

Is the fulfilment of objective wellbeing reflected in subjective wellbeing? A case study of vulnerable communities in Volta Delta, Ghana

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Abstract: There is growing interest in the measurement and conceptualisation of wellbeing due to its increasing importance within policy outcomes; however, the understanding of how different wellbeing outcomes associate within sustainability research is limited. This paper uses household survey data from the vulnerable Volta Delta, South Ghana, as a case study to illustrate the different philosophical approaches and measures of wellbeing, and the potential impact upon policy interventions. The frequent use of objective wellbeing measures, such as monetary poverty, within development policy is challenged as to whether it sufficiently reflects overall wellbeing. For example, objective monetary measures may not incorporate the intangible components of wellbeing, which can alternatively be captured within individuals' self-evaluated, subjective wellbeing.

This study first outlines the conceptual and methodological choices required when measuring wellbeing, before drawing on ideas of objective and subjective wellbeing to examine whether these concepts from different disciplines align or oppose one another. Contrasting theories within the literature justify this focus. By testing for associations between objective and subjective wellbeing outcomes, this study highlights how the methodological and conceptual choices made when measuring wellbeing can result in differing conclusions. Despite statistically significant associations being found amongst some wellbeing measures, results which show opposing outcomes highlight how subjective and objective wellbeing are not entirely interchangeable. Our study concludes there is a benefit to incorporating both objective and subjective measures in research and development targets across multiple scales to more-comprehensibly capture, and improve our understanding of, human wellbeing in vulnerable locations.

Keywords: wellbeing; poverty; happiness; objective; subjective; deltas

1. Introduction

Wellbeing is intrinsically interlinked with the multiple social, economic, political and climatic challenges faced within deltaic environments (Nicholls, et al., 2020; Schleicher et al., 2018). Therefore, appropriate policy solutions are required to address both human needs, and the various pressures experienced by communities in these vulnerable locations. To achieve this sustainable development research must contribute to understanding and conceptualising wellbeing beyond traditional material and monetary approaches (Helne & Hirvilammi, 2015). However, despite developments in the literature on the measurement of wellbeing due to its growing importance as a policy outcome (Osei-Tutu et al., 2020), the integration of wellbeing

research, and the understanding of how different wellbeing outcomes relate, within the field of sustainability is limited (Voukelatou et al., 2021). Consequently, a more-comprehensive understanding of wellbeing amongst vulnerable communities in low-middle-income countries (LMICs) is required (O'Mahony, 2022).

Wellbeing can be universally understood as a “favourable state of life desirable for every human being in the world at all times” (Böhnke & Kohler, 2010;5). However, the conceptualisation and measurement of wellbeing is defined in numerous ways across different disciplines and contexts (White, 2016). For example, objective approaches to wellbeing are primarily used in economics and development studies (e.g., Eid & Larsen, 2008), and subjective approaches in psychology (e.g., Cooke et al., 2016).

This study on the complex relationships between objective (OWB) and subjective wellbeing (SWB), within a vulnerable environment, is justified by the prominence of traditional wellbeing research within the field of sustainable development focusing upon singular outcomes, with the implicit assumption that singular measures capture the totality of wellbeing (Barbier & Hochard, 2018; Nanor et al., 2021). Specifically, there is an underutilisation of SWB outcomes in LMIC studies, with much research and policy focus, particularly within the context of global environmental challenges, being located in higher-income countries (Sulemana et al., 2016; Zhang et al. 2017). The reason for this potentially relates to Maslow's “hierarchy of needs” framework, where the primary focus within LMIC communities is the satisfaction of tangible needs required for survival, rather than the “bonus” psychological needs encompassed within SWB (Chumo et al. 2023). Therefore, this study aims to support future decisions within sustainable development as to how wellbeing is captured and monitored, by examining whether different wellbeing outcomes, grounded within different disciplines, associate with one another within a vulnerable context.

The prominence of OWB within sustainable development is highlighted by the objective measures incorporated within the UN Sustainable Development Goals (SDGs). For instance, SDG1 “eradicate extreme poverty and hunger” is primarily measured by the proportion of people with <\$1.25/day (UN, 2015). This indicator alone does not recognise how intangible SWB components can contribute to improved, sustainable overall wellbeing (Kezer & Cemalcilar, 2020). For example, evidence shows that happier people can be more economically productive (Ravallion, 2015). Incorporating SWB outcomes can also increase opportunities for successful policy interventions by improving decision-makers' understanding of communities' priorities and behaviours, which may not always align with objective measures. For example, Gross-Camp (2017) illustrated that despite community-based forest management projects increasing objective inequality in Tanzania, many disadvantaged communities supported the project due to the pride derived from engaging with external organisations and actively conserving their local environment. Furthermore, analysing OWB *and* SWB measures can increase research validity. For example, if a policy intervention strongly associates with OWB and SWB, the evidence supporting its capacity to promote positive change is strengthened (Sacks et al., 2010).

This study outlines different measures of OWB and SWB, and analyses how the different wellbeing outcomes align or oppose one another; using Volta Delta, Ghana as a case study. Exploring whether OWB and SWB associate is important when evaluating whether sustainable development policy interventions successfully achieve “comprehensive” wellbeing (White, 2016). “Comprehensive” wellbeing includes three components: (i) broad indicators, (ii) relevance to people's lives, (iii) inclusion of subjective and objective measures. Significant associations between OWB and SWB support the assumption that improvements in one strand of human wellbeing can provide “holistic” improvements. However, opposing relationships highlight the

danger of narrowly focusing upon singular outcomes, as Copestake (2008) states targeting OWB is not harmful in itself, but “by prioritising them, other dimensions of wellbeing can be ignored, [unaffected or] damaged” (p.591). Therefore, opposing OWB/SWB relationships could advocate for the inclusion of SWB measures when implementing and evaluating sustainable development interventions, or the use of subjective information to calibrate existing OWB measures (Ravallion, 2014); for example, applying locally-collected weights to multidimensional measures (Decancq & Lugo, 2013).

Understanding how different wellbeing measures, from different disciplinary backgrounds, relate within rural LMIC communities is under-researched within sustainable development, with an improved understanding required to facilitate holistic improvements to individuals’ and communities’ lives (Sachs, 2022). This paper will not explicitly test how one wellbeing outcome contributes towards another, but rather utilises chi-square association tests between different wellbeing measures to support and structure conceptual discussions.

Before investigating the driving factors behind various wellbeing outcomes, it is important to understand how wellbeing is measured, and how different measures are associated. Consequently, this exploratory study could provide important findings to aid future research in examining the specific contextual effects, such as environmental conditions, that influence the relationship between OWB and SWB. These relationships are not explicitly tested within this paper. The following sections first define OWB and SWB, before briefly evaluating the different benefits and challenges from methodological and policy standpoints.

1.1 Objective wellbeing

OWB incorporates universal, measurable components relating to quality of life which are often given meaning by socially constructed desirable norms (Vazonienė, 2014), such as income or educational attainment (Western & Tomaszewski, 2016). Financial OWB uses a neoclassical approach, which is positioned within “utility theory”, where financial capital reflects an ability to satisfy needs by consuming services and goods (Rasool et al., 2011). OWB can alternatively be captured through basic needs, defined by individuals’ access to core human requirements, spatially and temporally ranging from “survival needs” (i.e., access to food and water), to “productive survival” (i.e., employment and political participation) (Streeten & Burki, 1978).

When implementing development policy, quantifiable measures of OWB benefit from being easy to understand and monitor (Laderchi et al., 2003); however, objective measures can encounter conceptual challenges. Firstly, financial wellbeing can be defined as unidimensional (Voukelatou et al., 2021), meaning it excludes non-market components of wellbeing (Ravallion, 2015). Moreover, focusing on financial wellbeing can introduce bias if the relative value of monetary capital differs over space (Kofinti & Annim, 2016). For example, Arndt & Tarp (2016) suggest certain low-welfare populations may sacrifice private wealth for improved public services, as the latter is more crucial for their immediate security and survival. Furthermore, monetary poverty outcomes are sensitive to different methodological choices, including the choice of data (income/expenditure/consumption) (Atkinson, 2019), absolute/relative thresholds (Houghton & Khandker, 2009), and household equivalisation scales (Batana & Cockburn, 2018; OECD, 2011), which can limit generalisability across different contexts.

The unidimensional weakness of objective financial wellbeing can be mitigated by measuring OWB through a multidimensional basic needs approach, which facilitates the inclusion of non-monetary skills and services, such as education, health and social capital (Alkire & Fang, 2019; Artha & Dartanto, 2018; GSS, 2020; Santos & Villatoro, 2018; Streeten, 1984). The multidimensional approach aligns with studies which demonstrate LMIC communities to

prioritise improved access to basic needs due to their importance for “productive survival” (Streeten & Burki, 1978). The importance is heightened within LMICs due to the restricted availability of public services, and the threat posed to core needs from social and climatic shocks (Dolan & White, 2007; Tay & Diener, 2011).

