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Referee bias and its impact on low fans attendance at stadiums: standpoints from Ghana

Shani Bashiru and Emmanuel Opoku

Abstract

This study delved into referee bias in football matches with the aim of determining its impact on fans attendance. The study reviewed relevant literature on referee bias and discovered that in most cases, related works dwelt on existence of referee bias and its impact on match outcomes using time added on, yellow and red cards. This work adopted a quantitative approach and collected relevant data from 100 participants drawn from football parks and stadiums during football activities. Data was analyzed and represented in diagrams with further analysis conducted using odds-ratio test of Chi-squared tests, Likelihood Ratio and Linear – by- linear Association statistical independence to determine linkages between referee bias on match outcomes and low fan attendance. We found that football fans believe referee bias is widespread in Ghana and referees professionalism leaves much to be desired. We recommend that referees should be trained and retrained to improve their professional judgment and their reward system should be improved to fortify that against inducements from club officials.

Keywords: referees, bias, fans, attendance, match outcomes

1. Introduction

In a football match, referees are appointed as umpires to officiate the contest in a spirit of fair play. Objectivity in the line of duty by a referee is required and stakeholders of football expect a referee to exhibit greater awareness and unbiased adjudication in order to promote acceptable outcomes of matches (Dohmen & Sauermann, 2015) ^[21]. However, referees have at times courted controversy by making dubious decisions against players and teams leading to outrage on the part of affected teams, football authorities and pundits with some referees penalized for their doubtful decision making (Pope & Pope, 2014) ^[46].

Referees are critical to the game of football prompting some researchers to elevate the position of referees to star player status in terms of influence of outcomes of games (Groot, 2005) ^[27]. Referees are therefore important to the effective and smooth functioning of football and other sporting disciplines such as boxing. This study concentrates on football and the impact of refereeing on fans attendance that has suffered a nosedive in sub Saharan Africa (Shani, 2015). Players in a match and spectators in attendance look forward to a referee to exercise good judgment and professionalism. In spite of the critical role of referees, some of their decisions have ruffled and baffled many football followers making referees to be associated with contentious decisions (Baldwin, 2008) ^[5]. Referee decisions that have been perceived to be unfair are known to have caused grief to fans with a concomitant effect on their attendance (Groot, 2005) ^[27] apart from causing financial downturns to football clubs. This study focused on referee bias and its impact on low fans match attendance at the stadium. Low fans attendance has become a worrying development (Baroncelli & Lago, 2006) ^[7] which makes the phenomenon worth investigating (Cohen & Avrahami) because fans are the source of financial backing for football teams to finance their financial budgets and are the bases on which sponsorship funds from media houses and corporate entities are secured (Armstrong & Estrata, 2005) ^[3]. Beside, fans inspire players to display vintage performances but their cheers and chants for their clubs (Cheng, Chen & Yao, 2004) ^[14].

1.1 Bias officiating

Referee bias is influenced by societal pressures. Social agitations in several sports including

football have the effect of triggering referee bias especially when crowds are very close to the field of play during a football match (Dohmen, 2005; Moskowitz, Tobias & Wertheim, 2011) ^[37]. Social pressures constitute external influences on referee bias but internal influences do exist (see Price & Wolfers, 2010; Morgan & Rotthoff, 2014) ^[47, 35]. Referees are trained for their roles and duties and are expected to make the right calls in matches but as humans, the inevitability of committing errors in decisive moments is quite imperative because of limitations in cognitive and perceptual functions (Sanabria, Cenfor, Marquez, Gutierrez, Martinez, & Prados-Garcia, 1998) ^[52]. Scholarly works have adduced evidence showing that making flawed decisions breeds anxiety amongst referees (Kaissidis & Anshel, 1993; Stewart & Ellery, 1998; Taylor, 1990) ^[30, 56]. Fans have mostly been unsympathetic towards wrong decisions and are quick to describe referees as bias when wrong calls are made. The actions of referees have come under serious scrutiny and with television broadcasting of matches in top tier leagues set to continue backed by the slow but steady introduction of video technology in certain leagues and continental football competitions, this pattern is set to continue.

Referees are often accused of bias officiating in favour of home teams and some “big” clubs (Downward & Jones, 2007; Rickman & Witt, 2008; Sutter & Koecher, 2004) ^[22, 49, 58]. Managers, players and referees frequently have grievances to express against referee decisions although football authorities frown on open hostile complaints against referees and have often imposed hefty fines against offending persons and teams.

