fasanella Servat* surgery (group A)

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Figure 2. Stages of *Frontalis sling surgery with double Pentagon technique* (group B)

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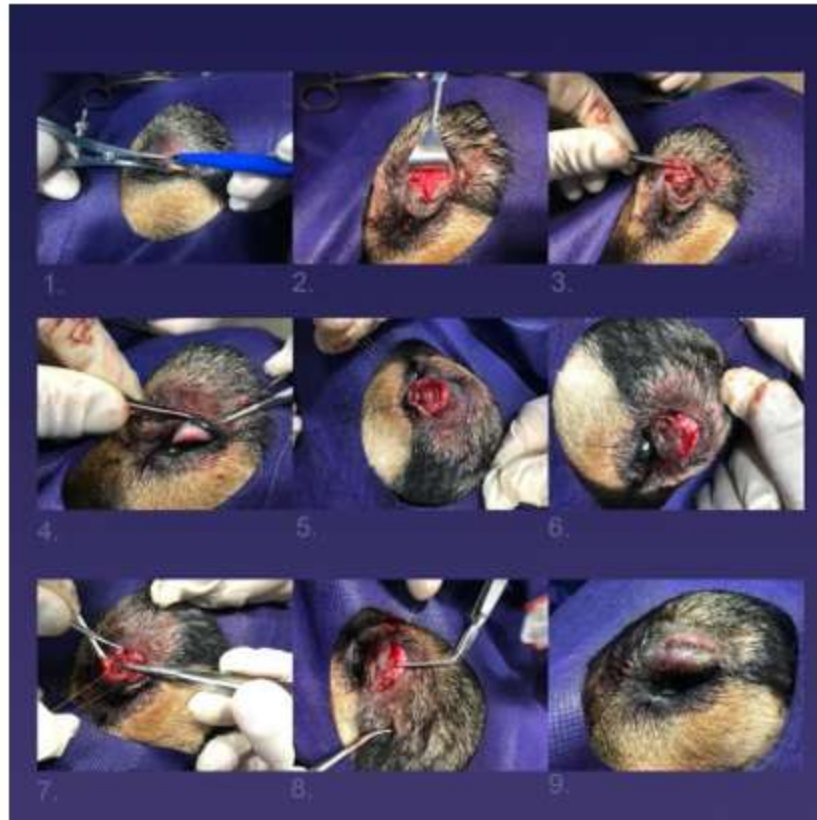


Figure 3. The stages of Levator resection procedure (group C)

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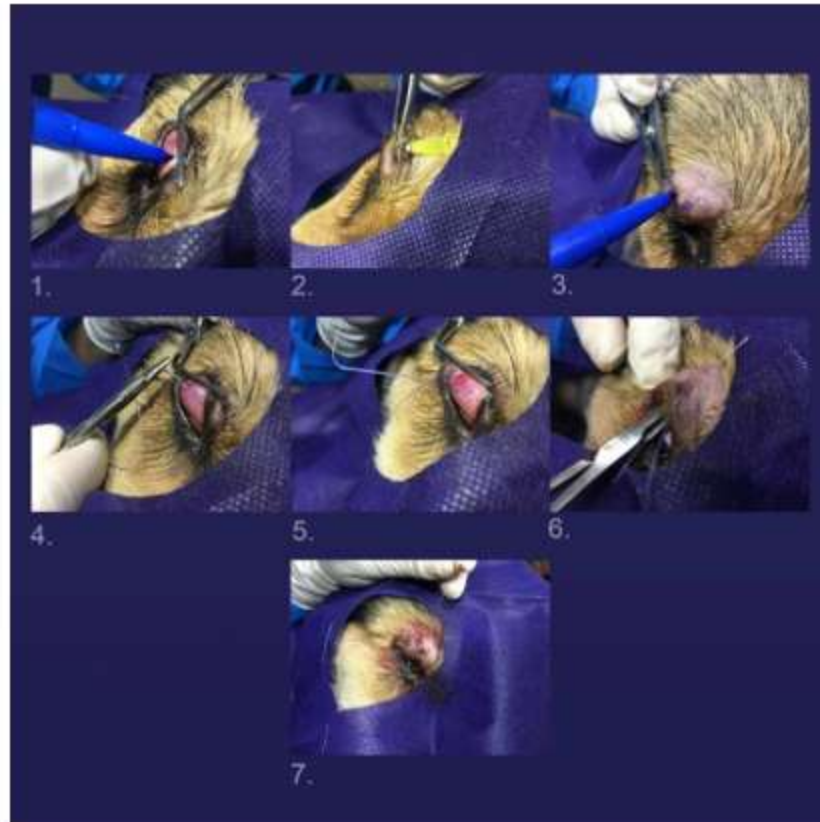