Nevertheless, the basic needs approach also faces methodological challenges. Firstly, if the inclusion of different basic needs components are externally derived, then the measured outcome may not harmonise with the needs of the target community, and reduce policy buy-in (Alam & Mallick, 2022; Davis & Sanchez-Martinez, 2014; Kay & Jost, 2003; Ravallion, 2015). Similarly, decisions regarding the weighting of different basic needs introduces subjectivity regarding the relative importance of different components (Decancq & Lugo, 2013). Even if weighting is excluded, this introduces the simplistic and paternalistic assumption that all components are inherently equal, which may not reflect reality on the ground (Esposito & Chiappero-Martinetti, 2008). Communities’ priorities are also likely to shift over time and space, challenging the universal applicability of basic needs measures (Laderchi et al., 2003). For example, different contextual factors, such as climatic conditions, produce different needs; flood-impacted areas may define high-quality housing as a core need due to potential inundation damage, whereas drought-impacted communities may view irrigation as an essential need. Consequently, it is preferential for communities to define their own basic needs within the relational context.

1.2 Subjective wellbeing

SWB captures individuals’ internal assessments, cognitive judgments and affective reactions to their life and environment (Stone & Mackie, 2013). SWB outcomes are developed from “affects”, consisting of emotions and moods, and “thoughts”, referring to individuals’ perception of their life in relation to others, and their socially constructed aspirations (Vazonienė, 2014; Veenhoven, 2009). SWB, which can be measured through happiness or self-evaluated financial stress, is also sensitive to individuals’ comparisons to past periods of time, and future ambitions (Hodkinson & Martine, 2013). Within an increasingly volatile, uncertain climatic (Addo et al., 2018; Sagoe-Addy & Addo, 2013) and economic context (IMF, 2023; World Bank, 2022), as is the case in Ghana, it is important to explore how these changes influence subjective outcomes, compared to objective measures which are often fixated within single time periods (Adger et al., 2013; Davis, 2014).

According to Dolan et al. (2011), SWB sits within three broad categories: (i) “evaluation” – general overall assessments of life or specific domains such as health, (ii) “experience” – measures the balance of positive/negative emotions, (iii) eudaimonic - inherent psychological positives everyone strives for. Different thoughts exist regarding the positives incorporated within eudaimonic wellbeing. For example, Deci & Ryan (2012) note three innate needs: autonomy, relatedness (social connection), and competence (mastery of skills/environment). Relatedness and competence are particularly important within collective agricultural communities in LMICs (Markussen et al., 2018).

SWB outcomes benefit from the inclusion of wide-ranging information, such as emotions towards health, future opportunities and relative comparisons (Mahmood et al., 2019; Narayan & Petesch, 2002; Ravallion & Lokshin, 2002; Reyes-García et al., 2016; Wang et al., 2020). However, the magnitude of complex information included can restrict policy from pinpointing specific needs (Brüggen et al., 2017). Nevertheless, Flik & Van Praag (1991) argue that “individuals themselves are the best judges of their own situation” (p.313), suggesting subjective approaches could provide more accurate, context-specific understandings of wellbeing that minimise the influence of external decisions, such as the selection of absolute poverty thresholds (Nunan,

2015). SWB research also facilitates mutual learning, where the value of individual freedom is upheld (Kingdon & Knight, 2006), and the poverty discourse is not controlled by the non-poor (Narayan & Petesch, 2002).

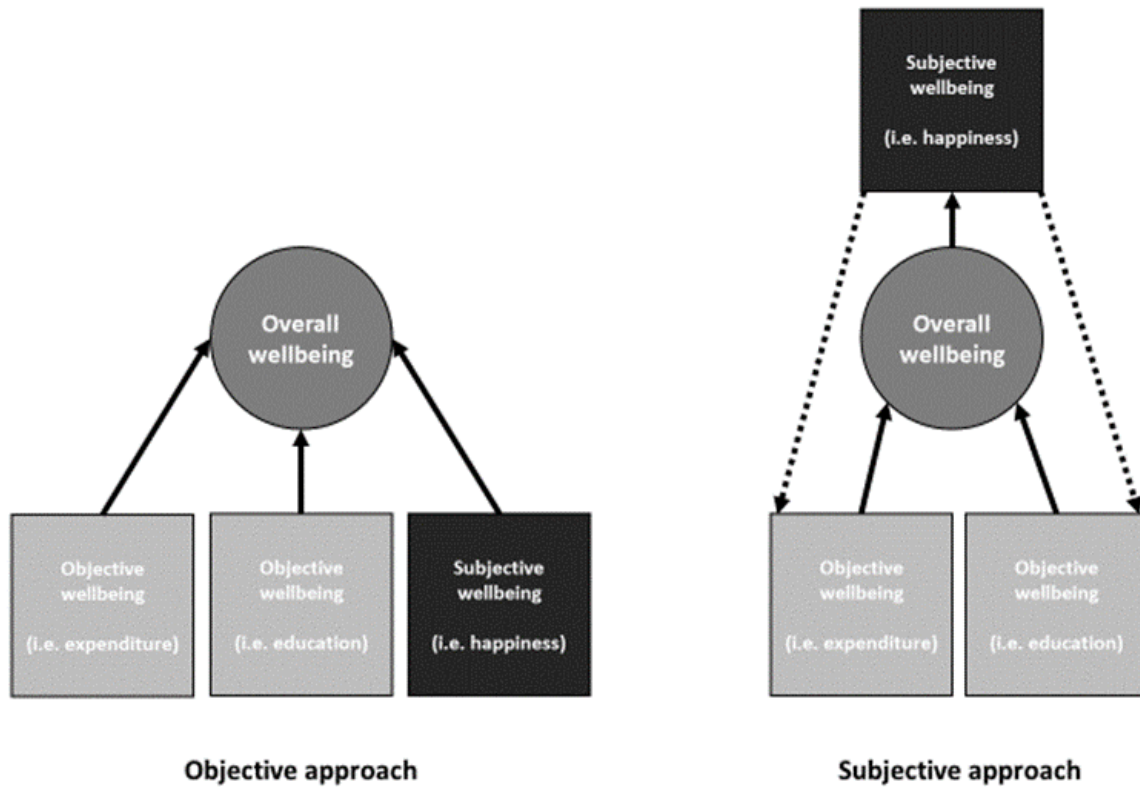
On the contrary, subjective measures are criticised for being abstract (Dolan & White, 2007), as without a natural scale, differences in wellbeing cannot be quantified; this contrasts the tangible differences in OWB (Sacks et al., 2010). Furthermore, the comparative reference points individuals use when forming SWB are likely to differ depending on information access and visibility of higher living standards, limiting the comparability of subjective outcomes between individuals and the ability to use SWB to guide broad policy interventions (Ballas et al., 2007; OECD, 2020). For example, despite Owusu (2005) claiming the majority of Ghanaians position themselves within administrative units when making relative comparisons, as resources are typically allocated at these levels following national decentralisation, remote areas with poor transport infrastructure may be contained within local communities. In contrast, increased media consumption in urban areas could produce global reference points (Ng & Diener, 2014). From a policy perspective, using lower reference points when self-evaluating SWB can create “poor but happy” identities, which risks romanticising poverty from a Western perspective and rationalising inequality (Crossley, 2012; Davis & Sanchez-Martinez, 2014). Furthermore, policy measures primarily focused on subjective outcomes can discourage material investments and more-immediate tangible change, in favour of softer approaches based on social programmes and individuals’ psychology (Kay & Jost, 2003). Solely focusing on SWB can also de-politicise policy, with interventions aiming to change how people view the world, rather than how the world is (White, 2010). This can result in persistent deprivation within LMICs being blamed “on the dysfunctional thinking of the oppressed” (Franzblau & Moore, 2001:94), rather than the material and structural causes (Gough & McGregor, 2007).

From a methodological standpoint, SWB is also potentially exposed to multiple types of bias, including: (i) positivity - focus on current areas of high satisfaction and ignore detrimental emotions (Dolan & White, 2007), (ii) social desirability - exclude stigmatised incidents or emotions, particularly in face-to-face interviews (Conti & Pudney, 2011), (iii) perceived utility - attach positive emotions towards normality and negative emotions towards unpredictable, unknown events (Durayappah, 2011), (iv) temporal - focus on the end result rather than the emotions felt during the process (Dowling & Yap, 2012).

1.3 How are objective and subjective wellbeing related?

When examining whether OWB and SWB outcomes align or oppose one another, Böhnke & Kohler (2010) present two interpretations (Figure 1). Firstly, an objective approach where SWB is independent of OWB, which allows for opposing outcomes. The second interpretation is a subjective approach, where objective resources influence overall wellbeing, which is then reflected in SWB, suggesting OWB and SWB outcomes align. Contradicting theories justify the broad research focus on how OWB and SWB measures capture similar and/or differing information. Wellbeing is “relational”, meaning it is constructed within a specific time and space (Gough & McGregor, 2007). Therefore, it is important to explore both Böhnke & Kohler’s (2010) models to account for how the relationship between OWB and SWB may differ across varying local contexts. Exploring associations between multiple wellbeing outcomes at the local scale can potentially support a more-complete appreciation of human wellbeing within sustainability research and development policy (Sachs, 2022).

Figure 1. Böhnke & Kohler’s (2010) objective and subjective approaches to objective/subjective wellbeing associations



Note. Dashed arrows are incorporated to illustrate the capacity for subjective wellbeing to also influence objective outcomes.

This conceptual discussion, regarding the potential mechanisms behind aligning/opposing OWB and SWB, is a crucial step before future research can explore how various contextual characteristics influence the different wellbeing outcomes, and the relationship between them.