Referees have critical responsibilities in a game and are entrusted with the responsibility of enforcing the rules of football during matches and ensuring compliance on the part of players and even managers of clubs. An analysis of European Football Championship in 2000 revealed that a referee makes an average of 137 decisions on free kicks, penalties and infringements during a match (Helsen & Bultynck, 2004) ^[28]. The referee exercises immense discretionary powers on decisions regarding whether infringements should be penalized by award of a penalty, caution or red cards. These discretionary powers of referees is have at times been exercised with some dose of subjective judgments’ making fans, managers, players and some pundits to accuse referees of inconsistent decision making bordering on bias officiating (Boyko, Boyko & Boyko, 2007; Buraimo *et al.*, 2007; Dawson *et al.*, 2007) ^[8, 17]. However, some scholars have observed that the incidence of bias officiating diminishes in competitions where stakes are high and where highly experienced and professional referees are steering affairs of the competitive game (Parsons, Sulaeman, Yates, & Hamermesh, 2011) ^[40].

Previous works on referee judgments have tilted towards time added on after regulation play and referees verdicts on award of red card and yellow cards. Research conducted on major European football leagues showed some prevalence of referee bias precipitated by crowd noise and in North America, studies have been undertaken on referee bias emanating from racial discrimination officials (see, for example, Price & Wolfers, 2007). This study is aimed at assessing the impact of bias refereeing on low fans attendance at stadium during football matches.

Richman and Witt (2008) ^[49] detected the occurrence of referee bias in the English Premier League as exemplified in stoppage time in favor of home teams. Scoppa (2008) ^[52] found evidence of referee bias in football matches and in the

Major Soccer League in United States, Lucey and Power (2005) concluded that referee bias is prevalent. In Brazil and Colombia football league in South America, traces of referee bias were found by researchers especially on the quantum of time added after full time of 90 minutes time (Mendoza and Rosas, 2013; Rocha, Sanches, Souza, Domingos da Silva, 2013) ^[32, 50]. These studies are concentrated on European and American football leagues with sparse studies conducted on referee bias in Africa. Besides, these studies fail to analyse the impact of referee bias on football stakeholders especially fans. This study fills this void by assessing the canker of referee bias and its impact on low fans attendance at stadiums.

Referee bias is a topical issue worth exploring in empirical works. Referees display of partiality can influence the outcome of games and can leave fans groaning and teams robbed of victories (Dohmen & Sauermann, 2015) ^[21]. Competitive football is a low scoring enterprise with most scores in low single digits. Referee calls can therefore be decisive and with enormous discretion on extra time and infringements, referees by their decisions can influence the outcome of matches (Yewell, Caudill, & Mixon, 2014) ^[63].

2. Literature Review

2.1 Sport consumption

There is no single definition of sport consumption that has gained universal appeal (Funk, 2008) ^[24]. According to Funk, Mahony and Havitz (2003) ^[25], sport consumption involves consumer behavior relative to sports products and services. Classification of sport consumption has influenced the definition of the concept. Gibson, (2003) classified sport consumption into three parts; (a) Participation in sport activity, (b) Watching sporting event and (c) touring a sporting attraction of facility. Drawing from this categorization, Funk (2008) ^[24] defined sport consumption as a process whereby a person makes a choice, purchases, utilizes and disposes sport related products and services in order to satisfy their desires and derive some satisfaction.

2.2 Types of fans

Fans profile differs in terms of their needs, wishes, values, attitudes, and behaviors (C. Sá & Sá, 1999; Meir, 2000). Some are passionate and fanatical, but not all of them are fanatical in the same way; some use their team to confirm their personal identity yet some are absolutely loyal; some are aware of their club history and are resistant to changes that may threaten team values and practices (Stewart, Smith, & Nicholson, 2003) ^[57]. Sport consumption is complex and fan typologies cannot be defined based on a single factor (Crawford, 2004) ^[16].

2.3 Previous fans motivation models

Various sports motivation models have been developed to provide insights into fans motivations as far as attendance to sports competitions are concerned

2.3.1 Sport need Achievement and Power Scale (SNAPS)

Sloan, Bates, Davies and Schweiger (1987) ^[53] are acknowledged as pacesetters in the development of sport consumption motivation and are acclaimed to have devised the SNAPS. Sloan and Van Camp (2008) later presented an analysis of the SNAPS covering five motivations; salubrious effect, stress and stimulation seeking, aggression and catharsis, entertainment and achievement