Figure 4. The stages of the invented procedure (group T)

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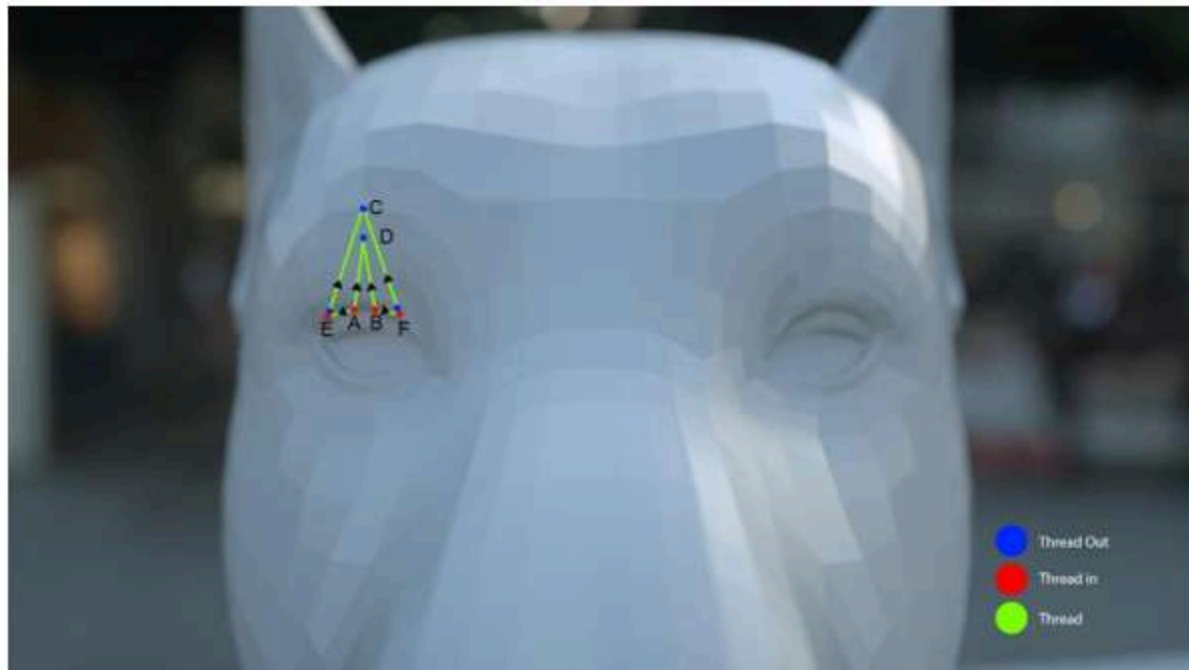


Figure 5. Schematic picture of the anatomical sites used for the invented surgery

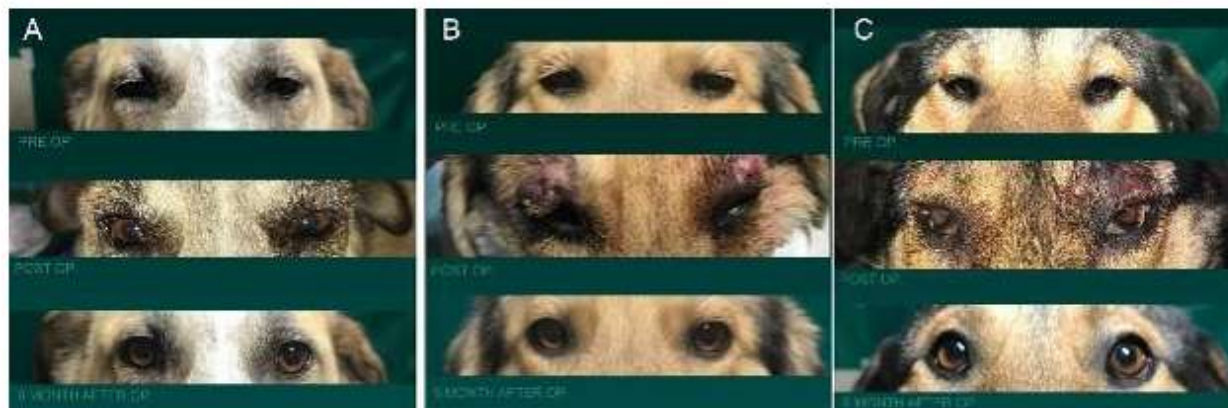


Figure 6. Pictures taken at different intervals in different study groups

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