1.3.1 Objective & subjective wellbeing: Opposing relationship

Many studies illustrate OWB and SWB, captured through various measures, to differ (e.g., Alem et al., 2014; Bradshaw & Finch, 2003; Datt, 2002; Graham & Felton, 2006; Posel & Rogan, 2016; Tibesigwa et al., 2016). The objective/subjective dichotomy features in the eminent Easterlin Paradox (Easterlin, 1974), where national-level economic growth increases short-term happiness, yet has reduced long-term returns. Individuals’ aspirations increase in relation to their objective wealth, termed the “hedonic treadmill”, creating constantly repositioning gaps between desires and fulfilment. An inability to reach aspirations is a pivotal control of SWB (Zhang & Churchill, 2020), particularly within countries experiencing rapid economic and material growth, such as Ghana (Crawford & Abdulai, 2009). This effect can result in financial wellbeing only controlling SWB until basic needs are consistently met; supported by Layard & Layard (2011) stating, “once subsistence income is guaranteed, making people happier is not easy” (p.4). These ideas are supported by studies in Ghana which found financial capital to be irrelevant to a “good life” beyond avoiding absolute poverty (Dzokoto et al., 2019). Additionally, others argue objective financial capital only represents “potential”, rather than “realised”, wellbeing (Gasper, 2007; Sen, 2005). Transforming “potential” to “realised” wellbeing requires rights, skills, institutional support, and favourable environments. Without such resources individuals may struggle to translate their financial capital into improved SWB. For example, insufficient health

infrastructure could lower health, regardless of objective wealth, and consequently lower happiness (Addai & Adjei, 2014).

The relationship between OWB and SWB may also differ spatially. For example, urban populations with greater media exposure and mobility may possess higher material aspirations, and place greater weight on relative positionality than remote rural communities when defining their SWB (Corazzini et al., 2011; Haughton & Khandker, 2009; Ng & Diener, 2014; Ravallion, 2014). In contrast, rural communities may achieve material needs through other non-market channels, such as subsistence agriculture and community trading, or prioritise a lower level of financial wellbeing which enables the fulfilment of non-material needs such as community relations, safety, cultural identity and purpose (Ward & King, 2016). These ideas relate to the “poor but happy”, or “happy farmer” (Markussen et al., 2018) identities. These concepts suggest poorer rural communities achieve higher SWB through collective conceptualisations of wellbeing (Leviston et al., 2018), greater togetherness (Dussailant & Guzmán, 2014; Schutte et al., 2022), and higher place/community attachment (Bunkus et al., 2020; Ma et al., 2022; Quinn & Halfacre, 2014). Nevertheless, happiness is not a substitute for OWB; therefore, sustainability policy should not be discouraged from providing tangible support to these vulnerable locations (Kay & Jost, 2003).

Furthermore, other studies illustrate that self-defined financial insecurity commonly exceeds objective rates. One potential reason for this is that external decisions or thresholds, such as pre-defined poverty lines (Haughton & Khandker, 2009), are unharmonized with communities' requirements (Datt, 2002). Objective/subjective relationships are also non-linear (Böhnke & Kohler, 2010); therefore, low SWB can be experienced across the OWB spectrum (Ravallion et al., 2013). For example, objectively non-poor households can encounter financial stress if exposure to climatic shocks means their current situation is relatively worse-off than a previous point in time, or compared to neighbouring households; particularly in unequal societies with differing adaptive capacities (Haughton & Khandker, 2009; Sachs, 2022). This concept is supported by evidence illustrating that households frequently use higher reference points when self-defining their financial wellbeing, particularly when in the middle of the financial distribution (Graham & Pettinato, 2006). Alternatively, previous studies have also shown households which have historically encountered deprivation to continue to negatively self-evaluate, regardless of any OWB improvements (Alem et al., 2014; Biewen, 2009).

Objective/subjective differences could also depend on survey timing. For example, agricultural households experiencing increasingly uncertain seasonality may not face immediate objective monetary impacts; yet fears regarding future financial viability could immediately increase financial stress or lower happiness (Bradshaw & Finch, 2003). Furthermore, SWB can also be volatile in relation to respondents' mood, potentially creating temporal differences in individuals' objective/subjective alignment (Ravallion, 2014).

Different methodologies may also contribute to different outcomes. For example, capturing objective financial wellbeing within subsistence economies, with non-monetary payments and poor financial records, can produce errors in poverty classification (Posel & Rogan, 2016). Furthermore, the different number of dimensions included within the different wellbeing measures could produce opposing OWB/SWB relationships (Brüggen et al., 2017). For example, multidimensional subjective financial stress which captures feelings around current and past incomes, future opportunities, employment, education, health and access to public services (Posel & Rogan, 2016), incorporates information uncaptured within objective monetary measurements.

1.3.2 Objective & subjective wellbeing: Aligning relationship

Studies have also shown how OWB and SWB can correlate (e.g., Addai et al., 2014; Brown et al., 2021; Gyampoh et al., 2009; Helliwell, 2008; Kangmenang & Elliott, 2019; Miñarro et al., 2022; Pollnac & Poggie, 2008). For instance, Ravallion (2015) found happier people earn more due to their greater productivity. However, this relationship can also be bidirectional since objective resources and circumstances may shape individuals' perceptions (White, 2010), whilst subjective emotions and social expectations can also shape which objective resources are strived for (Appadurai, 2004). Furthermore, the alignment of OWB and SWB could be driven by underlying characteristics, such as individuals' personality traits influencing both happiness and objective employability (Ravallion, 2015).

Dunn et al. (2011) state "money can buy many...if not all...the things that make people happy" (p.123). This statement is supported by Reyes-García et al. (2016) who evidence current absolute income to significantly increase happiness amongst rural African and Asian households, whilst Van der Geest (1997) defines money as a crucial prerequisite for happiness because it facilitates access to domestic care and social support in rural Ghana. Furthermore, Dzokoto et al. (2019) refer to money as a "social glue", forging "kin relations even where there are no blood ties" (p.13); with "relatedness" a key component of eudaimonic SWB (Deci & Ryan, 2012).

Studies based in Ghana also reveal that objective material wealth can act as a means to higher SWB by stimulating self-growth and fulfilment (Osei-Tutu et al., 2020), improving social status and dignity, increasing autonomy, facilitating "things of intrinsic worth" (Kingdon & Knight, 2006; Sen, 1983), and buffering against the detrimental impacts of contextual pressures, such as climatic risks, by aiding adaptation and recovery (Kushlev et al., 2015; Markussen et al., 2018; Tay et al., 2018; Ward & King, 2016). These findings oppose claims in the wellbeing literature that objective resources positively influence cognitive life evaluations, but not emotional wellbeing (Deci & Ryan, 2012; Diener et al., 2010). However, studies suggest that higher OWB and lower SWB could still emerge if the material wealth is not self-made or beneficial to the wider community (De Witte, 2003; Dzokoto et al., 2019).

Access to objective basic needs, such as education and employment, are also often encapsulated within subjective evaluations, particularly in LMICs where large proportions experience multidimensional deprivation (Layard & Layard, 2011). Multiple examples of how SWB and objective basic needs interlink are illustrated:

- **Health:** happiness improves recovery time from disease (Diener & Biswas-Diener, 2002), whilst good-health and longer life expectancy increases SWB (Addai et al., 2014; Dowling & Yap, 2012).
- **Education:** access to education can increase optimism for the future, reduce financial stress and unhappiness, and increase people's sense of security (Graham, 2010; Lent, 2004).
- **Employment:** periods of unemployment can lower SWB by limiting freedom of choice, causing a loss of "competence" (mastery of environment/skills), "relatedness" (work-based social connections) (Deci & Ryan, 2012; Markussen et al., 2018), and preventing the fulfilment of socially expected identities and obligations (Brown et al., 2021; Miñarro et al., 2022; Pollnac & Poggie, 2008).
- **Political freedoms:** higher societal happiness is a potential prerequisite for successful democracy (Inglehart, 1990), whilst high governmental trust and low corruption increases SWB (Helliwell, 2008).
- **Social networks/cooperative groups:** membership within networks/groups can improve happiness (Voukelatou et al., 2021), whilst cognitive social capital (subjective trust and

social norms) can lower objective issues such as crime and conflict, and facilitate further tangible, reciprocal relationships (Claridge, 2018).