2.3.2 The Sport Fan Motivation Scale (SFMS)

Wann, (1995) and Wann, *et al.*, (1999)^[58, 60] proposed a scale comprising eustress, self-esteem, escape, entertainment, economic, aesthetic, affiliation and family. Eustress is a kind of constructive stress that triggers excitement as fans watch games. It covers the pleasure that emanates from watching games (Wann, Schrader & Wilson, 1999)^[60]. With regards to self-esteem, the SFMS opines that fans feel a sense of upliftment in their self-esteem when their team is on a winning spree and has strong history of superb performances. Being a fan therefore ignites a kind of feel good syndrome especially when the club they are affiliated to have lots of trophies in their cupboards (Wasserberg, 2009)^[61]. In terms of escape, it involves fans desire to disconnect themselves from boredom associated with everyday activities at work and or home by seeking an escape route through patronizing sports (Wann *et al.*, 1999b)^[60]. Football has often been tagged as a beautiful game. Cross sections of fans love the charm of the game. Some fans motivation to go and watch live games is therefore underpinned by quest for entertainment. Yet some fans attend for economic reasons. Such fans engage in gambling via prediction of scores and a host of other gambling avenues (Wann, 1995)^[58]. Superb and tantalizing skills of athletes and players put on display during sport contests are described as the aesthetic aspect of sports (Agas *et al.*, 2012). Games however do have ugly scenes such as horrific tackles and crowd violence which often mars the sparkle and erodes the shine of games. Bias officiating by match officials has widely been cited as peeling away the joy of watching competitive matches (Garicano, Palacios-Huerta, & Prendergash, 2001, 2005; Dohmen, 2008)^[25, 20]. Fans desire for group affiliation leads to sports patronage. In this context, we use group to mean association of friends and other acquaintances devoid of family members. The quests to find peer acceptance and conform to group dynamics result in some fans attending sports competitions. Thus, some fans attend match day games to fit and fraternize with their social group (Wasserberg, 2009)^[61].

2.4 Manifestations of referee bias

Referee bias is usually manifest in stoppage time (Garicano, Palacios-Huerta, & Prendergast, 2001, 2005)^[25], disputed goals (Dohmen, 2008)^[20], Penalties (Sutter & Kocher, 2004)^[58] and yellow and red cards (Dawson, Dobson, Goddard, & Wilson, 2007)^[17].

2.4.1 Stoppage time

Allowance made for time lost during regulation time as a result of stoppages emanating from events that leads to brief or protracted interventions is stoppage time or time added on (Dohmen, 2008)^[20]. Garicano *et al.*, (2001, 2005)^[25] assessed stoppage time during matches and identified referee bias in decisions on amount of time allocated for stoppages. In competitive football matches which consists of a total of 90 minutes, allowance is made for lost time because of substitutions, infringements, time wasting and other causes (FIFA, 2008). In allowing for time lost, the discretion of referees have been brought into disrepute following strings of favors shown to mostly home teams especially when they are trailing by a lone goal. The aim is to create an opportunity in terms of time to allow for the home team to score a goal and once the home team scores, referees have shown a tendency of truncating the stoppage time (Dohmen & Saermann, 2015)^[21]. Garicano *et al.* (2005)^[25] posited that referee bias connected to stoppage time is aimed at pleasing the home

crowd and secure social recognition and praise. When the host team is staring defeat, the tendency of referees adding extra time is high (Sutter & Kocher, 2004)^[58]. In La Liga in the Spanish top league, the prospect of stoppage time is low when the home team is leading than when the teams are tied on score line (Dohmen, 2005). However in Bundesliga in Germany, time added on last longer even when the home team has taken a solitary lead. In most of the top leagues in the world, similarities have emerged regarding time made for time lost during regulation play and a key attribute is one of more stoppage time when the home team is down by a goal or where the goal difference is one against the home team with less stoppage time when the match is heading for a draw (Lucey & Power, 2005; Scoppa, 2008)^[52]. An analysis of the English Premier League of 1999/2000 and 2002/2003 by Rickman and Witt (2008)^[49] revealed that evenly contested matches stretches about 32 seconds farther when the home team is trailing at the end of 90 minutes regulation time. The Italian Serie A displayed similar traits when Scoppa (2008)^[52] examined the 2003/2004 and 2004/2005 season. He found that, referees bias tilted towards home teams in situations when the home team is lagging behind by a lone goal and the US Major Soccer League exhibited similar features with 31 seconds being added when the away team is leading by one goal. However, relatively smaller times were recorded in Brazilian and Colombian leagues with 11 seconds being time added on in the respective leagues when the home team is a goal down and in dire search of an equalizing goal (Mendoza, & Rosas, 2013; Rocha, Sanches, Souza, & Carlos Domingos da Silva (2013)^[32, 50].

2.4.2 Goals

Goals awarded to home teams at times smack off referee bias. Indeed, home teams have been adjudged to be beneficiaries of dubious goals as a result of bias officiating with away teams bearing the brunt of such decisions. Dohmen (2008)^[20] evaluated the propriety of referee decisions and postulated that goals in favor of teams are laden with doubt. In analyzing actions heralding a goal, Dohmen (2008)^[20] suggested that visiting teams are recipients of fewer controversial goals with home teams credited with comparatively more disputed goal. The empirical studies of Boyko *et al.* (2007)^[8] provided deeper insights of referee bias made manifest in award of less convincing goals. As result of analyzing 5344 of the 5566 representing 96% of matches played the period of August 1992 and June 2006, they found considerable evidence of referee bias in award of contested goals for home teams. However, Johnston (2008)^[28] could not find evidence of referee bias associated with questionable goals awarded to home team in his work that used relatively smaller samples.

