To address your question, let's first clarify the concept of a group in mathematics, and then discuss whether the set of natural numbers under addition and multiplication qualifies as a group.

### Definition of a Group

A group is a mathematical structure consisting of a set of elements together with an operation that combines any two of its elements to form another element of the set. This structure must satisfy four fundamental properties:

1. Closure: For any elements \( a \) and \( b \) in the set, the result of the operation \( a \times b \) (or \( a + b \) depending on the operation) is also in the set.

2. Associativity: For any elements \( a \), \( b \), and \( c \) in the set, the equation \( (a \times b) \times c = a \times (b \times c) \) (or \( (a + b) + c = a + (b + c) \) for addition) holds.

3. Identity Element: There exists an element \( e \) in the set such that for every element \( a \) in the set, the equation \( e \times a = a \times e = a \) (or \( e + a = a + e = a \) for addition) holds.

4. Inverse Element: For every element \( a \) in the set, there exists an element \( b \) in the set such that \( a \times b = b \times a = e \) (or \( a + b = b + a = e \) for addition), where \( e \) is the identity element.

### Natural Numbers under Addition

The set of natural numbers \( \mathbb{N} = \{0, 1, 2, 3, \ldots\} \) under addition:

- Closure: Yes, the sum of any two natural numbers is a natural number.

- Associativity: Yes, addition of natural numbers is associative.

- Identity Element: Yes, the identity element is 0, as \( 0 + n = n + 0 = n \) for any natural number \( n \).

- Inverse Element: No, except for 0, no other natural number has an additive inverse within the set of natural numbers. For instance, there is no natural number \( n \) such that \( 1 + n = 0 \).

### Natural Numbers under Multiplication

The set of natural numbers under multiplication:

- Closure: Yes, the product of any two natural numbers is a natural number.

- Associativity: Yes, multiplication of natural numbers is associative.

- Identity Element: Yes, the identity element is 1, as \( 1 \times n = n \times 1 = n \) for any natural number \( n \).

- Inverse Element: No, except for 1, no other natural number has a multiplicative inverse within the natural numbers. For instance, there is no natural number \( n \) such that \( 2 \times n = 1 \).

### Conclusion

The set of natural numbers is not a group under either addition or multiplication. While both operations satisfy closure, associativity, and have identity elements, the lack of inverse elements for all members of the set (other than the identity itself) in both cases prevents \( \mathbb{N} \) from being a group under these operations.

Thus, to have a group structure with either of these operations, one needs to consider a broader set such as the integers \( \mathbb{Z} \) for addition, where every element indeed has an inverse, making \( \mathbb{Z} \) a group under addition.