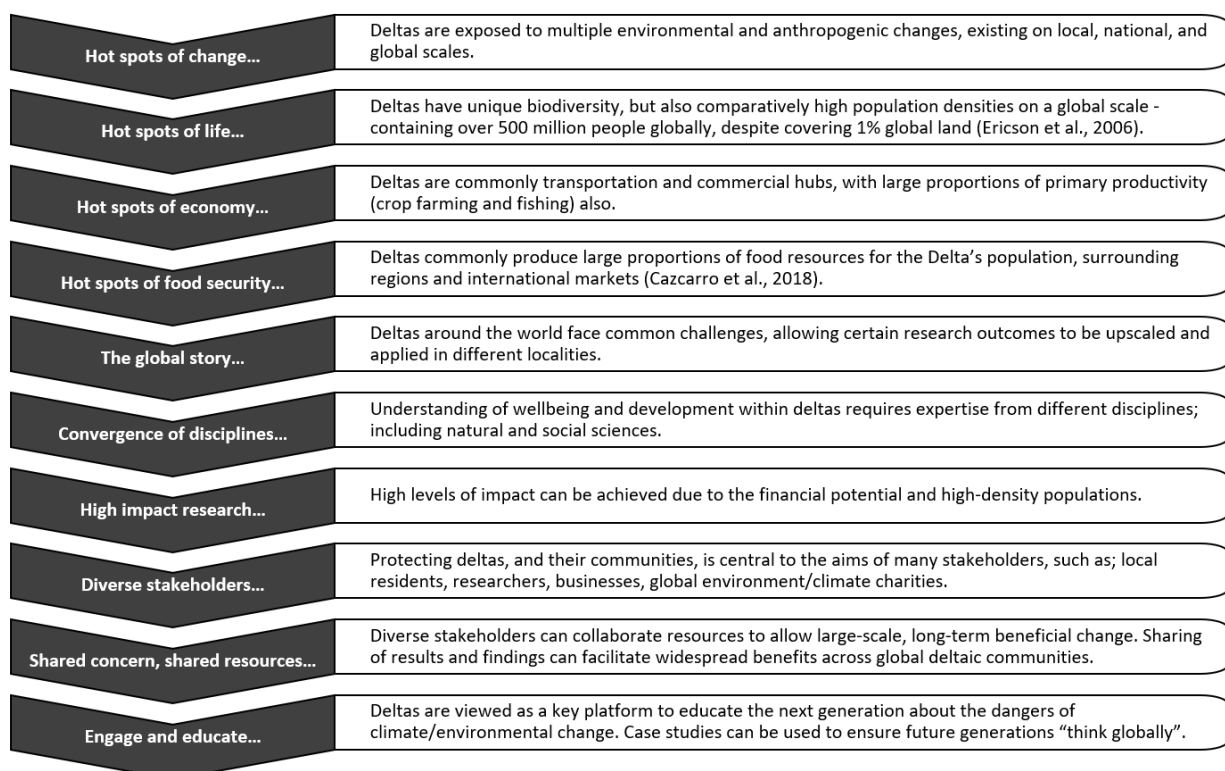
Existing studies provide evidence for both aligning and opposing relationships between OWB and SWB within LMICs. The following section rationalises why this wellbeing study focuses on a deltaic environment, with the remainder of the paper exploring Böhnke & Kohler’s (2010) objective and subjective approaches, using Volta Delta as an illustrative case study.

2. Materials & methods

2.1 Study site

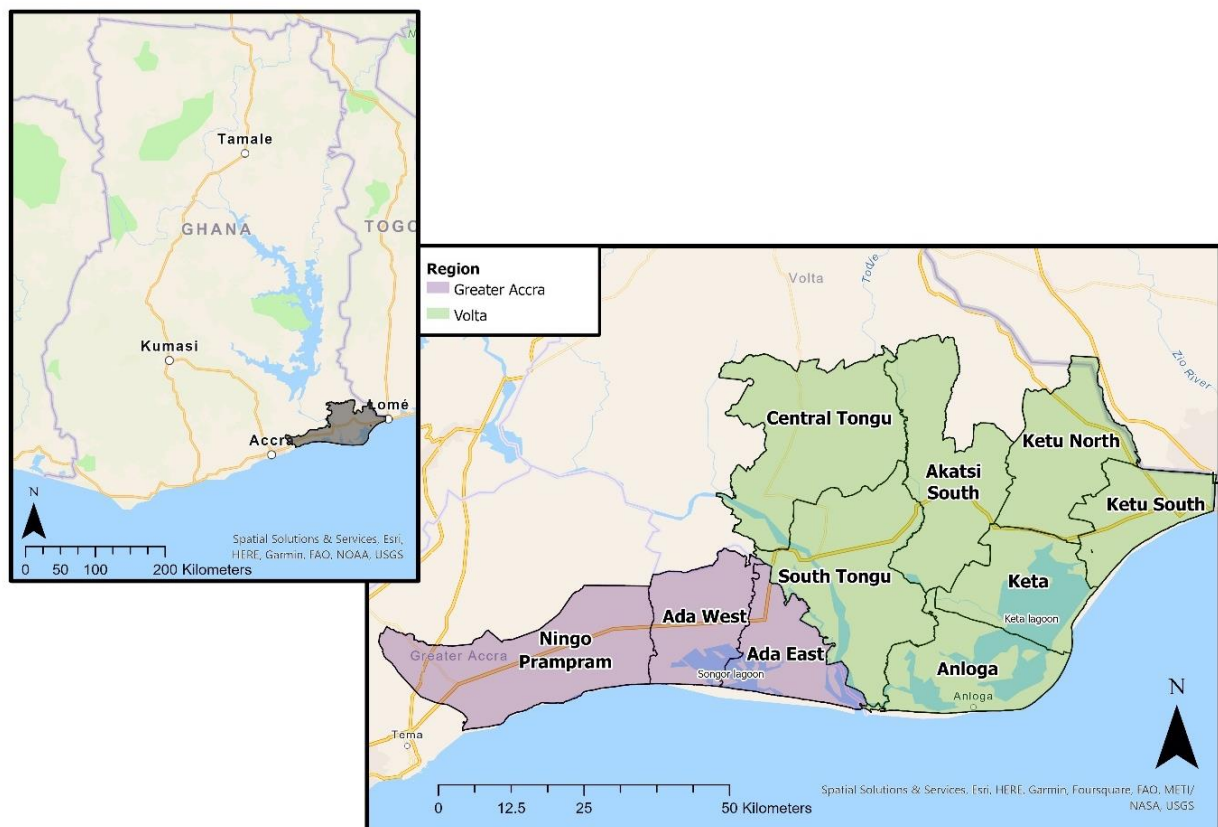
Volta Delta, South Ghana, is used as the case study site for this research. Due to the combination of high population densities (Ericson et al., 2006), economic potential, environmental vulnerability, and high dependency upon ecosystem services for human and material wellbeing (Kuenzer & Renaud, 2012), deltas, many of which are located in LMICs, are often target areas for international sustainable development (Szabo et al., 2016). Analysis exploring OWB and SWB is not exclusive to deltaic communities; however, due to the multitude of pressures and challenges experienced, these locations provide opportunities for research into the different mechanisms and processes which influence the numerous components of “comprehensive” wellbeing (White, 2016). As discussed, wellbeing is “relational”, therefore similar analysis should be replicated in different locations to understand further how local factors influence wellbeing outcomes. This study advances the understanding of wellbeing measurement and conceptualisation, with future mixed methods research required to understand the relationships between specific challenges, such as climate and health shocks, and local understandings of wellbeing. Further reasons for operationalising this study in a deltaic environment are expanded upon in Figure (2).

Figure 2. Ten reasons why deltas are recognised as hotspots for sustainable development research, adapted from Foufoula-Georgiou et al. (2013)



Volta Delta is located across two regions, Volta and Greater Accra, in southern Ghana (Figure 3). The study location is the area below 5m elevation in the southern Volta River Basin, containing 4% of the national population (945,827). Landcover consists predominantly of croplands, grasslands, wetlands and lagoons (Keta & Songor) (Jayson-Quashigah, 2016). Approximately 1/3 of individuals work within agriculture, higher than the proportion of GDP generated by agricultural activities (22%). This disparity is driven by high subsistence farming, meaning agricultural activities do not provide financial outputs, low productivity and technology access curtailing monetary returns (Arto et al., 2020), and exposure to environmental challenges, such as droughts and uncertain seasonality, reducing crop yields and trade profits (Codjoe et al., 2020).

Figure 3. Map of Volta Delta, with regional (Volta and Greater Accra) and district boundaries



2.2 Dataset

Data collected through the Deltas, Vulnerability and Climate Change: Migration & Adaptation (DECCMA) household survey is used. The survey was undertaken with household heads during the growing season in 2016 (April-June) using face-to-face interviews. A two-stage clustered sampling strategy attempted to survey 1,500 households. Households were stratified into five strata based on environmental hazard risk¹. Fifty enumeration areas² were randomly selected, proportional-to-size, from the strata. Thirty occupied residential dwellings from each enumeration area were randomly selected. A 91% response rate was achieved (1,364 households) (Atiglo et al., 2022).

Due to different numbers of responding households in each enumeration area, the sample is not self-weighted. However, as enumeration areas were selected proportional-to-size, and are

¹ A standardised risk score was separated into quintiles; very low, low, medium, high and very high risk.

² Classified during Census enumeration, and used in GSS Living Standard and Demographic Health Surveys.

designed to have similar household counts³, it was assumed that households had approximately equal selection probabilities. Therefore, the absence of survey weights is unlikely to cause discrepancies in analytical estimates (Groves et al., 2011).

The DECCMA survey collected various data, including information on households' finances, subjective evaluations, self-evaluated environmental conditions, sociodemographic characteristics, and assets. The survey was primarily designed to capture migration behaviour when exposed to environmental pressures; however, this study adapts the variables to facilitate a multidimensional and comprehensive evaluation of household wellbeing (Tripathy, 2013).

2.3 Wellbeing measures

This section outlines and justifies how the measures of wellbeing were selected and calculated. Two objective measures, expenditure poverty and basic needs deprivation, and two subjective measures, financial stress and unhappiness, were chosen based on the available data and methodological literature.