2.4.3 Penalty kicks

Sutter and Kocher (2004)^[58], capitalized on Journalists' reports on performance of referees in the Bundesliga in the 2000/2001 season and found disproportionate penalty awards to home teams. They detected that, 81 percent valid penalties were awarded to home teams but only 51 percent legitimate penalties were awarded to visiting teams. The difference of 30 percent of penalties awarded home teams is statistically significant and has been attributed to referee bias. Boyko *et al.*, (2007)^[8] found corroborative evidence in their analysis of penalties in the English Premier League when they noticed referees awarding significantly more penalties to home teams even where crowd influence is negligible. Dohmen (2008)^[20] brought some new perspective into penalty awarded to home

teams to depict referee bias. He observed that when a home team is on the verge of defeat by virtue of a lone goal, referees tend to award penalties that are disputed by connoisseurs of the game following video analysis. In the FIFA Confederation Cup that took place in Russia in June-July 2017, video technology was approved and used to assist referees to make undisputed decisions especially on critical issue like award of penalties and goals.

2.4.4 Yellow and red cards

Referees caution players via yellow cards and penalize players with red cards if they are deemed to have seriously breached the laws of the game through unparadigmatic or potentially or actual tackles that results in career threatening injuries. Array of studies have found that referees are harsh in the use of yellow red cards against visiting teams (Buraimo, Forrest, & Simmons, 2010; Buraimo, Simmons, & Maciaszczyk, 2012; Dawson & Dobson, 2010; Dawson, Dobson, Goddard, & Wilson, 2007) ^[10, 11, 18, 17]. However, Boyko *et al* (2007) ^[8] produced mixed results their study involving referee bias on decisions to caution a player with a yellow card or show a player the exit during a match by showing a red card. In connection with yellow card, they realized that referees are predisposed to showing visiting team players more yellow cards but found no evidence of referees less inclination to punish home team players with red card. Some studies found no statistically significant evidence faulting referees in the use of both yellow cards and red cards. Johnston (2008) ^[28] and Reilly and Witt (2013) ^[47] in their analysis of the English Premier League of 2006/7 and 2003/4 to 2006/7 seasons respectively posited that there is no material evidence of referee bias in penalizing players with yellow and red cards irrespective of whether teams are playing at home or away. Downward and Jones (2007) ^[22] held contrary view and argued that referees are less likely to caution home team players with a yellow card especially on home crowds is colossal.

2.5 Determinants of referee bias in football

2.5.1 Stake size

Stakes are higher in a match when a season is getting to the end and where teams have a tradition of intense rivalry. Fans in a stadium are usually in full voice when the stakes are high and this tends to influence referee decision. When a season is approaching an end, the incidence of referee bias becomes more pronounced (Garicano *et al.*, 2005) ^[25]. When a league is at its final stages, the quest to finish tops and at times escape from the tentacles of relegation galvanizes most teams to up their game with fans in support and this is where referees become more inclined to favor home teams as the football season advances to a close.

2.5.2 Attendance and composition

Fans attendance in record numbers especially for home teams influences referee bias. Noise emanating from a baying crowd attract referees verdicts in favor of the home team (Balmer, Nevill, & Williams, 2001; Nevill, Balmer, & Williams, 1999, 2002). However, some studies opined that crowd noise stimulates superior performance on the part of players than prodding a referee to make biased decisions (e.g. Agnew & Carron, 1994; Bray 1999;) ^[1, 9]. Huge attendance has been observed to trigger referee bias. Garicano (2007) suggested that increased attendance by one standard deviation leads to a more than proportionate increase of 20 percent in bias officiating. The impact of fans attendance on referee bias to

the advantage of home teams is corroborated by Buraimo *et al.*, (2007) who concluded that referee bias to the gain of a home team is anchored on empirical evidence. A contrary view was expressed by Ridder, Cramer and Hopstaken (1994) ^[49] whose standpoint is that, the Netherlands Professional League showed no referee bias against visiting teams. An analysis of 2006/7 Serie A and Serie B matches in Italy where some teams played with fans in attendance and others played in empty stadia in compliance to disciplinary action following crowd violence saw the researchers concluding that referee bias was prevalent when fans are in attendance/

2.5.3 Distance to the field

Some stadiums have tracks that keeps fans at a distance. Fans are much closer to the field of play when track are not constructed in a stadium. Dohmen (2005) contended that running tracks inject some degree of safety for referees, thereby diluting referee bias which has been corroborated by Anders and Rothhoff (2014) ^[2] who found diminishing referee bias when running tracks are in a stadium because it provides a margin of safety for referees. In Italian Serie A, Scoppa (2008) ^[52] argued that stadiums with running tracks led to referees making unbiased calls that when matches are played without running tracks. This means fans proximity to the field of play exerts pressure on referees to make questionable decisions. Dawson and Dobson (2010) ^[18] in their appraisal of data from European competitions supported the view that distance of fans plays a role in referee bias when the espoused the idea that referees tend to penalize home teams when they are playing in stadium with running tracks. Buraimo *et al.* (2010) ^[11] and Buraimo *et al.* (2012) ^[11] also supported the conclusion that referee bias against visiting teams is more striking in the Bundesliga when teams are playing in a match without running tracks.

2.5.4 Referee profile

The personal attributes of referees define their ability to cope with external influences such social pressure. In a study on Australian referees, age was found to be critical on how referees cope with crowd pressure during titanic matches (Folkesson, Nyberg, Archer, & Norlander 2002) ^[22]. Experienced referees are also acknowledged to show fewer red cards to teams playing away from home (Garicano, 2007). However, Dawson (2012) contradicted the suggestion that experienced referees are less inclined to favor home teams because of their ability to cope with home crowds adding that the size of the home can has an effect on referees' match day performance. Dohmen (2005) found insignificant differences between how personal attributes of referees' impact on their performance. As things stand now, the evidence on how personal characteristics of referees impacts on their sense of objectivity or subjectivity remains inconclusive.

Another source of bias officiating is discrimination. Price and Wolfers (2010) ^[47] opined that referees favor players when they have ethnic commonalities. Matches officiated by referees from the same region will find favor from the referee (Parsons, Sulaeman, Yates, & Hamermesh, 2011) ^[40]. These conclusions were drawn from studies conducted on baseball. This study however focuses on football. In the Australian football league, Mohr and Larsen (1998) ^[35] observed traces of bias refereeing when a team and the refereeing crew are from the same state.

Provision of financial incentives also affects referee bias. A case in point was spotted in the English league following the introduction of professional referees who attracted relatively

higher financial rewards. Rickman and Witt (2008) [49] found a referee bias associated with stoppage time for home team advantage at the end of regulation time eventually disappeared as a result of professional refereeing. Sociologists however argue that individual behavior is not only influenced by financial rewards but also non-financial rewards such as social approval (see Asch, 1951 or Coleman, 1988) [4, 15].

Prior information about a player or situation also influences referee bias. A player who is notorious for brutal tackles is likely to be cautioned or given the marching off orders when he commits an offence akin to what the referee knows him for (Jones *et al.*, 2002). A referee who previously awards a team a penalty is less likely to award another penalty but will not hesitate to award a penalty to the opposing team (Plessner & Betsch, 2001) [42].

3. Methods

Pohlkamp (2014) [43] used data from the German Bundesliga from actual matches played to establish linkages between referee bias and match outcomes. We extend the discourse to the point of collecting data from fans on refereeing bias and its impact not only on match outcomes but on fans attendance. Football is played for the joy and enjoyment of fans who constitute source of financial backing for football teams and fans importance on the game of football has been emphasized by researchers (Kruger, Botha, & Saayman, 2012) [30]. We adopted a sample size of 100 participants. Questionnaires were distributed to participants for self administration to minimize the incidence of bias using systematic sampling. We targeted participants watching football at football parks and on one occasion, we gathered responses by distributing questionnaires to fans who were attending a football match in a premier league encounter at the Accra Sports Stadium, the national stadium of Ghana. We used Excel to generate charts and tables and utilized Pearson Chi Square to determine association between the independent variables (referee bias) and dependent variables (match outcomes and low attendance).

4. Results and discussions

Out of the total number of respondents as in figure 1, 83% disclosed that they are football fans and the remaining 17% said they are not. This result is understandable because most of the targeted respondents were selected at football parks and stadiums. The 83% fans means that majority of those who watch football categorize themselves to be fans but 17% respondents do not consider themselves to be fans.