2.3.1 Objective wellbeing: Expenditure poverty

Objective financial wellbeing was calculated using expenditure rather than income data because income data can both underestimate and create volatile measures of financial wellbeing in LMICs characterised by informal employment, non-monetary payments, and uncertain seasonal labour (Atkinson, 2019).

All recorded expenditure types were summed for each household, excluding housing and loan repayments (Supplementary Material 1a). Housing expenditure was removed to avoid incorrectly identifying homeowners as experiencing poverty due to low spending on housing⁴, and loan repayments were excluded as they are insufficiently related to living standards (Arndt & Tarp, 2016). Household expenditure was adjusted for regional living costs (Supplementary Material 1b), and equivalised using the Ghanaian Statistical Service (GSS) calorie-intake scale (GSS, 2018) (Supplementary Material 1c) to provide an "expenditure/equivalent adult per year" measurement. Equivalisation facilitated comparison between households (Batana & Cockburn, 2018) by accounting for differences in household size, age composition and "economies-of-scale"⁵ (OECD, 2011).

Adjusted and equivalised household expenditure was compared to the GSS upper poverty line. GSS adjusted 2012/13 thresholds for changes in inflation and living costs in 2016/17, which avoided changing the target when addressing poverty challenges (Ferreira et al., 2016). The upper poverty line of GH¢1,760.8 per adult equivalent/year is based on the costings of essential food and non-food items, such as cleaning products and energy. If households' equivalised expenditure was below this threshold, they were classified as experiencing poverty.

2.3.2 Objective wellbeing: Basic needs deprivation

Households' basic needs deprivation was captured using the Alkire-Foster (2011) "dual cut-off" count method. Twelve indicators (Table 1), adapted from existing basic needs studies (GSS, 2020; Santos & Villatoro, 2018; Streeten, 1984), were constructed from the DECCMA dataset. For each

³ Approximately 150 households per enumeration area (Cordes et al., 2021).

⁴ Justified by 86% respondents with missing/no expenditure on renting property or land.

⁵ "Economies-of-scale" refer to how the monetary resources required for certain living standards do not rise proportionally with household size because goods/services are shared. For example, five-person households do not expend five-times more on durable goods than one-person households (Lanjouw et al., 1998).

indicator a “deprivation” threshold was applied (Supplementary Material 2), with a second threshold defining the number of deprivations needed to be deprived “overall”.

Table 1. Household counts (%) experiencing each of the 12 deprivation indicators and “nested” weights, grouped by the Sustainable Livelihoods Framework capitals

Capital	Indicator	Count (%)	Nested weight
Financial	One or more household members are unemployed	328 (24%)	1
	Monthly expenditure on food >60% total expenditure	776 (57%)	1
	No access to bank or loan service	823 (60%)	1
Human	All household members aged 15+ without basic education	453 (33%)	1.5
	Over 5km from nearest hospital	1,120 (82%)	1.5
Social	Not a member of a community cooperative network ⁶	1,167 (86%)	1.5
	Under 3 family/friends outside household with migration experience	471 (35%)	1.5
Physical	Low-quality roof material	738 (54%)	0.6
	Unsafe latrine facility	557 (41%)	0.6
	Unsafe drinking water source	304 (22%)	0.6
	Overcrowded household	222 (16%)	0.6
	Home is not owned	195 (14%)	0.6

Following Alkire & Santos (2010), “nested” weighting was applied to the basic need indicators. Indicators were grouped within financial, human, social and physical capitals, as outlined in the Sustainable Livelihoods Framework (SLF)⁷ (Scoones, 1998), with each group weighted equally (Table 1). Details of sensitivity testing, alternative weighting options (equal, frequency, and statistical), and further justifications for selecting “nested” weighting, are presented in Supplementary Material (3).

Drawing on the SLF capitals ensured the different resources which control livelihood and adaptive strategies, which are intrinsically interlinked with communities’ environments (Burney & Naylor, 2012; Forkuo et al., 2021), and are depended upon to “durably sustain people’s basic needs” (Gaillard et al., 2009;120), were considered within the multidimensional measure. Using broad objective capitals to structure the basic needs measure also provided flexibility - enabling the inclusion of various relevant indicators available within the dataset.

As the survey dataset was designed primarily for an alternative purpose, proxy indicators, guided by existing multidimensional deprivation studies, were used to measure basic needs. The

⁶ Cooperatives are “autonomous associations of people who get together voluntarily to meet their common economic, social, and cultural needs and aspirations through jointly owned and democratically controlled organizations” (Francesconi & Wouterse, 2011;1).

⁷ Note, “natural” capital is not included as it is interpreted as a determinant of wellbeing. However, it is acknowledged that “environment” can also be defined as a constituent of wellbeing (Schleicher et al., 2018).

indicators do not capture the SLF capitals in their totality; however, within the dataset restraints, they were designed to capture key documented requirements within an LMIC context.

A household was defined as deprived “overall” if it experienced at least 50% weighted deprivations, meaning the cumulative nested weight for the household was equal to, or greater than, six⁸ (González et al., 2021; Hjelm, Ferrone, et al., 2016). The 50% threshold was selected as it provided the most-comparable result to GSS (2020) multiple deprivation estimates. It also fulfilled existing criteria for multiple deprivation classification, including the equivalent of two full “nested” deprivations, as used in UNICEF Child Poverty reports (Alkire & Foster, 2011), and the requirement for the majority of weighted deprivation components to be experienced (Aguilar & Sumner, 2020). The effect of different thresholds on the overall rate is illustrated in Supplementary Material (3).

2.3.3 Subjective wellbeing: Financial stress

Subjective financial stress captures information on individuals’ self-perceived financial situation in relation to others and past/future time periods (Hodkinson & Martine, 2013). The measure was captured using an adequacy approach (Mahmood et al., 2019), defined by the binary response to: “do you feel under stress with your current income?”. This method was favoured over the minimum amount approach, which creates a self-defined threshold from the question: “how many cedi (GH¢) per month does your household require to not feel under stress/pressure?”. The minimum amount method was not used as asking individuals in subsistence economies to quantify monthly requirements can produce errors (Ravallion, 2015); exemplified by only 65% of households describing themselves as financially stressed having an adjusted expenditure below their self-defined threshold.

2.3.4 Subjective wellbeing: Unhappiness

Unhappiness was captured using a life domains approach, which assumes happiness with different areas of life additively represent overall happiness (Rojas, 2006). Ordinal principal component analysis (PCA) was used to agglomerate eight correlating measures of happiness; incorporating household heads’ happiness with financial, material, social and environmental components (Vyas & Kumaranayake, 2006). The first component⁹ was used as the happiness index (Berni et al., 2011). All domains correlated positively with the happiness index, illustrated by the loading values (Supplementary Material 4). Next, k-means clustering was used to formulate three clusters¹⁰ (Vyas & Kumaranayake, 2006); defined as low, medium, and high happiness. The “low” category was defined as “unhappy” in the binary outcome variable. Transforming the index into a binary variable enabled comparability with other measures and reduced the significance of small index differences that may have resulted from measurement error (Lutz, 2022).

A life domains approach was favoured over a global evaluation approach, which encompasses questions such as “how happy are you with your life in general?”. The former can capture less-tangible components of collective wellbeing, such as community satisfaction (Fagerholm et al., 2016), which may not be adequately captured in abstract global evaluations. For example, in the survey 78% of generally unhappy households were happy with community

⁸ The highest potential score was 12, equal to the number of components within the measure.

⁹ Capturing 37% variance.

¹⁰ The “elbow method” (examining when the number of clusters stops influencing the total within-clusters sum of squares), and the *NbClust* R function, which brings together different statistical indices, were used to decide the number of optimum categories.

interactions, yet only 11% were happy with more-tangible economic security (Supplementary Material 5).

For both subjective measures, the response of the household head is assumed to be representative of the household as a whole. It is acknowledged that this limits the capacity to analyse intrahousehold wellbeing inequalities; however, it was required to ensure comparability to objective measures which encompass information from the entire household.

2.4 Association analysis

After calculating two objective, and two subjective measures, chi-square association tests were undertaken between each combination of binary outcomes. This analysis was undertaken to examine whether significant associations existed between different wellbeing measures, explore whether objective and subjective measures align or oppose one another, and hypothesise whether different measures capture similar or differing information. Additional chi-square analyses between wellbeing outcomes and individual components of the decomposable basic needs deprivation measure are presented in Supplementary Material (6) to support the interpretation of objective/subjective relationships.

Chi-square analysis does not provide robust evidence as to the existence of causal relationships between wellbeing outcomes; however, for the purpose of this paper, association tests were used to help support and structure conceptual discussions.

The spatial distributions of selected wellbeing outcomes were also illustrated to demonstrate how associations between OWB and SWB vary across Volta Delta. The proportion of households, within each of the 50 sampled enumeration areas, experiencing the selected wellbeing outcomes were calculated and compared to the sample average. Visualising the spatial patterns helped interpret the influence of location and local characteristics, which as mentioned, can influence the relationship between OWB and SWB.