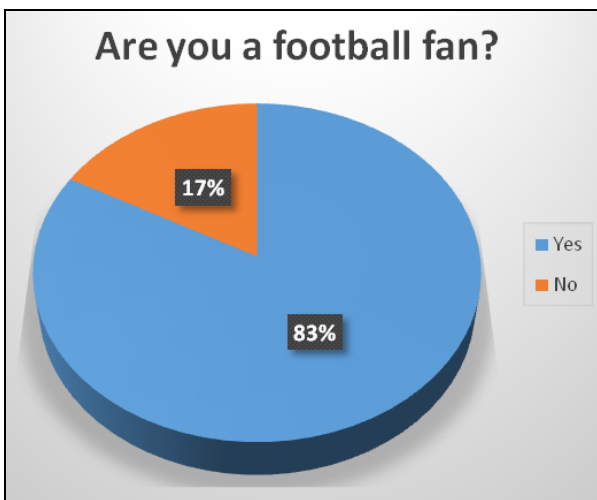


Fig 1

On the question of participants viewing football matches live on TV, figure 2 shows that, 83% answered yes to the question and the rest of 17% said they do not. On the evidence of this study, viewing matches on live TV has assumed prominence in Ghana because majority of respondents follow the game of football on TV.

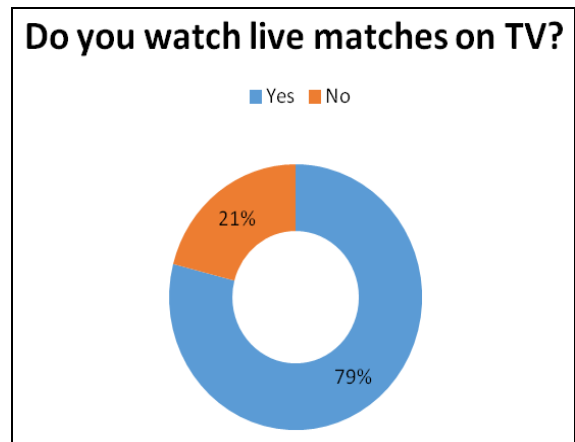


Fig 2

From figure 3, respondents were asked to vouch for the professional competencies of Ghanaian referees using 5 point likert scale. Out of the total respondents, 34 strongly disagreed that the Ghanaian referees are professional in handling matches, 13 disagreed, 30 agreed, 12 strongly agreed and the remaining 14 respondents said they do not know. An aggregation of those who strongly disagreed and disagreed totals 47% whilst those who strongly agreed and agreed summed to 42%. By this numerical analysis, fans in Ghana cast doubt about the competencies of referees.

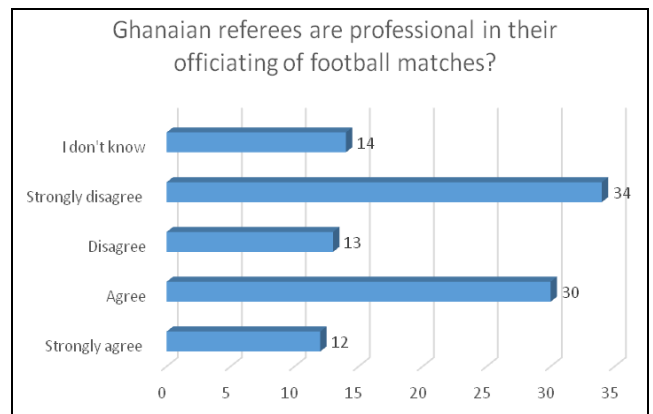


Fig 3

From figure 4, the respondents were further asked whether Ghanaian referees exhibit bias officiating. 64 % said that it is True, 20% said it is False and 16% said they are Uncertain. From these responses, majority of football followers in Ghana believe that referees exhibit subjective judgments during matches. This standpoint is widespread amongst football fans in Ghana it is not uncommon to find fans and coaches of losing teams after a match point accusing fingers at referees bias officiating as the cause of their defeat. Such expressions are at times dismissed as sour grapes but on the strength of this study, there is pervasive stance regarding referee bias in Ghana.

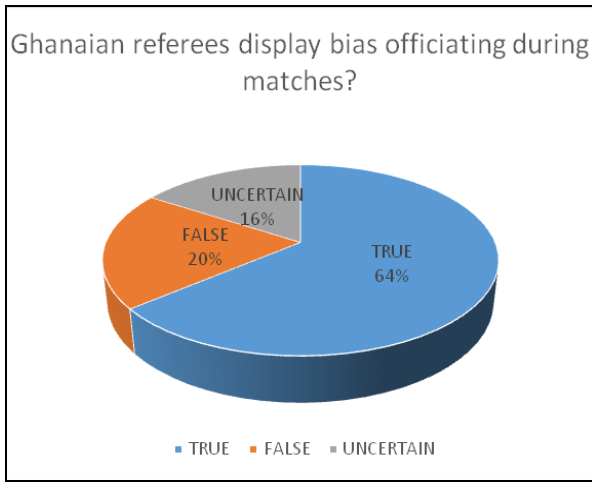


Fig 4

4.1. Pearson Chi-Square

The study used odds-ratio test of Chi-squared tests, Likelihood Ratio and Linear – by- linear Association statistical independence.

Our null and alternative hypotheses are as follows:

H0: Match Outcome is statistically independent of the Referees Bias

H1: Match Outcome is statistically dependent of the Referees Bias

H0: Win for your team is statistically independent of the Referees Bias

H2: Win for your team is statistically dependent of the Referees Bias.

H0: low attendance is statistically independent of the Referees Bias

H3: low attendance is statistically dependent of the Referees Bias

We illustrate the method using two variables with two levels each as in tables 2, 4 and 6, but the same principles apply for nominal variables with more than two levels.

Let two nominal variables be measured on the same sample of *N* subjects. We can summarize the data as a two-way table of frequencies (*cross-classification table as in tables 4.3, 4.5 and 4.7*), where *O_{ij}* is the number of cases observed with level *i* of variable 1 and level *j* of variable 2.

This format uses the cross-classification table or a contingency table. The numbers along the edges (bottom and right), known as the marginal frequencies or sometimes the *marginals*, are the row (*r₁* and *r₂*) and column (*c₁* and *c₂*) totals.

We use the row and column marginal totals to compute the expected frequencies of each cell. Under the assumption of statistical independence, the probability of a randomly selected case falling in cell (*i, j*) is the probability of falling in row *i* × the probability of falling in column *j*. This is adapted from the *multiplication rule for independent events*: P (A and B) = P (A) P (B)

We estimate these row and column probabilities from the marginal frequencies of our table. For example, *r₁/N* estimates the probability of a case falling in row 1, and *c₁/N* estimates the probability of a case falling on column 1.

The expected frequency of cases falling in cell (*i, j*) is therefore estimated as follows:

$$E_{ij} = N \frac{r_i}{N} \frac{c_j}{N} = \frac{r_i c_j}{N}$$

Applying this formula produces a table of expected frequencies:

If H0 is correct, the observed frequencies should differ by more than is expected by random sampling variability from the expected frequencies. To test this, we measure the discrepancy of observed and expected frequencies using the formula:

$$\text{Pearson } X^2 = \sum_{\text{All cells}} \frac{(O - E)^2}{E}$$

Or, more precisely:

$$\text{Pearson } X^2 = \sum_i \sum_j \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

where, summation is over *i, j* = 1, 2.

4.2 Degrees of freedom

The degrees of freedom for this test are:

$$df = (R - 1) \times (C - 1)$$

where *R* is the number of rows and *C* is the number of columns.

The Pearson *X*² statistic is follows what is called a chi-squared (*χ*²) distribution.

There is a separate *χ*² distribution for every number of *df*.

The *p*-value of the *X*² statistic was computed using SPSS:

Statistically:

If *p* < *α* (e.g., *p* < 0.05), we reject H0 and conclude that there is statistical evidence of dependence between the variables. Otherwise we conclude only that we failed to reject the null hypothesis.

4.3. Likelihood-ratio chi-squared test,

An alternative to the Pearson *X*² of independence is the Likelihood-ratio chi-squared test, which is denoted as either *L*² or *G*². This statistic is computed as follows:

$$L^2 = 2 \sum_i \sum_j O_{ij} \ln \frac{O_{ij}}{E_{ij}}$$

Like the *X*² statistic, *L*² has a chi-squared distribution with (R – 1) × (C – 1) *df*. Therefore *X*² and *L*² usually very close in value (but not identical).

The long-range future of the Pearson *X*² is a little uncertain, due to advances in computing. It is now feasible to use advanced algorithms to test the hypothesis of statistical independence based on the exact probability of observing a given configuration of the table. These algorithms use discrete probability models and consider all possible ways in which, say, *N* = 100 cases can be distributed among the available cells of a contingency table (see tables 4.3, 4.5 and 4.7).

Table 1: Referees Bias * Match Outcome Crosstabulation

Count	Match Outcome			Total
	yes	no	don't know	
Very slow	8	0	0	8
Low	11	0	0	11
High	25	0	0	25
Very High	35	14	0	49
Not sure	0	0	7	7
Total	79	14	7	100

The use of chi-square to test the null hypothesis against the alternative hypothesis required either passing Pearson chi-square or Likelihood Ratio test or Linear-by-Linear Association test at a significant level of 0.05 we reject the null hypothesis. The Alternative hypothesis is accepted if we fail to accept the null hypothesis at 0.05 significant levels. The results indicate that all the three tests are highly significant

(see table 4.2); a manifestation that we fail to accept (reject) the null hypothesis: H0: Match Outcome is statistically independent of the Referees Bias and accept the alternative H1: Match Outcome is statistically dependent of the Referees Bias. We therefore conclude that base on the test result; we reject the null hypothesis (Ho) and accept the alternative hypothesis.

Table 2: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	115.913 ^a	8	.000
Likelihood Ratio	70.895	8	.000
Linear-by-Linear Association	27.587	1	.000
N of Valid Cases	100		

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is .49.