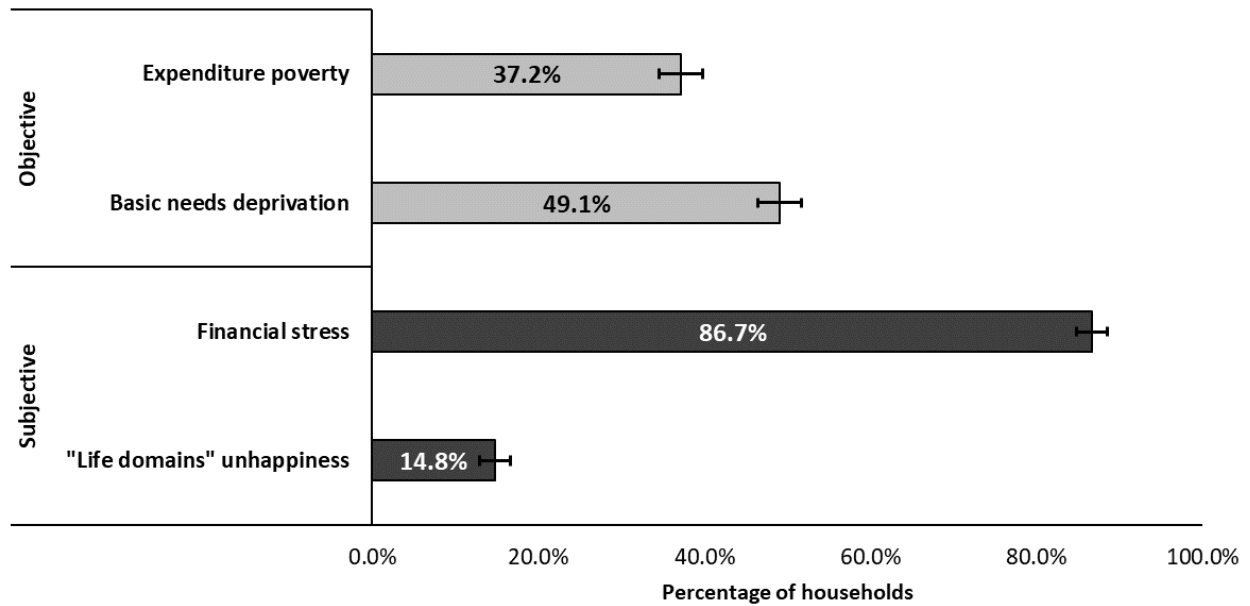
3. Results

This section presents the overall rates for the different wellbeing measures, followed by chi-square analysis results exploring associations between different wellbeing outcomes.

3.1 Wellbeing rates

Due to the measures containing different information, and being based on different conceptualisations from different disciplines, varying rates were produced (Laderchi et al., 2003). 506 households (37.2%) were classified as experiencing objective expenditure poverty, which is substantially lower than the proportion of households that self-defined as experiencing subjective financial stress (86.7%, $n=1,178$) (Figure 4). Basic needs deprivation rates were highly sensitive to weighting and threshold selection (Supplementary Material 3); however, when using nested weighting and a 50% second threshold, 667 households (49.1%) were classified as experiencing basic needs deprivation. Lastly, 202 households (14.8%) were grouped in the lowest life domains happiness cluster, and therefore defined as subjectively unhappy.

Figure 4. Calculated wellbeing rates, with 95% confidence intervals, for the two objective, and two subjective measures



3.2 Associations between wellbeing outcomes

This section presents the results of the chi-square association tests between the four calculated wellbeing measures (Table 2). Crosstabulations for each of the six association tests are presented in Supplementary Material 7.

Table 2. Test statistics and significance results⁺ for the six chi-square association tests between objective wellbeing (expenditure poverty and basic needs deprivation) and subjective wellbeing (financial stress and life domains unhappiness)

		Objective		Subjective	
Wellbeing measure		Expenditure poverty	Basic needs deprivation	Financial stress	Life domains unhappiness
Objective	Expenditure poverty				
	Basic needs deprivation	✘ (2.757*)			
Subjective	Financial stress	✓ (7.286***)	✘ (1.432)		
	Life domains unhappiness	✓ (6.571***)	✘ (0.075)	✓ (24.057***)	

Note. Significance defined at the 5% level.

Firstly, expenditure poverty associated with both subjective measures, with higher proportions of households experiencing subjective financial stress ($p < 0.01$) and unhappiness ($p < 0.01$) when

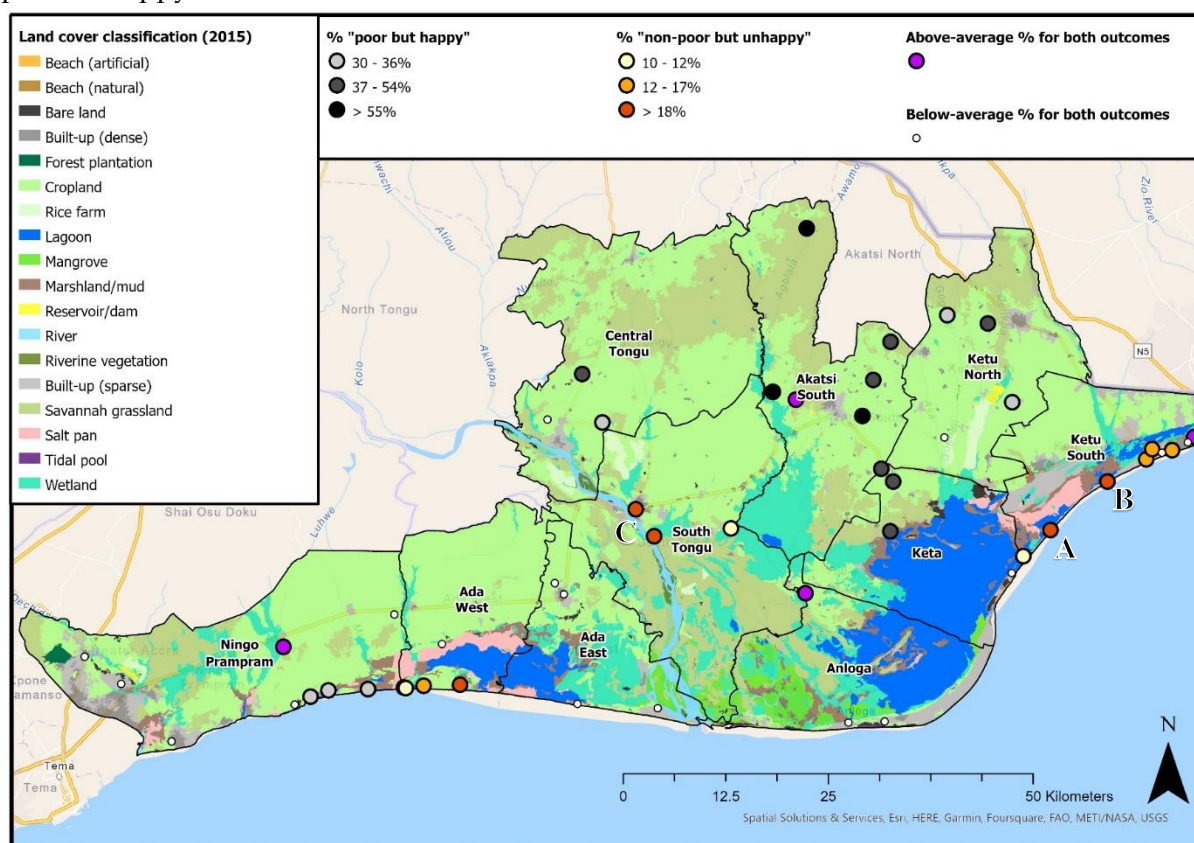
⁺ *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

in expenditure poverty. In contrast, basic needs deprivation did not associate with any other wellbeing measure at the 5% significance level. However, both subjective measures did significantly associate with one another, with a higher proportion of households defined as unhappy, when also experiencing financial stress ($p < 0.01$).

Despite finding significant associations between certain wellbeing measures, numerous households also opposed the general trends. Research exploring the varying mechanisms behind opposing OWB/SWB outcomes can support decisions to include various wellbeing measures when implementing and monitoring policy. This approach can help prevent policy from narrowly prioritising specific outcomes at the expense of other important components of “comprehensive” wellbeing (Copestake, 2008; White, 2016).

For example, 36% happy households experienced objective expenditure poverty, whereas 55% unhappy households were defined as objectively non-poor (Supplementary Material 7). These relationships also varied spatially, with sampled enumeration areas with higher proportions of “poor but happy” households predominantly located within inland rural areas, and “non-poor but unhappy” households primarily located within coastal and/or riverine peri-urban areas (Figure 5).

Figure 5. Landcover classifications (Jayson-Quashigah, 2016), alongside the proportion of households in each of the 50 sampled enumeration areas classified as “poor/happy” and “non-poor/unhappy”



Note. The graduated colours were defined using natural breaks. Communities with a proportion above the sample average are highlighted black/red. Communities “above-average” in both opposing outcomes are highlighted purple, whereas communities “below-average” for both outcomes are coloured white. Sites A-C referenced in discussion.

4. Discussion

Drawing on Böhnke & Kohler's (2010) contrasting theories, this study aimed to understand whether different conceptual and methodological measures of OWB and SWB align or oppose one another; applied within Volta Delta, Ghana. Our results found associations between different wellbeing measures; however, differences between wellbeing outcomes were also evident. Hereafter we use the association test results to frame conceptual discussions regarding the potential reasons for the significant and non-significant relationships, and the potential mechanisms behind households possessing opposing wellbeing outcomes.