Table 3: Referees Bias * Win for your team Crosstabulation

Count		Win for your team					Total
		Very happy	happy	Unhappy	Very unhappy	Uncertain	
Referees Bias	Very low	8	0	0	0	0	8
	Low	11	0	0	0	0	11
	High	4	21	0	0	0	25
	Very High	0	13	24	10	2	49
	Not sure	0	0	0	0	7	7
Total		23	34	24	10	9	100

The use of chi-square to test the null hypothesis against the alternative hypothesis required either passing Pearson chi-square or Likelihood Ratio test or Linear-by-Linear Association test at a significant level of 0.05 we reject the null hypothesis. The Alternative hypothesis is accepted if we fail to accept the null hypothesis at 0.05 significant levels. The results indicate that all the three tests are highly significant

(see table 4); a manifestation that we fail to accept (reject) the null hypothesis: H0: Win for your team is statistically independent of the Referees Bias and accept the alternative H2: Win for your team is statistically dependent of the Referees Bias. We therefore conclude that base on the test result; we reject the null hypothesis (Ho) and accept the alternative hypothesis.

Table 4: Chi-Square Tests

	Value	DF	Asymp. Sig. (2-Sided)
Pearson Chi-Square	195.490 ^a	16	.000
Likelihood Ratio	163.538	16	.000
Linear-by-Linear Association	66.017	1	.000
N of Valid Cases	100		

a. 19 cells (76.0%) have expected count less than 5. The minimum expected count is .63.

Table 5: Referees Bias * low attendance Crosstabulation

Count		low attendance					Total
		Large extent	Some extent	Low extent	Very low extent	Uncertain	
Referees Bias	Very low	8	0	0	0	0	8
	Low	11	0	0	0	0	11
	High	15	10	0	0	0	25
	Very High	0	18	21	10	0	49
	Not sure	0	0	0	1	6	7
Total		34	28	21	11	6	100

The use of chi-square to test the null hypothesis against the alternative hypothesis required either passing Pearson chi-square or Likelihood Ratio test or Linear-by-Linear Association test at a significant level of 0.05 we reject the null hypothesis. The Alternative hypothesis is accepted if we fail to accept the null hypothesis at 0.05 significant levels. The results indicate that all the three tests are highly significant

(see table 4.6); a manifestation that we fail to accept (reject) the null hypothesis: H0: low attendance is statistically independent of the Referees Bias and accept the alternative H3: low attendance is statistically dependent of the Referees Bias. We therefore conclude that base on the test result; we reject the null hypothesis (Ho) and accept the alternative hypothesis.

Table 6: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	168.677 ^a	16	.000
Likelihood Ratio	149.698	16	.000
Linear-by-Linear Association	61.310	1	.000
N of Valid Cases	100		

a. 18 cells (72.0%) have expected count less than 5. The minimum expected count is .42.

5. Conclusions and recommendations

Significant conclusions can be drawn from this study. In terms of professionalism of referees in Ghana, we conclude that there is a lot to be desired when it come to professionalism being displayed by referees. Professionalism of referees has been blighted by insidious bias during football matches resulting in football fans calling to question the level of professionalism of referees. Bias officiating is not without effects. Further, based on the results of this study, it is our conclusion that match outcomes are influenced by referee bias. When referee decisions influences match outcomes, the referee is often described albeit sarcastically as the 12th man on the pitch (Buraimo, Forrest & Simmons, 2007). We also establish the point that match victory of teams may be a result of referee bias and this is underpinned by the belief of fans that their teams can win matches due to referee bias in their favor. Another conclusion we draw from this study is that referee bias precipitates on low fans attendance to stadiums during matches. Referee bias therefore serves as a inhibiting factor to fans match day attendance.

We recommend training and refresher training for referees to boost their professional capacity which can result in improved performances. Further, referees financial and non financial reward packages should be spiced to make the parry away financial inducements from club officials which tends to cloud their sense of judgment. With training and improved reward packages, severe disciplinary action should be taken against referees who engage in willful acts of bias in order to serve as a deterrent to others. Talk of using technology to aid goal line decisions has gathered momentum and at the just ended FIFA Confederation Cup Competition held in Russia, the use of video technology assisted in reducing refereeing errors and bias. The Ghana Football Association may take a cue and introduce video technology during premier league matches in Ghana. Security at the various stadia should be beefed to guarantee protection of match officials from fans during and after matches.

Future studies especially in sub Saharan Africa should use empirical data to prove the incidence or otherwise of referee bias by analyzing penalties, late goals and time added on of home teams in comparison to away teams. Football fan base in Ghana is quite sizable and an expansion of the sample size in future studies could result in more representativeness.

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