4.1 Expenditure poverty (objective wellbeing) and financial stress (subjective wellbeing)

The significant association between expenditure poverty and subjective financial stress supports existing studies which show absolute financial capital to contribute towards subjective financial evaluations (Mahmood et al., 2019). However, substantial differences were recorded, with 85% of objectively non-poor households self-evaluating as financially stressed (n=724). This finding supports existing evidence in the wellbeing literature that individuals' self-defined poverty commonly exceeds objective rates (Haughton & Khandker, 2009). These opposing objective/subjective outcomes could be driven by individuals across the financial spectrum consistently aspiring for greater wealth, externally-derived objective poverty thresholds understating communities' requirements, or by financial stress being generated by fears of future financial instability, potentially due to uncertain climates, despite immediate objective impacts not being experienced (Bradshaw & Finch, 2003; Datt, 2002; Graham & Pettinato, 2006; Posel & Rogan, 2016; Sacks et al., 2010). Wellbeing by definition requires a "person [to be] aware of it and...make it a human experience" (Rojas, 2011;177); therefore, despite the significant association, substantial differences in the overall rates highlight the inadequacy of objective financial measures in capturing individuals' holistic wellbeing.

4.2 Expenditure poverty (objective wellbeing) and unhappiness (subjective wellbeing)

Expenditure poverty was also found to significantly associate with life domains unhappiness, supporting studies which show monetary resources to influence SWB in rural LMICs (Bookwalter & Dalenberg, 2004; Feeny et al., 2014; García-Quero & Guardiola, 2018; Kahneman & Deaton, 2010; Mahadea & Rawat, 2008; Mateu et al., 2020; Tauseef, 2022). Our results support claims that a "good life" in Ghana is "growth-orientated" (Osei-Tutu et al., 2020), and that the threshold in which money stops increasing happiness, defined by the Easterlin Paradox (Easterlin, 1974), may yet to have been reached amongst certain households in Volta Delta. However, future analysis which looks at objective and subjective relationships at different stages of the financial spectrum would be required to examine the Easterlin Paradox robustly. Nevertheless, qualitative research is needed to uncover the mechanisms behind this significant association, whether financial capital indirectly influences happiness, for example through access to key services such as healthcare (Arndt & Tarp, 2016), or directly, by creating social bonds (Dzokoto et al., 2019) and contributing towards life purpose or social status (Ward & King, 2016). Another plausible explanation for the association between the two measures could be that happier people are more employable and economically productive (Ravallion, 2015).

Nevertheless, numerous households countered the general relationship, with 82% (415/506) of objectively poor households categorised as happy (Supplementary Material 7). Exploring opposing outcomes underlines how, despite significant associations being recorded between OWB and SWB, the different conceptual measures are not interchangeable, and therefore may be

influenced by different mechanisms and require distinct policy interventions. Chi-square analysis is an exploratory method and does not capture causality. Therefore, interpreting opposing outcomes, including the spatial distribution, remains crucial in ensuring the relationship between OWB and SWB is not generalised over the entire study area.

The low OWB/high SWB households support the aforementioned “happy farmer” identity (Markussen et al., 2018), as the enumeration areas with the highest proportions of “poor but happy” households are located within inland cropland and grassland locations (Figure 5). This spatial pattern complements existing studies which suggest a disassociation between financial wellbeing and happiness in rural areas (Ayerakwa et al., 2015; Borrero et al., 2013; Knight et al., 2009; Mentzakis & Moro, 2009), where social capital, place attachment and remoteness from higher living standards, can buffer against the detrimental objective conditions (Dowling & Yap, 2012; Ravallion, 2014). Higher happiness levels, despite financial deprivation, may also emerge if poorer people have no choice but to place greater weight on non-material components such as family, autonomy and identity when defining their SWB (Layard & Layard, 2011). The latter is particularly relevant in agricultural and fishing communities where being able to work, live a moral life, be self-sufficient, master a skill, and fulfil social expectations within the community can bring increased status, pride and happiness (Brown et al., 2021; Deci & Ryan, 2012; Markussen et al., 2018; Miñarro et al., 2022; Ohemeng et al., 2020; Osei-Tutu et al., 2020; Oteng et al., 2021).

Regional differences in the poverty/happiness association further support this potential explanation. There was no significant association between expenditure poverty and life domains unhappiness in Volta Region households, which primarily contain crop farmers, whereas there was a significant association in Greater Accra Region, which contains more urbanised locations and a higher proportion of business and salaried employee livelihoods (Supplementary Material 8). This result supports studies which suggest communities within more built-up locations possess higher comparative reference points and place greater emphasis on financial success when conceptualising their own SWB (Guillen-Royo & Velazco, 2012). The focus on different landscape characteristics stems from the clear spatial pattern presented in Figure (5). However, multiple other factors, including social norms and governance structures, may also be influencing the opposing OWB/SWB in these areas. Overall, the different relationships across space emphasise the importance of exploring individual and context-specific influences on objective/subjective relationships.

When viewing the opposing objective/subjective relationship in the alternative direction, 13% (110/854) of objectively non-poor households were in the lowest cluster for life domains happiness (Supplementary Material 7). Figure (5) shows the highest concentrations of “non-poor and unhappy” households to be in peri-urban coastal areas near the Togo border (A & B) and the riverine district capital of Sogakope (C). Higher financial wellbeing in these locations may be due to a greater availability of non-primary livelihoods, such as construction/factory work and tourism industries (Sagoe-Addy & Addo, 2013), which offer more consistent income channels, and are less vulnerable to climatic risks than agricultural, rural livelihoods (Antwi-Agyei et al., 2018). Furthermore, access to large urban markets, such as Lomé (capital city of Togo), could improve the profitability of trading for coastal fishing communities. These opportunities could stem from the ability to choose the market, either Ghanaian or Togolese, which is offering livelihood inputs at the lowest cost, and selling fish products at higher prices (Béné & Friend, 2011; Bird et al., 2010).

However, despite potential objective benefits, several hypothesised mechanisms could be driving unhappiness in these communities: (i) formalised less-vulnerable livelihood options can

increase material aspirations, which if unmet can reduce happiness (Alem et al., 2014), (ii) lower social capital and trust in peri-urban areas could promote inequalities and individualistic wellbeing conceptualisations, which can increase relative comparisons to “better-off” households (Reyes-García et al., 2016; Tibesigwa et al., 2016), (iii) experience or fear of coastal climatic risks, such as flooding, can cause psychological damage and lower SWB (Sekulova & Van den Bergh, 2016), (iv) past state interventions, such as Livelihood Empowerment Against Poverty (LEAP) programmes in Sogakope, being removed without an effective exit plan can restrict long-term development goals and subsequently reduce happiness by creating a continued dependence upon state support (Karakara & Ortsin, 2022; Ohemeng et al., 2020; Osei-Tutu et al., 2020).

4.3 Expenditure poverty (objective wellbeing) and basic needs deprivation (objective wellbeing)

The non-significant association between expenditure poverty and basic needs deprivation challenges utility theory, where realised financial security facilitates access to essential needs through market transactions (Rasool et al., 2011). The decomposable nature of the multidimensional basic needs deprivation measure (Alkire & Foster, 2011) facilitates further supporting analysis to aid the interpretation of the overarching non-significant association. Chi-square association tests between expenditure poverty and the individual deprivation indicators are presented in Supplementary Material (6).

The non-significant association also opposes the hypothesised bidirectional relationship, where access to basic needs can improve objective financial wellbeing. For example, the non-significant association between expenditure poverty and the individual deprivation indicator relating to “safe latrine access” (Supplementary Material 6), opposes ideas that improved sanitation can increase financial wellbeing by reducing health issues, such as cholera (Mireku-Gyimah et al., 2018; Osumanu et al., 2019), which could otherwise decrease the number of economically active household members (Atiglo, 2017; Serdeczny et al., 2017).

The absence of a significant association between the two measures also suggests that basic needs are ends in themselves, and are not an interchangeable reflection of financial security. For example, an underrepresentation of homeownership amongst the objectively non-poor (Supplementary Material 6), could reflect the high rent costs, large collateral requirements for mortgages in built-up areas, and the preference for outright ownership of self-constructed dwellings in poorer rural areas (Parby et al., 2015). Furthermore, less than expected objectively poor households expend >60% on food (measure of financial/food security), which suggests basic needs can be fulfilled through non-market channels such as reciprocal trading and subsistence farming (Corazzini et al., 2011; Haughton & Khandker, 2009; Ng & Diener, 2014). Non-significant associations between expenditure poverty and the individual deprivations incorporated within the basic needs measure could also reflect the difference between “potential” and “realised” wellbeing (Sen, 2005). For example, the non-significant association between expenditure poverty and education deprivation (Supplementary Material 6) could reflect inadequate transport infrastructure restricting access to schools, regardless of objective wealth (Addo et al., 2018).

4.4 Basic needs deprivation (objective wellbeing) and financial stress/unhappiness (subjective wellbeing)

Similarly, basic needs deprivation did not significantly associate with either subjective outcome. This result challenges the general assumption that basic needs fulfilment constitutes the foundation of SWB in LMICs (Bull et al., 2010; Diener et al., 2010; Drakopoulos, 2008; Guillen-Royo et al., 2013; Nanor et al., 2021). One possible explanation is that subjective financial stress and unhappiness are more influenced by relative comparisons to other households, or past points in time, than by objective resources and skills (Kangmennaang & Elliott, 2019; Kangmennaang et

al., 2019). Another hypothesis relates to the varying mechanisms impacting different wellbeing outcomes within different contexts. For example, remote rural communities, distant from district capitals, may have restricted access to basic needs such as education and healthcare, yet alternatively the greater distance from urban areas with higher living standards could result in lower material aspirations (Ravallion, 2014); therefore, reducing relative comparability in the community and the consequent negative impacts upon SWB.

The non-significant association between basic needs deprivation and the SWB measures could also relate to how different types of information are captured, and how individuals possess different ideas as to what constitutes “a good life” (Dzokoto et al., 2019). For example, the basic need of education may not be a priority for certain communities when defining their SWB if their happiness is driven by fulfilling their intergenerational, socially obligated livelihood roles (Brown et al., 2021; Dowling & Yap, 2012). This theory highlights the possible limitation of using pre-defined basic needs within wellbeing measures, and the benefit of using community-preference weightings to ensure the basic needs measure more-accurately reflects communities’ priorities and subjective interpretations of “wellbeing”. Community-preference weighting can also overcome methodological challenges when wellbeing outcomes are highly sensitive to weighting choice (Decancq & Lugo, 2013) (Supplementary Material 3).

4.5 Financial stress (subjective wellbeing) and unhappiness (subjective wellbeing)

The two subjective measures, financial stress and life domains unhappiness, are also significantly associated. This finding supports evidence showing pessimistic financial outlooks, captured within financial stress, to reduce happiness by lowering social status, and inducing emotions of anger, shame, and envy (Fafchamps & Shilpi, 2008; Guillen-Royo, 2011; Kawachi et al., 1997; Knight & Gunatilaka, 2012; Kollamparambil, 2020; Wilkinson, 1997). However, our results could also suggest a bidirectional relationship, as happiness with certain domains, such as housing quality (Marks, 2007) and health (Wang et al., 2020), can lower financial stress by improving individuals’ perceived current financial status and future financial optimism. The significant relationship between the two subjective measures may also be driven by individuals’ underlying characteristics and personality traits contributing towards both outcomes (Voukelatou et al., 2021).

Despite the significant association, the overall incident rates of unhappiness (15%) and financial stress (87%) are substantially different, suggesting alternative processes or measurement biases could have influenced the subjective outcomes in different ways. For example, the lower levels of unhappiness could result from social desirability bias, where respondents are unwilling to share their struggles, and exaggerate positive affects (Reisinger, 2022), to maintain a favourable image in the community (White, 2016); particularly when acknowledging the pride associated with being happy in Ghana (Dzokoto, 2012). Alternatively, the high levels of financial stress may have resulted from survey respondents believing the enumerators worked for government or international development agencies, and therefore responses could have been exaggerated to receive greater support (Dosu, 2021; Frey & Gallus, 2013).

SWB is constructed within a specific time and space (White, 2010); therefore, local-specific factors may have also influenced the varying rates of financial stress and unhappiness. Dzokoto (2012) and Dzokoto et al. (2018, 2019) record multiple Ghanaian cultural traits which could support the interpretation of low “life domains” unhappiness in Volta Delta: (i) Akan cultural teachings showing life to consist of “ups and downs”, (ii) greater acceptance of external constraints, such as political or spiritual powers, minimising self-blame, contrasting high-income

countries such as USA, where there is a belief of limitless opportunities and agency, (iii) being tolerant, and finding alternative solutions, when faced with adversity due to “the social reality of little environmental control and slow socioeconomic and infrastructural development” (Dzokoto, 2012;318) (Box 1), (iv) laid back sense of time negates negative impacts from time pressures, (v) lower thresholds for a “good life”, such as the contentment with simply being alive; exemplified by the proverb; “if the head has not fallen off, you keep on putting a hat on it”. Further qualitative analysis within specific communities would be required to validate, or challenge, these cultural influences upon SWB in Volta Delta.

Box 1. A hypothetical conversation created by Dzokoto (2012;319) to symbolise the acceptance of social and environmental challenges in Ghana.

New to Ghana: I turned on the tap, and there was no water!

Ghanaian: Yes, the water isn't running.

New to Ghana: What do you mean the water isn't running?

Ghanaian: Like I said, the water isn't running.

New to Ghana: Well, why isn't the water running? Is there a water main break?

Ghanaian: No.

New to Ghana: Well, is there a drought or something?

Ghanaian: No.

New to Ghana: So then why isn't the water running?

Ghanaian: My friend, this is Ghana. Sometimes, the water runs, sometimes, it doesn't. That is how it is...Here, take this bucket. There is water in the tank around the corner.

The different incident rates of the two SWB measures underpins the importance of investigating different wellbeing measures, as outcomes are not interchangeable even within the same broad philosophical approach. The complex and multidimensional information incorporated within individuals' personal evaluations (Brüggen et al., 2017; Mahmood et al., 2019; Reyes-García et al., 2016; Wang et al., 2020) could also explain why there is greater disparity between the SWB measures, compared to the relative similarity of the OWB rates.

Different biases, and specific cultural tropes, could explain the different SWB rates; however, a significant association between the two measures suggests unhappy households are also more likely to experience subjective financial stress.

5. Conclusion

Understanding different concepts of wellbeing, and how they associate, is a crucial component of sustainable development research to ensure policies target comprehensive wellbeing improvements within vulnerable communities (Helne & Hirvilammi, 2015). Wellbeing is understood differently across disciplines, however there is no requirement for a consensus on how wellbeing is defined. Rather, a multidisciplinary approach which draws on different ideas of wellbeing is favourable to overcome the constraints of singular approaches (Addison et al., 2008; Nunan, 2015), and ensure more holistic improvements to individuals' and communities' lives (Vazonienė 2014). The need for this approach is illustrated by the non-significant association between the two OWB measures, despite existing within the same overarching philosophical category. Regardless, wellbeing studies need to be transparent, and critically evaluate the methodological choices and their limitations (Haughton & Khandker, 2009). This

paper briefly touches on the methodological decisions made when measuring OWB and SWB, while alluding to the need for flexible methodologies depending on the research context. For example, the preferential use of expenditure data rather than income, and the use of an “adequacy” rather than a “minimum amount” approach, when measuring objective financial wellbeing and subjective financial stress within LMIC environments with informal, seasonal employment, and non-monetary payments (Atkinson, 2019).

Our comparative analysis highlighted significant associations between expenditure poverty, financial stress and unhappiness, whereas basic needs deprivation did not significantly associate with any other measure. Additionally, across all four measures, large proportions of households possessed unaligned wellbeing outcomes, suggesting different wellbeing measures are not interchangeable, and that wellbeing studies using single measures may risk excluding additional crucial information. For example, non-significant associations between basic needs deprivation and both subjective outcomes challenge the assumption that fulfilling absolute needs and skills controls happiness and self-defined financial stress within LMICs. This finding suggests policy interventions which target wellbeing solely through a basic needs approach may generate a “false simplicity” (Ghai, 1978), where increased service access or material assets are wrongly assumed to translate into SWB benefits, and therefore further interventions would be required.

Many households also experienced subjective financial stress despite being objectively non-poor, whilst other objectively poor households experienced high happiness. These results suggest OWB and SWB outcomes have different underlying mechanisms. For example, “poor but happy” households may cope with financial insecurity and maintain higher SWB through the use of social capital, such as family relationships, community trust, and the fulfilment of social obligations. Overall, this study highlighted the importance of investigating both OWB and SWB outcomes within sustainable development research, rather than assuming singular outcomes within siloed disciplines holistically capture wellbeing.

This paper expands the understanding of how OWB and SWB interrelate within a vulnerable context. Global deltas are vulnerable to a multitude of social, economic, political and environmental pressures (Nicholls et al., 2020); therefore, the information presented in this paper can provide an important prerequisite for future research into how these different contextual challenges influence the relationship between different wellbeing conceptualisations. Despite focusing on a single case study site meaning results are not necessarily generalisable, the methodologies for calculating and comparing wellbeing outcomes are applicable in other contexts. Furthermore, this study highlights the importance of understanding the conceptualisation of wellbeing, prior to applying policy within sustainable development. By illustrating different wellbeing measures to associate, yet not be interchangeable, this study advocates for including SWB measures, alongside objective measures, when implementing and monitoring policy at multiple scales.

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Ethical approval

Ethical approval for this study was received from the University of Southampton (ERGO ID: 67535).

Authorship

All authors contributed to the design and review of the paper. Laurence Cannings was responsible for the conceptualisation of the paper, data curation, formal analysis and writing the original draft. Craig Hutton, Alessandro Sorichetta and Kristine Nilsen supervised the project, and also reviewed and edited the final manuscript.

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Data deposition information

The DECCMA household survey dataset is openly available at Mendeley Data (<https://data.mendeley.com/datasets/223z53kwnm/1>).

The land cover classification data is also openly available at Delta-Portal (<https://www.delta-portal.net/geonetwork/srv/eng/catalog.search;jsessionid=17A16671A3C85ABEA1519F9C670B57E4#/metadata/86b279b8-3cc9-4584-a8bd-9d4300a028df>)

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